

M-Series Instrument Performance Report

Q.A. APPROVED

S/O#: 19327

Customer: MASSACHUSETTS INST. OF TECH.

Model: #1250 M

Serial: 0158

Date: 06/19/02

Engineer: N. I.

All Inspection and Test Criteria:

PASS / FAIL



3880 Park Ave • Edison, NJ 08820 USA • Phone 732-494-8660 • Fax 732-549-5125

GRATING(S)

Grooves\mm 1800
Blaze 400 nm
Serial No. 295853
Turret 1 SIDE A

Grooves\mm 3600
Blaze 225-500 nm
Serial No. 295852
Turret 1 SIDE B

Grooves\mm 2400
Blaze 400 nm
Serial No. 296607
Turret 2 SIDE A

Grooves\mm 300
Blaze 600 nm
Serial No. 295855
Turret 2 SIDE B

Grooves\mm _____
Blaze _____
Serial No. _____
Turret _____

Grooves\mm _____
Blaze _____
Serial No. _____
Turret _____

RESOLUTION

The resolution of an instrument is determined by measuring the width of a peak at half of its total height above the baseline. The smaller the number, the better the resolution. All instrument specifications are based on a 1200 groove/mm grating. Different groove density gratings will yield proportional resolution based on the formula:

$$RES_{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}} = RES_{\substack{1200 \\ \text{Groove} \\ \text{Density}}} \times \frac{1200}{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}}$$

This formula can be applied to other specifications presented in this test report.

(TEST) GRATING
 Grooves/mm: 1200
 Blaze: 750 nm

ENTRANCE SLIT

Location: Axial / Lateral
 Width: 6 μm
 Height: 2 mm

EXIT SLIT

Location: Axial / Lateral
 Width: 6 μm
 Height: — mm

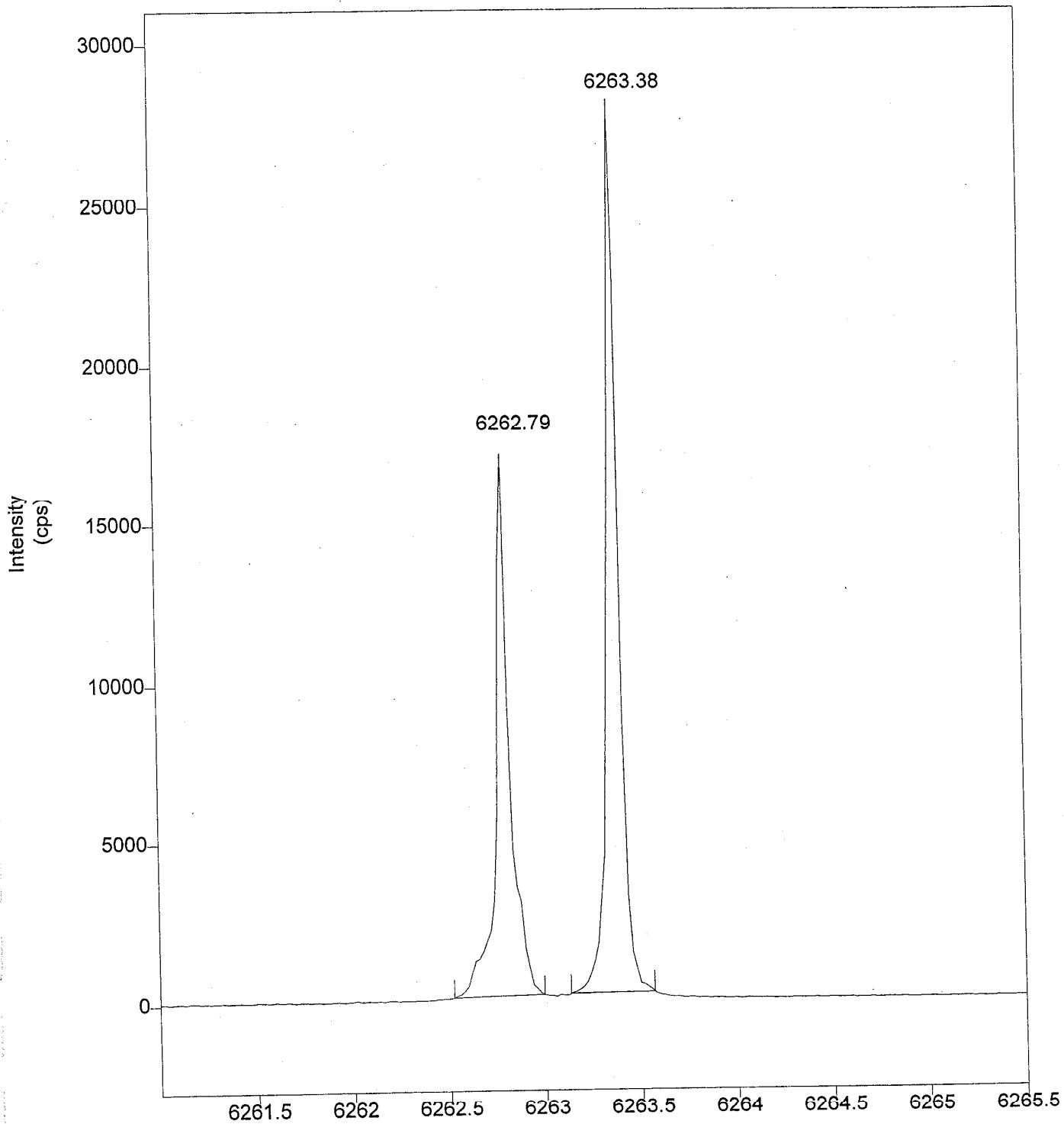
SCAN PARAMETERS

Wavelength: 3131.55 (A) nm / cm⁻¹ Order: 2nd

From: 6261 (A) nm / cm⁻¹
 To: 6265.5 (A) nm / cm⁻¹

Step Increment: 0.02 (A) nm / cm⁻¹ Integration Time: 0.100 sec.

Resolution: 0.055 A^o Specification: ≤ 0.060 A^o



File # 1 = MIT12A1

Wavelength (Ang)

[View All](#)

3131.55 2ND ORDER 1200/750NM

Res. = 0.055 A

(TEST GRATING)

RESOLUTION

The resolution of an instrument is determined by measuring the width of a peak at half of its total height above the baseline. The smaller the number, the better the resolution. All instrument specifications are based on a 1200 groove/mm grating. Different groove density gratings will yield proportional resolution based on the formula:

$$RES_{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}} = RES_{\substack{1200 \\ \text{Groove} \\ \text{Density}}} \times \frac{1200}{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}}$$

This formula can be applied to other specifications presented in this test report.

