

COMERCIAL RAFAER, S.L.

SUMINISTROS DE APARATOS E INSTRUMENTOS CIENTIFICOS PARA LABORATORIO



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08011 BARCELONA (España)

ESCUELA UNIVERSITARIA DE OPTICA
A la at. del Sr. J. Pujol
Colón, 1
08222 TERRASSA
(Barcelona)

FECHA 09-03-87

S/REF.

PRESUPUESTO N.º 1028/87

(al contestar rogamos citen este número)

Muy señores nuestros:

En correspondencia a su amable consulta, de acuerdo con referencia indicada, nos es grato someter su consideración el presente presupuesto.

En la confianza de vernos favorecidos con su grato pedido, les saludamos atentamente,

COMERCIAL RAFAER, S.L.

POSICIÓN	CANTIDAD	DESCRIPCIÓN	PRECIO UNIDAD	IMPORTE TOTAL
1	1	Radiometro de investigación sin detector, digital, mod. IL 1700, original de la firma International Light Control por microprocesador, con 5 decadas de rango, con cero automático y cambio de rango automático, salida analógica y RS232C, con capacidad para introducir señales exteriores de fuentes pulsantes, programable para efectuar lecturas en cualquier unidad óptica. Alimentación 150/220 V. o mediante baterías		287.239
2	1	Fuente de alimentación mod. IL 760 D, de la firma International Light, para acoplar al radiometro anterior, con una autonomía de 8 horas tras efectuar la carga. Duración del periodo de la carga 14 horas.		
3	1	Fotomultiplicador de la firma International Light, mod. PM 271 DS-20, con una respuesta entre 300 y 800 nm. No está incluida la calibración		143.270

POSICIÓN	CANTIDAD	DESCRIPCIÓN	PRECIO UNIDAD	IMPORTE TOTAL
4	1	Detector tipo SED 038/Y/W, de la firma International Light, calibrado para lectura en pie-candela y lux		81.419
5	1	Barrera de radiancia/luminancia para acoplar al detector anterior		35.118
<p>IMPORTE TOTAL PESETAS PRESUPUESTO (IVA no incluido)</p> <p>PLAZO DE ENTREGA: 10-12 semanas</p>				547.046

BARCELONA, 9 de marzo de 1987
 MG/lr

R. M. Z.: Hoja 3.256, folio 1, tomo 268, libro 45, sec. 2.ª - N.º F.: B 50.045988



international light inc.

DEXTER INDUSTRIAL GREEN, NEWBURYPORT, MASS. 01950
Tel. 617-465-5923 Telex 94-7135

→ $X_{cd/m^2} = X \cdot 2.919 \cdot 10^{-5}$ foot

Factor $1.754 \cdot 10^{-10}$

Factor 8

PHOTODETECTOR CALIBRATION CERTIFICATE

International Light certifies that the instrument described below has been compared with laboratory working standards whose calibrations are traceable to the US National Bureau of Standards and are in accordance with the requirements of Mil-STD-45662 Rev. 10 June 1980.

Rendered To: COMERCIAL RAFAEL, SL
Detector: SED038 #1395 Diffuser: R #172
Filter: Y #5485 Attenuator: _____
Spectral Response (half power points): SEE CHART

SENSITIVITY FACTOR:
_____ (A) (cm²) (W⁻¹) assuming monochromatic irradiance at _____ nm.
_____ (A) (Sr) (cm²) (W⁻¹) assuming monochromatic radiance at _____ nm.
_____ (A) (W⁻¹) assuming monochromatic source with beam diameter less than sensitive surface diameter, at _____ nm wavelength.
_____ (A) (cm²) (nm) (W⁻¹) assuming continuous spectral irradiance over a calibration bandwidth of _____ nm centered at _____ nm.
_____ (A) (ft²) (lm⁻¹) assuming _____ K color temperature source.
6.01 x 10⁻¹⁰ (A) (fL⁻¹) assuming 2854 K color temperature luminance.

OTHER CALIBRATIONS OR REMARKS: Unit will read directly in foot Lamberts when used with an IL1700.