(TEST) GRATING

Grooves/mm: 1200

Blaze: 750 NM

ENTRANCE SLIT

Location: Axial / Lateral
Width: 6 μm
Height: 2 mm

EXIT SLIT

Location: Axial / Lateral
Width: 6 μm
Height: mm

SCAN PARAMETERS

Wavelength: 3131.55 (A) nm / cm⁻¹ Order: 3RD

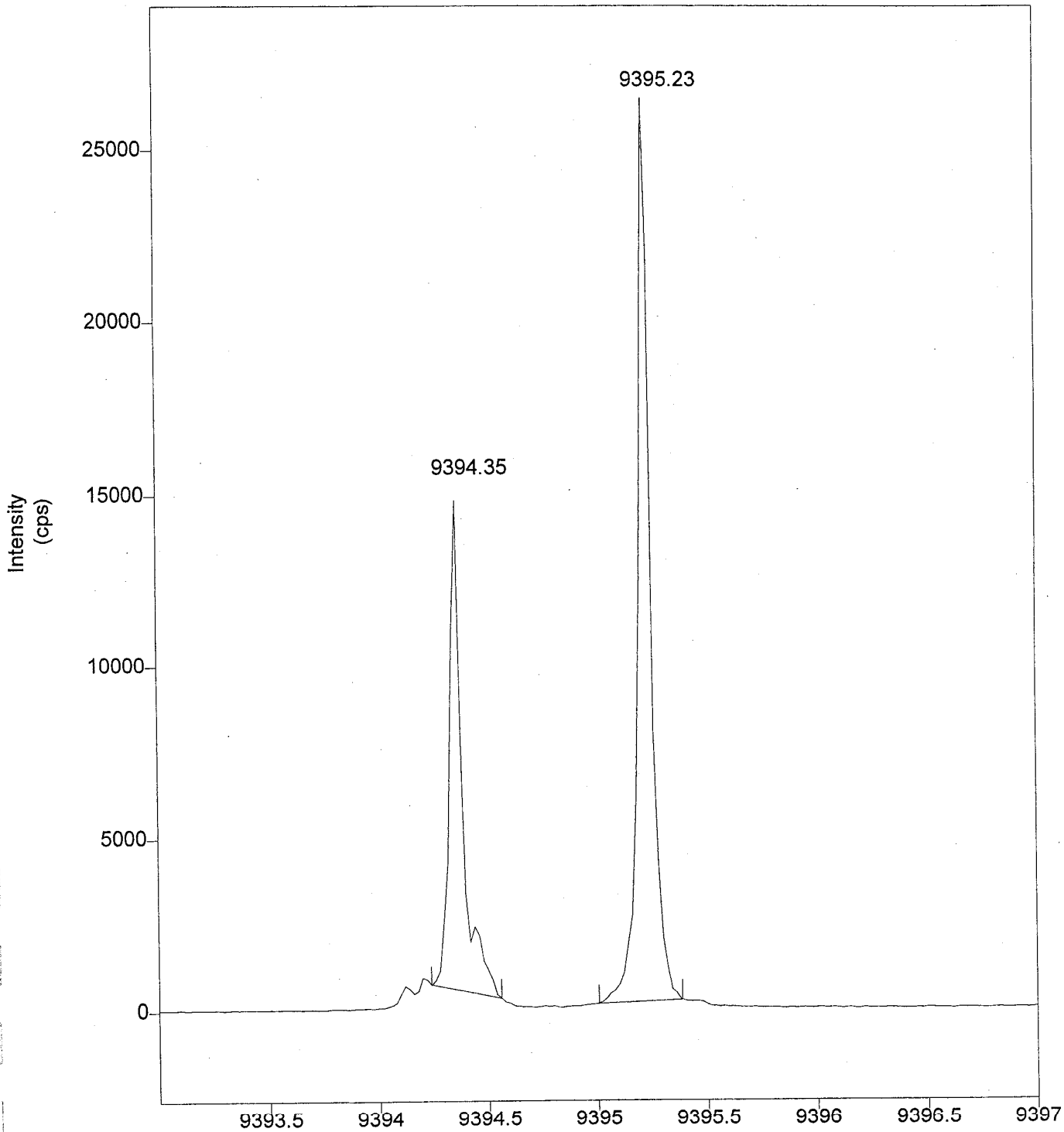
From: 9393 (A) nm / cm⁻¹

To: 9397 (A) nm / cm⁻¹

Step Increment: 0.02 (A) nm / cm⁻¹ Integration Time: 0.100 sec.

Resolution: 0.050 (A)

Specification: ≤ 0.060 (A)



File # 1 = MIT12B1

Res. = 0.050 A

Wavelength (Ang)

3131.55 3RD ORDER 1200/750NM

(TEST GRATING)

View All

LINEARITY

The linearity of an instrument is a measurement of its accuracy over its operating range. It is a test of the mechanics that move the grating during a scan. By tracking the position of peaks from a known light source, the drive mechanism is adjusted so that known peaks are detected at the proper locations (\pm tolerances) throughout the working span of the monochromator.

(TEST) GRATING
 Grooves/mm: 1200
 Blaze: 750nm

LIGHT SOURCE: Hg LAMP

ENTRANCE SLIT
 Location: Axial
 Width: 6 μm
 Height: 2 μm

EXIT SLIT
 Location: Axial
 Width: 6 μm
 Height: μm

DRIVE CALIBRATION

(A) $\text{nm} / \text{cm}^{-1}$

Theoretical Wavelength	Order	Theoretical Occurrence	Actual Occurrence	Linearity Error (Δ)
2536.520	1 ST	2536.520	2536.790	+0.270
4046.560	1 ST	4046.560	4046.520	-0.040
5460.740	1 ST	5460.740	5460.550	-0.190
3131.550	2 ND	6263.100	6262.810	-0.290
4358.350	2 ND	8716.700	8716.400	-0.300
3131.550	3 RD	9394.650	9394.440	-0.210
5460.740	2 ND	10921.480	10921.630	+0.150

Specification: $\pm 0.500\text{A}$ ⁰

RESOLUTION

The resolution of an instrument is determined by measuring the width of a peak at half of its total height above the baseline. The smaller the number, the better the resolution. All instrument specifications are based on a 1200 groove/mm grating. Different groove density gratings will yield proportional resolution based on the formula:

$$RES_{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}} = RES_{\substack{1200 \\ \text{Groove} \\ \text{Density}}} \times \frac{1200}{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}}$$

This formula can be applied to other specifications presented in this test report.

GRATING

Grooves/mm: 1800
Blaze: 400 NM

ENTRANCE SLIT

Location: Axial / Lateral
Width: 3 μm
Height: 2 mm

EXIT SLIT

Location: Axial / Lateral
Width: 3 μm
Height: mm

SCAN PARAMETERS

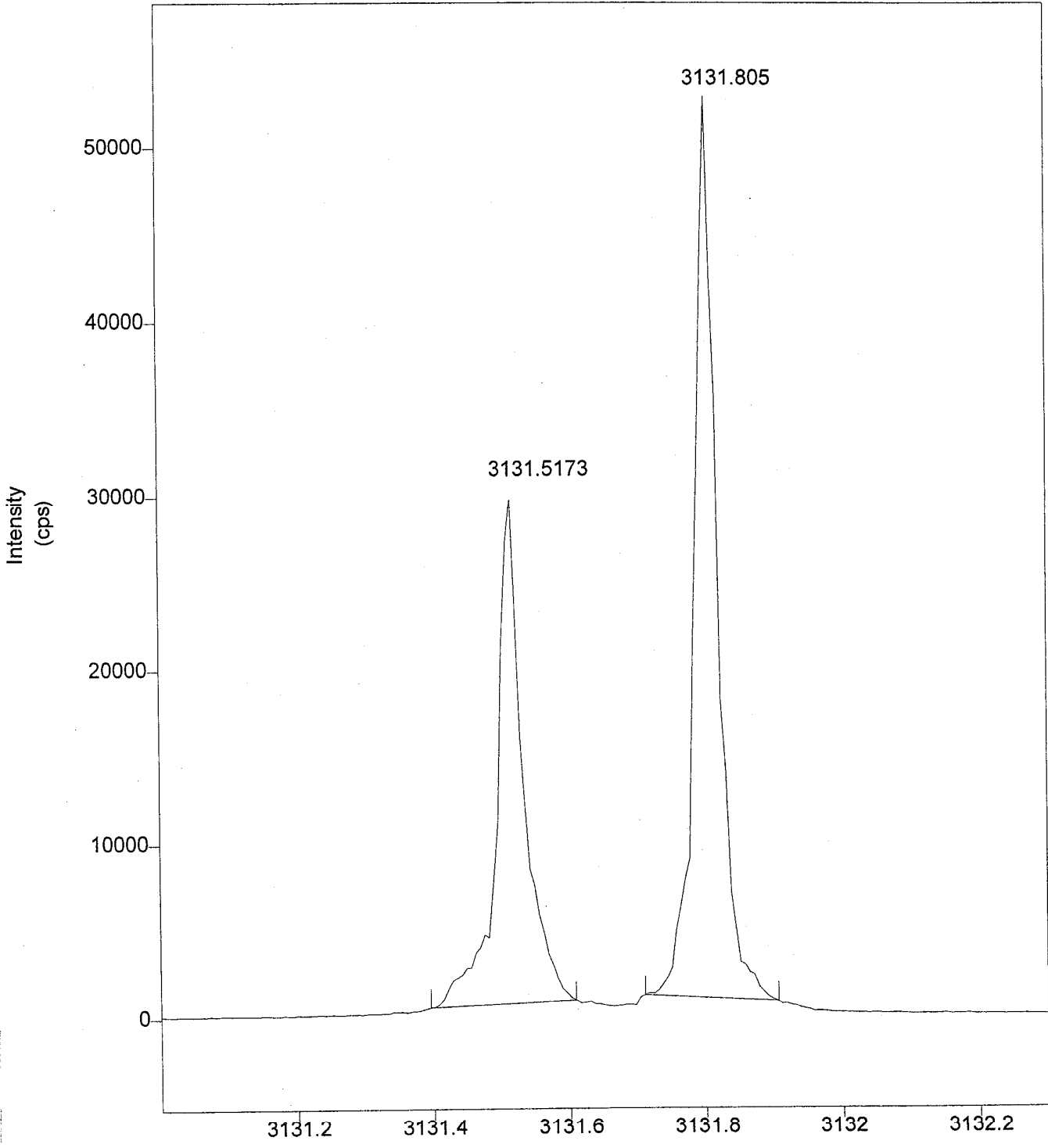
Wavelength: 3131.55 (A) nm / cm⁻¹ Order: 1ST

From: 3131 (A) nm / cm⁻¹
To: 3131.3 (A) nm / cm⁻¹

Step Increment: 0.00667 (A) nm / cm⁻¹ Integration Time: 0.100 sec.

Resolution: 0.032^D A

Specification: ≤ 0.0399 A^o



File # 1 = MIT1800

Wavelength (Ang)

View All

Res. = 0.032 A

3131.55 1ST ORDER 1800/400NM

RESOLUTION

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$$RES_{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}} = RES_{\substack{1200 \\ \text{Groove} \\ \text{Density}}} \times \frac{1200}{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}}$$

This formula can be applied to other specifications presented in this test report.