REFERENCE PLANE: _____ Scribe Line _____ Front surface of diffuser
_____ Groove No. _____, formed by filter or diffuser elements and next element, counted from front surface of assembly.
 Other: field of vision 3 degrees

PRIMARY STANDARD: US National Bureau of Standards Detector Response & Intercomparison package (D.R.I.P.), DR #10 - June 1980
INTERNATIONAL LIGHT PRIMARY TRANSFER STANDARD(S):
IL D.R.I.P. #01, IL D.R.I.P. #02, IL D.R.I.P. #03 30 July 1980

LIGHT SOURCE: 1P Tungsten Halogen
INSTRUMENTATION: #519 Radiometer
TEMPERATURE: 24 degrees C RELATIVE HUMIDITY: 68%
CALIBRATED BY: Cathy Olson CHECKED BY: [Signature]

FOR COPIES OF THIS CERTIFICATE OR OTHER INFORMATION PLEASE REFER TO THESE NUMBERS
Date: 6/01/87 Certificate # 706017805 FD # 21055A

x PHOTOGRAPHIC - 8.1.074 - 10 LUX

Sensitivity Factor: 3.93 10⁻⁹

Factor 3



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PHOTODETECTOR CALIBRATION CERTIFICATE

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Rendered To: COMERCIAL RAFAEL, SL
Detector: SED03B #1386 Diffuser: W #3728
Filter: Y #5485 Attenuator: _____
Spectral Response (half power points): SEE CHART

SENSITIVITY FACTOR:
_____ (A) (cm²) (W⁻¹) assuming monochromatic irradiance at _____ nm.
_____ (A) (Sr) (cm²) (W⁻¹) assuming monochromatic radiance at _____ nm.
_____ (A) (W⁻¹) assuming monochromatic source with beam diameter less than sensitive surface diameter, at _____ nm wavelength.
_____ (A) (cm²) (nm) (W⁻¹) assuming continuous spectral irradiance over a calibration bandwidth of _____ nm centered at _____ nm.
4.12 X 10⁻⁸ (A) (ft²) (lm⁻¹) assuming 2854 K color temperature source.
_____ (A) (fL⁻¹) assuming _____ K color temperature luminance.

OTHER CALIBRATIONS OR REMARKS: Unit will read directly in lumens per square foot (foot-candles) when used with an IL1700.

REFERENCE PLANE: _____ Scribe Line _____ Front surface of diffuser
 Groove No. ONE, formed by filter or diffuser elements and next element, counted from front surface of assembly.
_____ Other _____

PRIMARY STANDARD: US National Bureau of Standards Detector Response & Intercomparison package (D.R.I.P.), DR #10 - June 1980
INTERNATIONAL LIGHT PRIMARY TRANSFER STANDARD(S):
IL D.R.I.P. #01. IL D.R.I.P. #02, IL D.R.I.P. #03 30 July 1980

LIGHT SOURCE: 1P Tungsten Halogen
INSTRUMENTATION: #519 Radiometer
TEMPERATURE: 24 degrees C RELATIVE HUMIDITY: 68%
CALIBRATED BY: Cathy Olson CHECKED BY: Nelly

FOR COPIES OF THIS CERTIFICATE OR OTHER INFORMATION PLEASE REFER TO THESE NUMBERS
Date: 6/01/87 Certificate # 706017804 FO # 21055A



international light INC.

DEXTER INDUSTRIAL GREEN, NEWBURYPORT, MASS. 01950
Tel. 617-465-5923 Telex 94-7135

PHOTODETECTOR CALIBRATION CERTIFICATE

International Light certifies that the instrument described below has been compared with laboratory working standards whose calibrations are traceable to the US National Bureau of Standards and are in accordance with the requirements of Mil-STD-45662 Rev. 10 June 1980.

Rendered To: COMERCIAL RAFAER, SL
Detector: PM271D #1103 Diffuser: W #3796
Filter: _____ Attenuator: _____
Spectral Response (half power points): SEE CHART

SENSITIVITY FACTOR:

1.05 X 10⁺² (A) (cm²) (W⁻¹) assuming monochromatic irradiance at 400 nm.
_____ (A) (Sr) (cm²) (W⁻¹) assuming monochromatic radiance at _____ nm.
_____ (A) (W⁻¹) assuming monochromatic source with beam diameter
less than sensitive surface diameter, at _____ nm wavelength.
_____ (A) (cm²) (nm) (W⁻¹) assuming continuous spectral irradiance over
a calibration bandwidth of _____ nm centered at _____ nm.
_____ (A) (ft²) (lm⁻¹) assuming _____ K color temperature source.
_____ (A) (fL⁻¹) assuming _____ K color temperature luminance.

OTHER CALIBRATIONS OR REMARKS: Unit will read directly in watts per square centimeter
when used with an IL700A or IL1500.