GRATING

Grooves/mm: 3600
Blaze: 225-500NM

ENTRANCE SLIT

Location: Axial / Lateral
Width: 3 μm
Height: 2 mm

EXIT SLIT

Location: Axial / Lateral
Width: 3 μm
Height: — mm

SCAN PARAMETERS

Wavelength: 3131.55 \AA / cm^{-1} Order: 1st

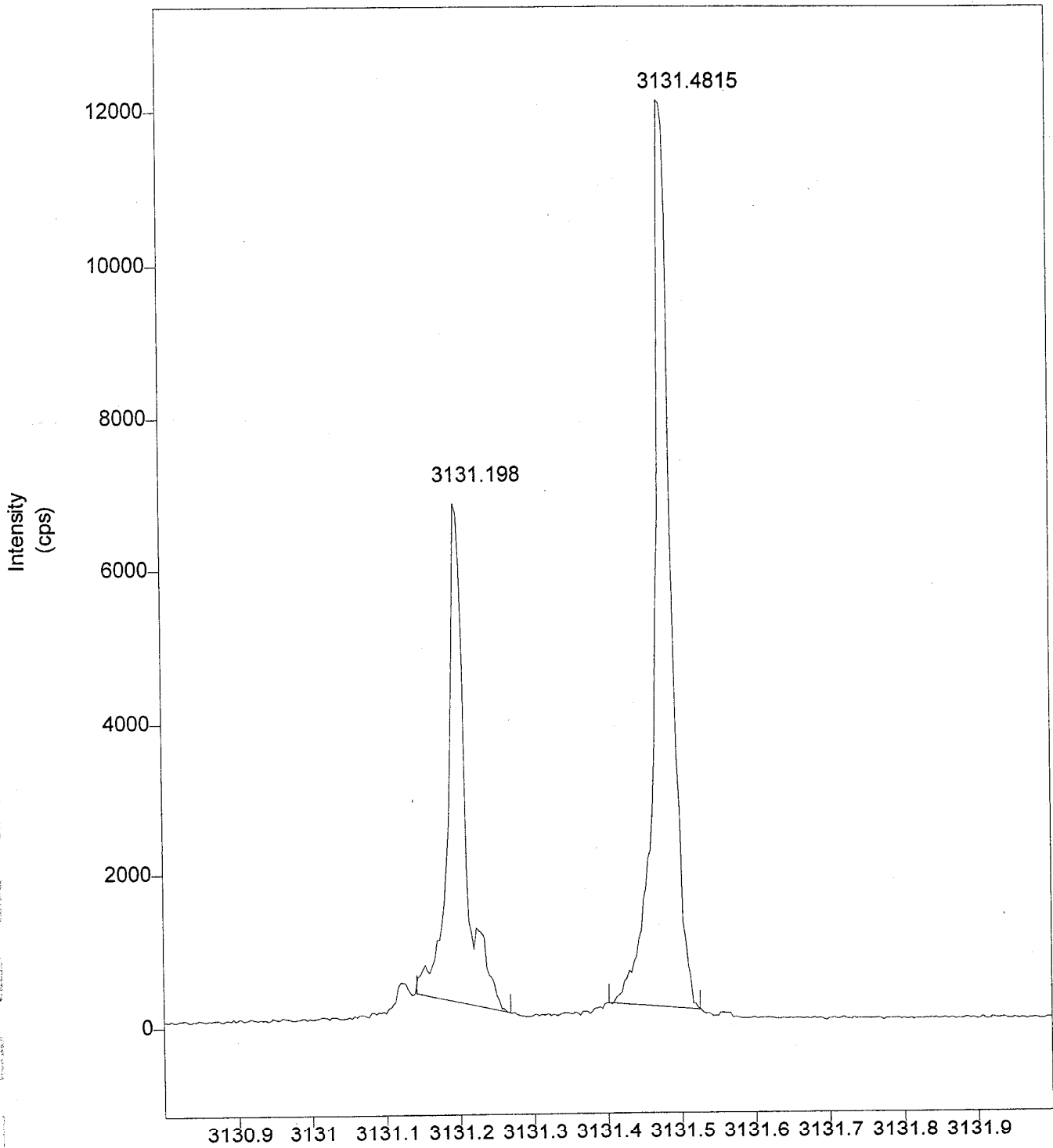
From: 3130.8 \AA / cm^{-1}

To: 3132 \AA / cm^{-1}

Step Increment: 0.0033 \AA / cm^{-1} Integration Time: 0.100 sec.

Resolution: 0.019⁰ \AA

Specification: $\leq 0.019^0$ \AA



File # 1 = MIT3600

Wavelength (Ang)

[View All](#)

Res. = 0.019 A

3131.55 1ST ORDER 3600/225-500NM

RESOLUTION

The resolution of an instrument is determined by measuring the width of a peak at half of its total height above the baseline. The smaller the number, the better the resolution. All instrument specifications are based on a 1200 groove/mm grating. Different groove density gratings will yield proportional resolution based on the formula:

$$RES_{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}} = RES_{\substack{1200 \\ \text{Groove} \\ \text{Density}}} \times \frac{1200}{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}}$$

This formula can be applied to other specifications presented in this test report.

GRATING

Grooves/mm: 2400
Blaze: 400NM

ENTRANCE SLIT

Location: Axial / Lateral
Width: 3 μm
Height: 2 mm

EXIT SLIT

Location: Axial / Lateral
Width: 3 μm
Height: — mm

SCAN PARAMETERS

Wavelength: 3131.55 \AA nm / cm^{-1} Order: 1ST

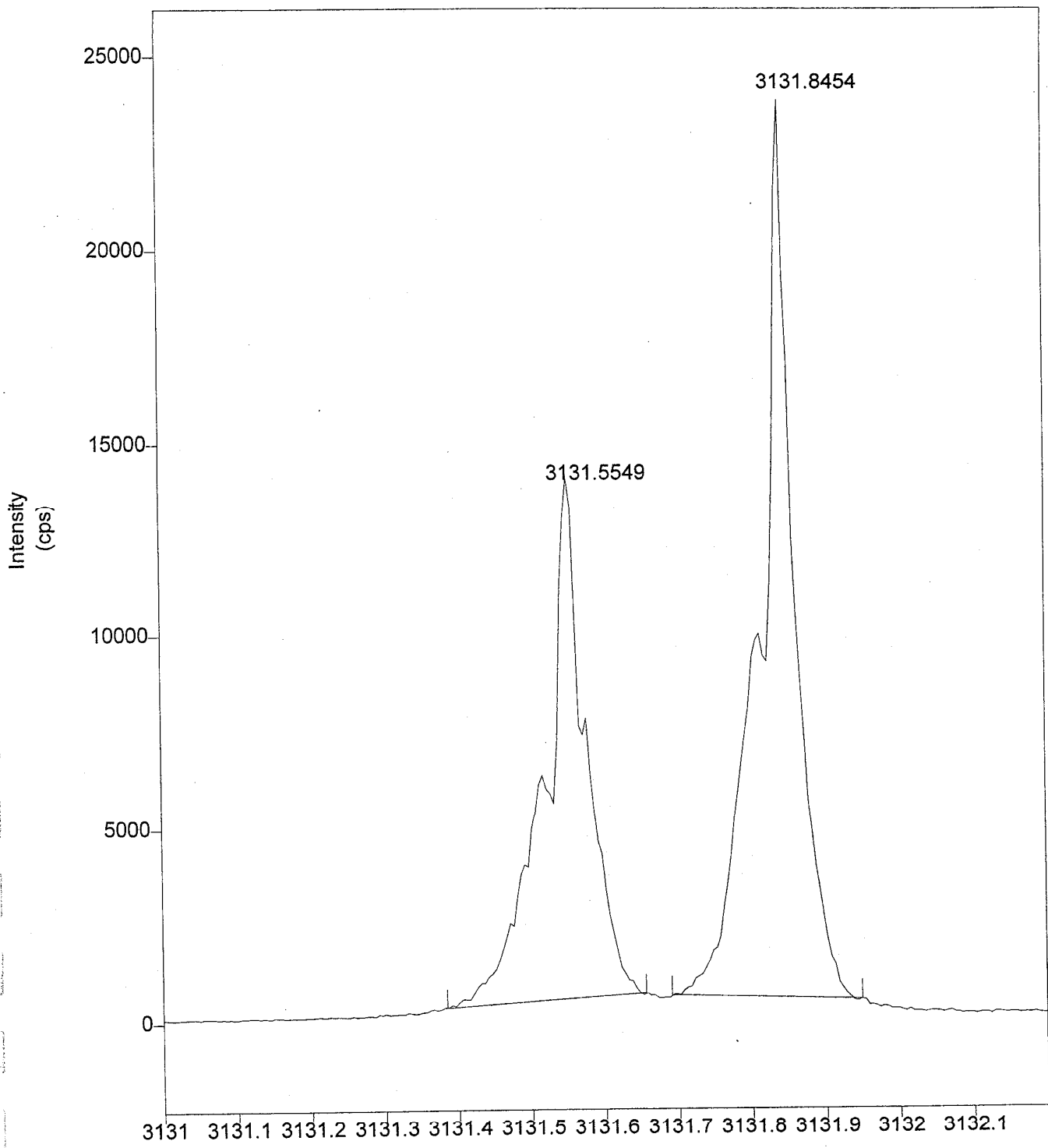
From: 3131 \AA nm / cm^{-1}

To: 3132.2 \AA nm / cm^{-1}

Step Increment: 0.005 \AA nm / cm^{-1} Integration Time: 0.100 sec.

Resolution: 0.029 \AA

Specification: ≤ 0.030 \AA



File # 1 = MIT2400

Wavelength (Ang)

View All

Res. = 0.029 A

3131.55 1ST ORDER 2400/400NM

RESOLUTION

The resolution of an instrument is determined by measuring the width of a peak at half of its total height above the baseline. The smaller the number, the better the resolution. All instrument specifications are based on a 1200 groove/mm grating. Different groove density gratings will yield proportional resolution based on the formula:

$$RES_{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}} = RES_{\substack{1200 \\ \text{Groove} \\ \text{Density}}} \times \frac{1200}{\substack{\text{Actual} \\ \text{Groove} \\ \text{Density}}}$$

This formula can be applied to other specifications presented in this test report.

GRATING

Grooves/mm: 300
Blaze: 600 NM

ENTRANCE SLIT

Location: Axial / Lateral
Width: 3 μm
Height: 2 mm

EXIT SLIT

Location: Axial / Lateral
Width: 3 μm
Height: — mm

SCAN PARAMETERS

Wavelength: 3131.55 \AA nm / cm^{-1} Order: 2ND

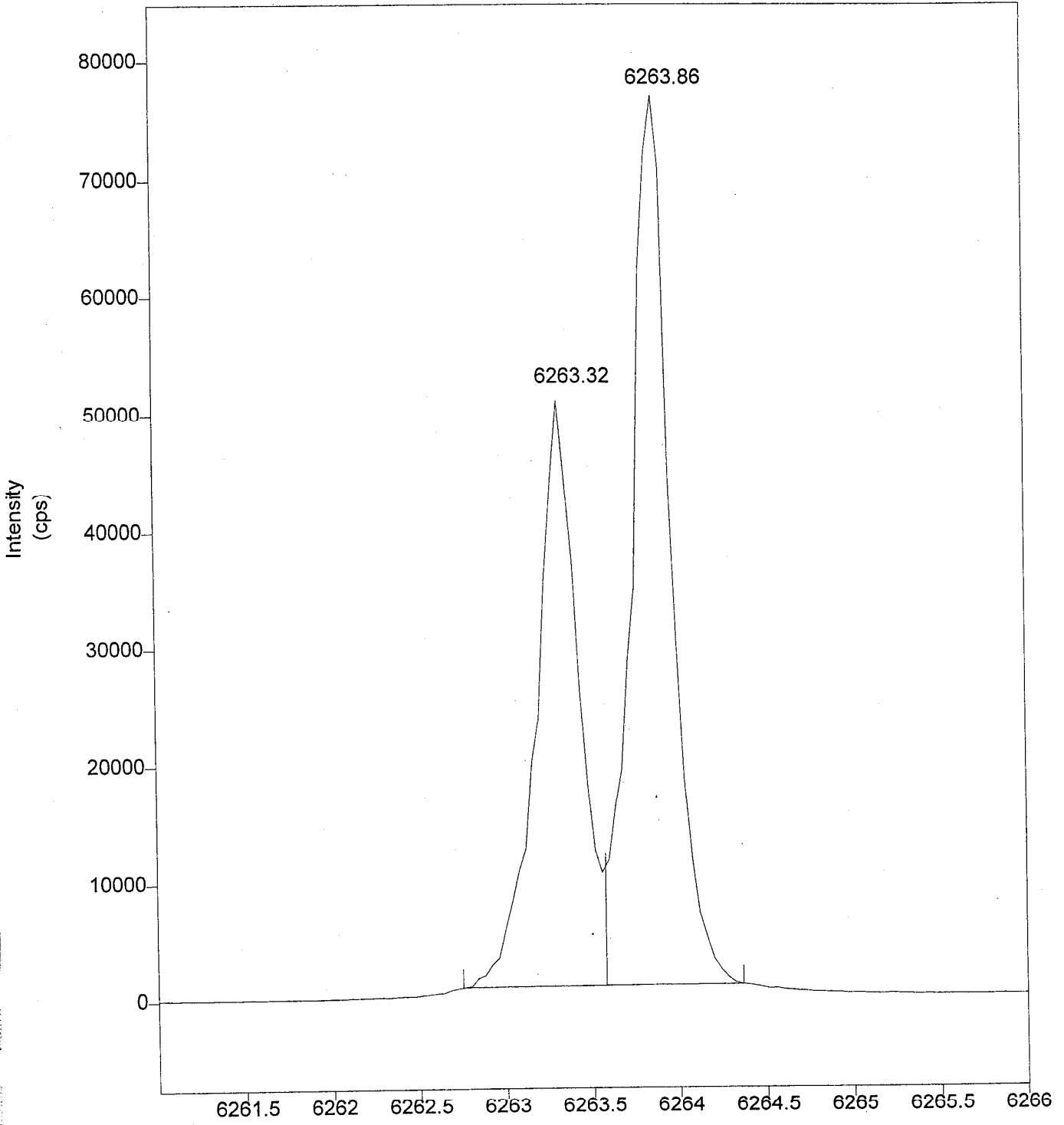
From: 6261 \AA nm / cm^{-1}

To: 6266 \AA nm / cm^{-1}

Step Increment: 0.040 \AA nm / cm^{-1} Integration Time: 0.100 sec.