REFERENCE PLANE: Scribe Line Front surface of diffuser
 Groove No. ONE, formed by filter or diffuser elements and next
element, counted from front surface of assembly.
Other

PRIMARY STANDARD: US National Bureau of Standards Detector Response & Intercomparison package
(D.R.I.P.), DR #10 - June 1980

INTERNATIONAL LIGHT PRIMARY TRANSFER STANDARD(S):
IL D.R.I.P. #01, IL D.R.I.P. #02, IL D.R.I.P. #03

30 July 1980

LIGHT SOURCE: 1P Tungsten Halogen

INSTRUMENTATION: #290 Radiometer

TEMPERATURE: 24 degrees C RELATIVE HUMIDITY: 68%

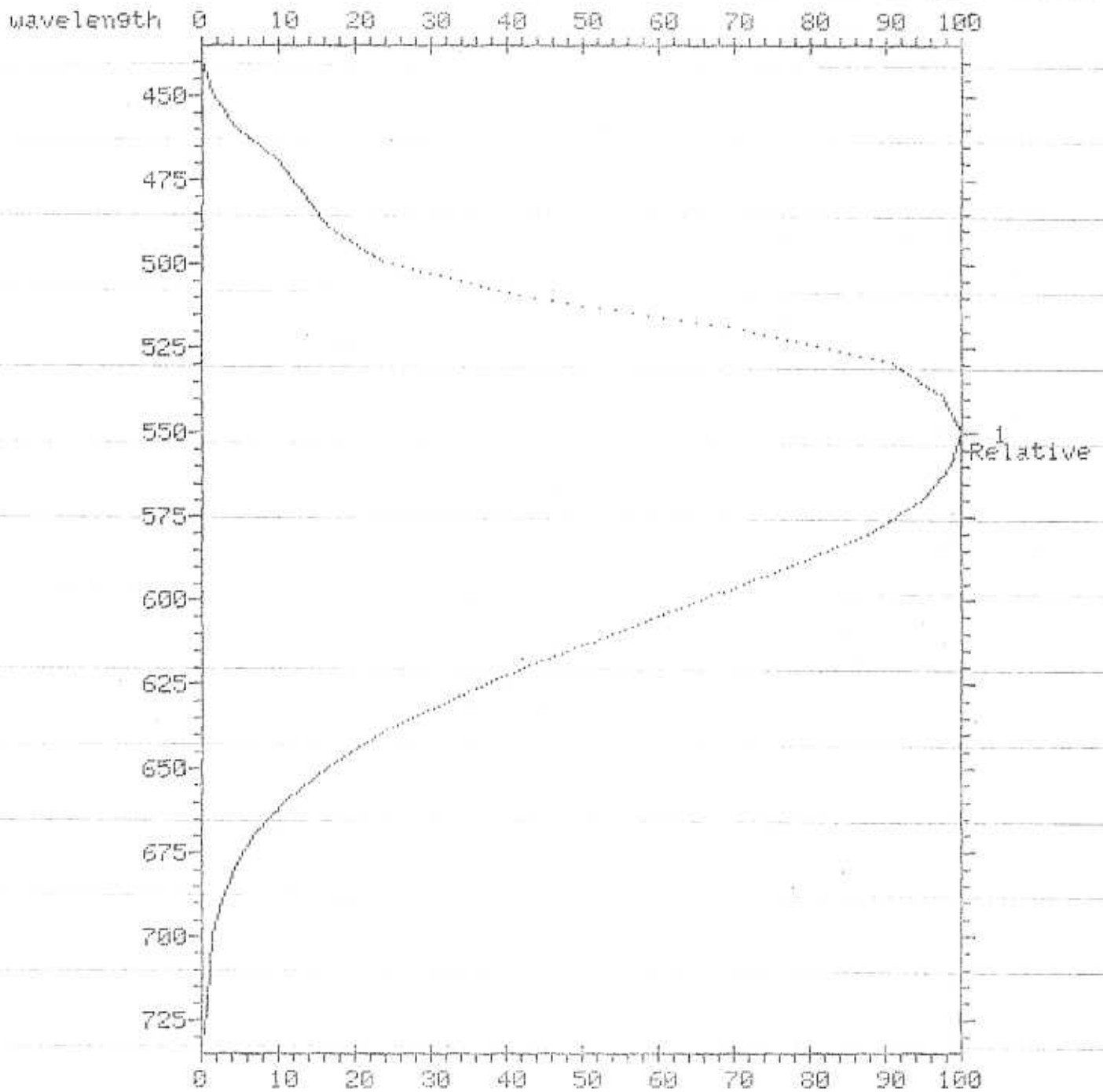
CALIBRATED BY: Cathy Olson CHECKED BY: Kelly