Resolution: 0.210⁰ \AA

Specification: $\leq 0.240⁰$ \AA



File # 1 = MIT300

Res. = 0.21 A

Wavelength (Ang)

3131.55 2ND ORDER 300/600NM

View All

REPEATABILITY

Repeatability testing ensures that from any starting point, the drive will reproduce a wavelength scan the same every time (\pm tolerances). Typically, the drive is moved to 700 nm then scanned from 542 to 550 nm where a known peak occurs. The procedure is repeated after moving the drive to 200, 600, and 400 nm before scanning.

(TEST) GRATING

Grooves/mm: 1200
Blaze: 750nm

ENTRANCE SLIT

Location: Axial
Width: 4 μm
Height: 2 mm

EXIT SLIT

Location: Axial
Width: 6 μm
Height: mm

SCAN PARAMETERS

Wavelength: 5460.740 (A) nm / cm⁻¹ Order: 1ST

From: 5459 (A) nm / cm⁻¹

To: 5462 (A) nm / cm⁻¹

Step Increment: 0.020 (A) nm / cm⁻¹ Integration Time: 0.100 sec.

SCAN

(A) nm / cm⁻¹

First Scan: 5460.77

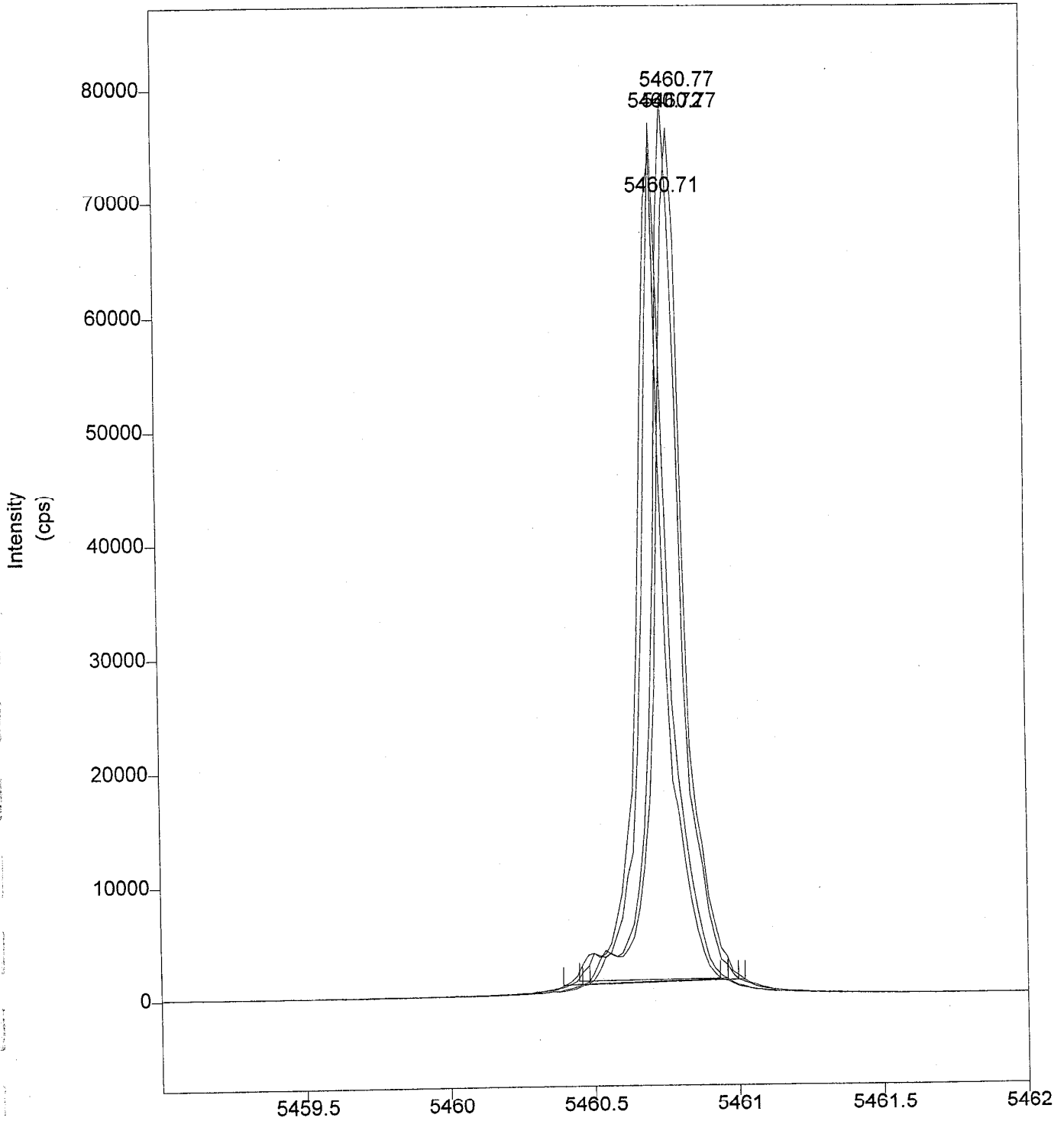
Second Scan: 5460.72

Third Scan: 5460.77

Fourth Scan: 5460.71

Deviation: $\pm 0.030 \text{ \AA}$

Specification: $\pm 0.050 \text{ \AA}$



File # 4 = DREP4

Deviation = +/- 0.030 A

Wavelength (Ang)

DRIVE REPEATABILITY TEST

(1200/750NM TEST GRATING)

View All

LIGHT LEAK

All instruments are made to be as light-tight as possible. Stray light can cause the baseline of a spectrum to rise. Before testing, each instrument is sealed as it would be normally. A scan is then tested from 0 nm to the end of the drive range in dark. This scan is repeated with the room lights on.

(TEST) GRATING

Grooves/mm: 1200
Blaze: 750 nm

ENTRANCE SLIT

Location: Axial
Width: φ μm
Height: φ mm

EXIT SLIT

Location: Axial
Width: 2000 μm
Height: — mm

SCAN PARAMETERS

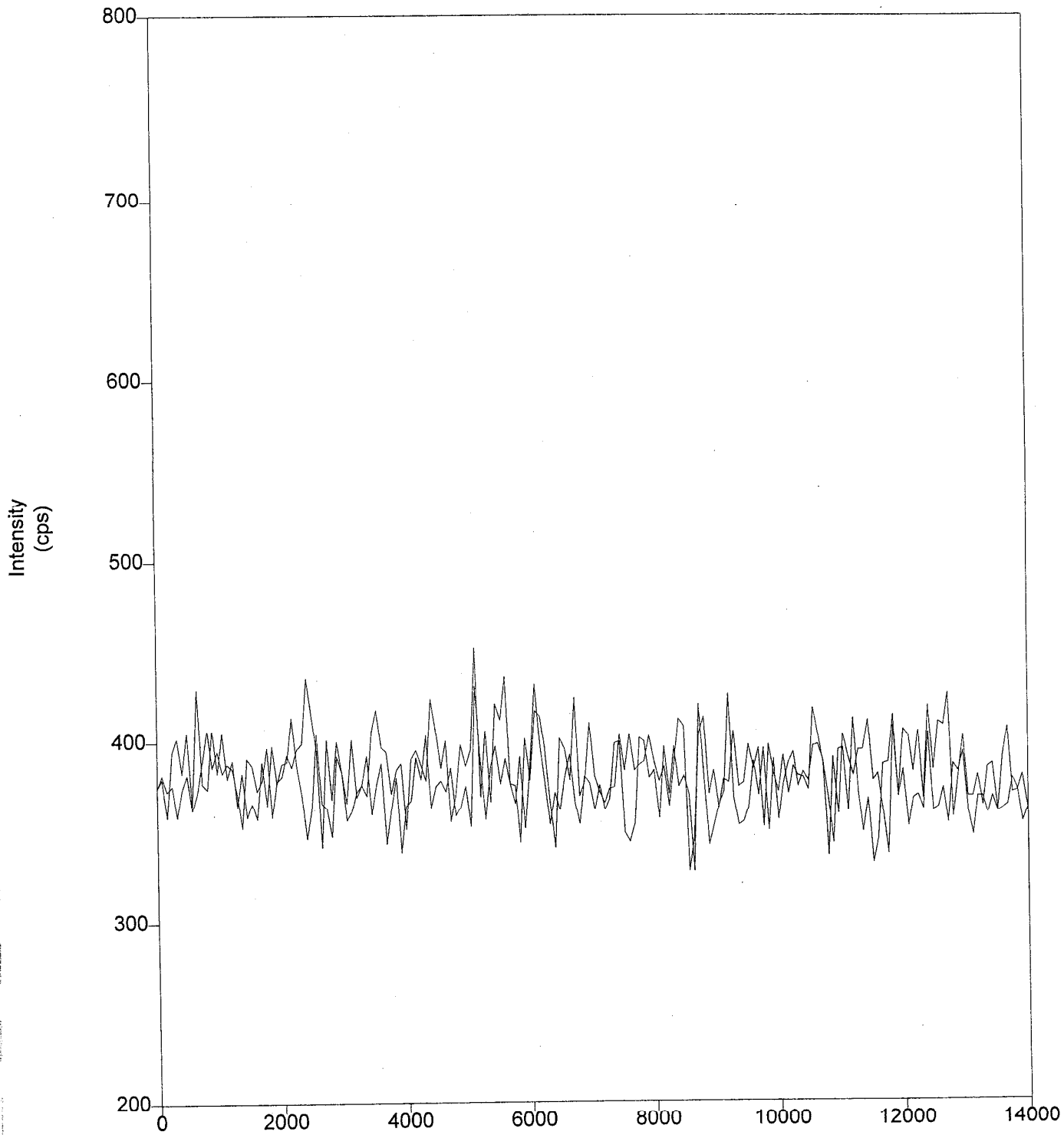
Wavelength: N/A A / nm / cm⁻¹ Order: N/A

From: φ (A) nm / cm⁻¹
To: 14000 (A) nm / cm⁻¹

Step Increment: 80 (A) nm / cm⁻¹ Integration Time: 1.0 sec.

SCANS

Wavelength of Largest Deviation: 2400⁰ A
Lights Off: 346 cps
Lights On: 436 cps
LIGHT LEAK: 90 cps



File # 2 = ON

Wavelength (Ang)

[View All](#)

LIGHT LEAK TEST

Light Leak = 90 cps @ 2400 A

PERFORMANCE TESTING

Limit Switch Positions:

Low End 99580
High End 15746

Operating Voltage:
Checked All Operating Speeds:
Checked Slewing Speed:
Controller Checked:
Tracking Tested:
Reproducibility Checked:
Repeatability Checked:
Light Leak Tested:
Fiber Imaging Test:
(Imaging spectrometers only)

110V/220V
✓
✓
✓
✓
✓
✓
✓
N/A

SOFTWARE INFORMATION

SOFTWARE	VERSION
<u>3PEX232/488 SUPPORT DISKETTE</u>	<u>V2.9</u>
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>

DETECTOR INFORMATION

HARDWARE	SERIAL NO.
PMT (R928P)	CD 9365
PMT Housing (DPM-HV6)	N/A
CCD Head	
CCD Controller	
IGA	
ICCD	
Other: _____	

ADDITIONAL HARDWARE INFORMATION

HARDWARE	SERIAL NO.
Computer	
HandScan / KeyLink	
DataScan / DataLink	
MSD 2	803
SpectrAcq2	265
PMT-HVPS	
Other: _____	

COMMENTS

#1250M

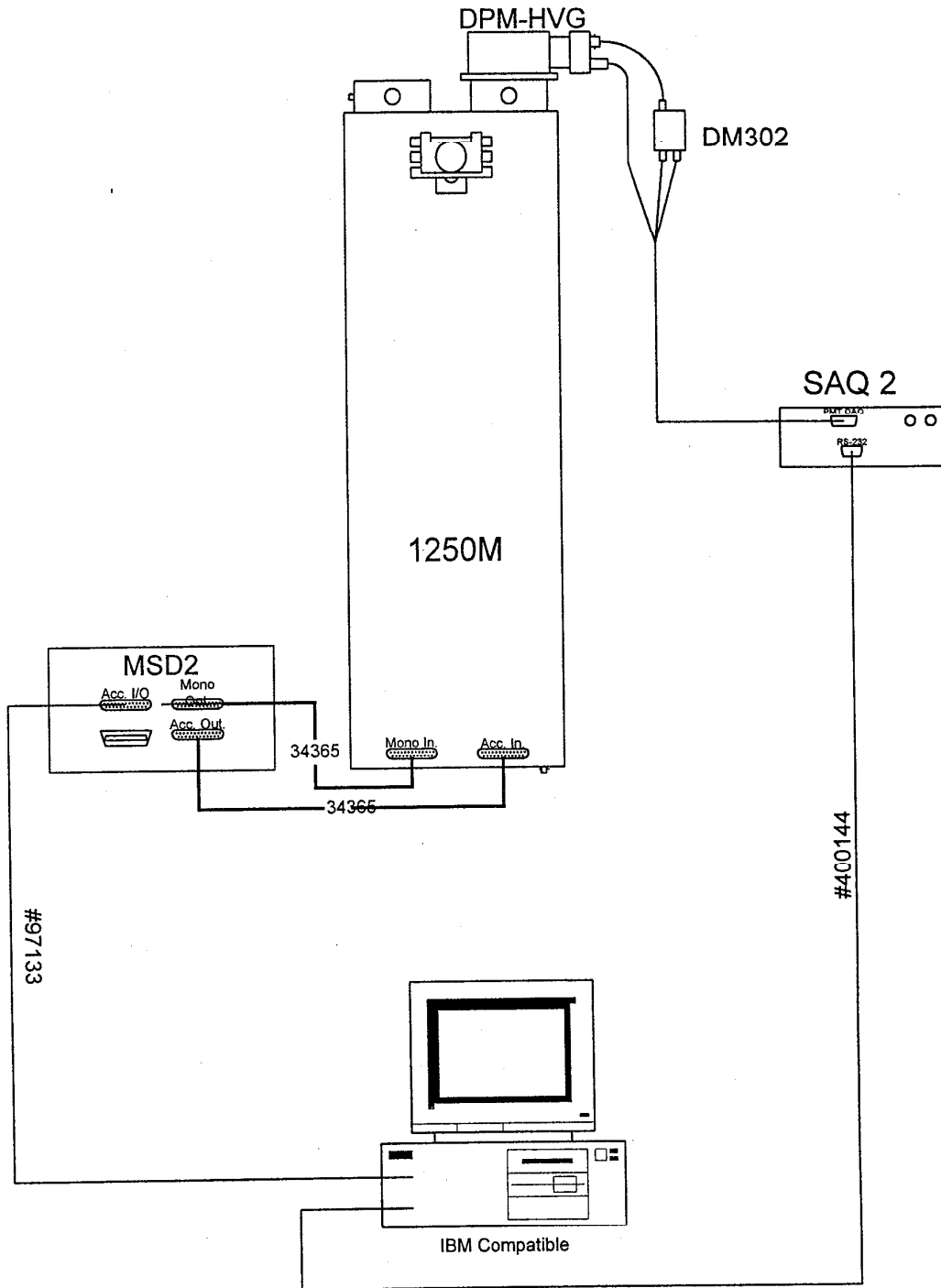
S/N: 0158

· INSTRUMENT WAS FIRST ALIGNED AND CALIBRATED WITH A TEST GRATINGS (1200/750 NM). AFTERWARDS, THE CUSTOMERS GRATINGS WERE USED.

· SYSTEM MEETS OR SURPASSES ALL SPECIFICATIONS.

System Engineers Initials: N.I.

SCHEMATIC DIAGRAM



PACKING

PACKING CHECKLIST

INCLUDED ITEMS

Sine Drive At Zero	<u>✓</u>	All Gratings Ordered	<u>N/A</u>
Csc Drive at 30,000 cm ⁻¹	<u>N/A</u>	1510 Grating Masks	<u>N/A</u>
Manual Slits Taped at 2mm	<u>✓</u>	Mirror Masks	<u>✓</u>
Motorized Slits at 2mm	<u>N/A</u>	Mirror Target	<u>✓</u>
Mirrors covered	<u>✓</u>	Three Leveling Feet	<u>✓</u>
All Mirrors Tightened	<u>✓</u>	Three Foot Pads	<u>✓</u>
Swing Away Mirrors Tightened	<u>N/A</u>	Allen Wrench Set	<u>✓</u>
All Holes Plugged	<u>✓</u>	Magic Wand	<u>✓</u>
All Gratings Labeled	<u>✓</u>	Power Cord(s)	<u>✓</u>
Gratings Packed Correctly	<u>✓</u>	Controller Cable(s)	<u>✓</u>
Interior Cleaned	<u>✓</u>	Performance Test Report	<u>✓</u>
Cover Fastened	<u>✓</u>	Manual(s)	<u>✓</u>
Exterior Cleaned	<u>✓</u>	All Accessories	<u>✓</u>
All Slits Covered	<u>✓</u>	Mounting Hardware	<u>✓</u>
Feet Nuts Tightened	<u>✓</u>	All Accessories' Paperwork	<u>✓</u>
All Labels Attached	<u>✓</u>	All Accessories' Manuals	<u>✓</u>

Engineer's Initials: N.I.

Date: 06/19/02

Configuration for: JY/SPEX 232

Controller:

Mono Drive Present: Y
Mono Type: 2
Self Calibrating Drive: N
Drive Type: 1
Turret Installed: Y
Limits Type: 1
Filter Wheel Installed: N
Filter Wheel Type: 0

Setup:

Actual Grating 1: 2400
Actual Grating 2: 300
Auto Calibration Offset: 0
IEEE-488 Address: 1

Slits:

Front Entrance Slit Installed: N
Front Entrance Slit Type: 0
Front Exit Slit Installed: N
Front Exit Slit Type: 0
Side Entrance Slit Installed: N
Side Entrance Slit Type: 0
Side Exit Slit Installed: N
Side Exit Slit Type: 0

Shutters and Mirrors:

Front Entrance Shutter Installed: N
Side Entrance Shutter Installed: N
Entrance Mirror Installed: N
Exit Mirror Installed: N

Accessories:

Accessory #1 Installed: N
Accessory #2 Installed: N
Accessory #3 Installed: N
Accessory #4 Installed: N

Configuration for: JY/SPEX 232

Controller:

Mono Drive Present: Y
Mono Type: 2
Self Calibrating Drive: N
Drive Type: 1
Turret Installed: Y
Limits Type: 1
Filter Wheel Installed: N
Filter Wheel Type: 0

Setup:

Actual Grating 1: 1800
Actual Grating 2: 3600
Auto Calibration Offset: 0
IEEE-488 Address: 1

Slits:

Front Entrance Slit Installed: N
Front Entrance Slit Type: 0
Front Exit Slit Installed: N
Front Exit Slit Type: 0
Side Entrance Slit Installed: N
Side Entrance Slit Type: 0
Side Exit Slit Installed: N
Side Exit Slit Type: 0

Shutters and Mirrors:

Front Entrance Shutter Installed: N
Side Entrance Shutter Installed: N
Entrance Mirror Installed: N
Exit Mirror Installed: N

Accessories:

Accessory #1 Installed: N
Accessory #2 Installed: N
Accessory #3 Installed: N
Accessory #4 Installed: N