FOR COPIES OF THIS CERTIFICATE OR OTHER INFORMATION PLEASE REFER TO THESE NUMBERS

Date: 6/01/87 Certificate # 706017803 FD # 21055A

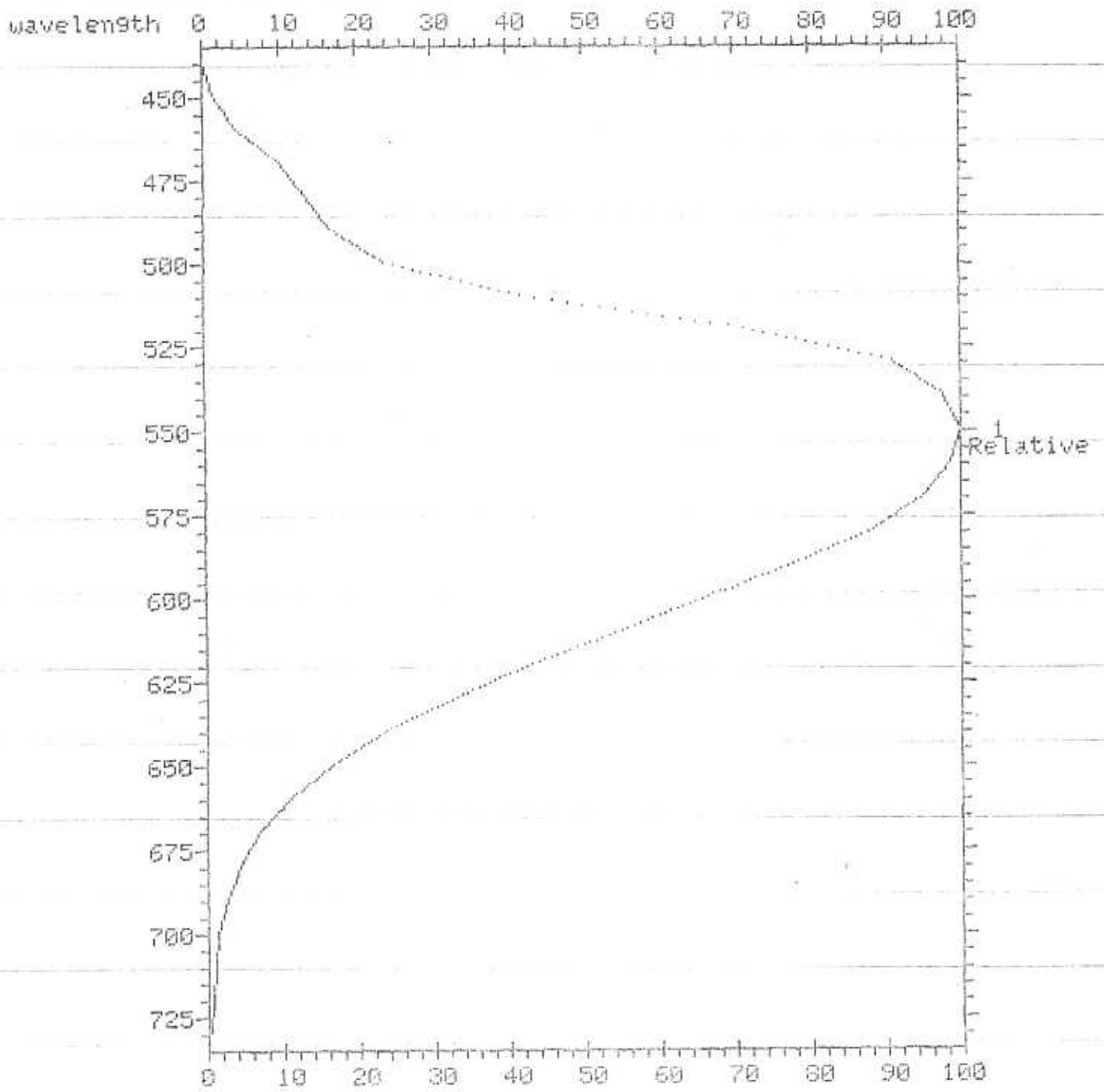
SED038 Y TYPICAL RESPONSIVITY 1/27/87

this is a spectral Plot of file 'test.y.filter' normalized to 100

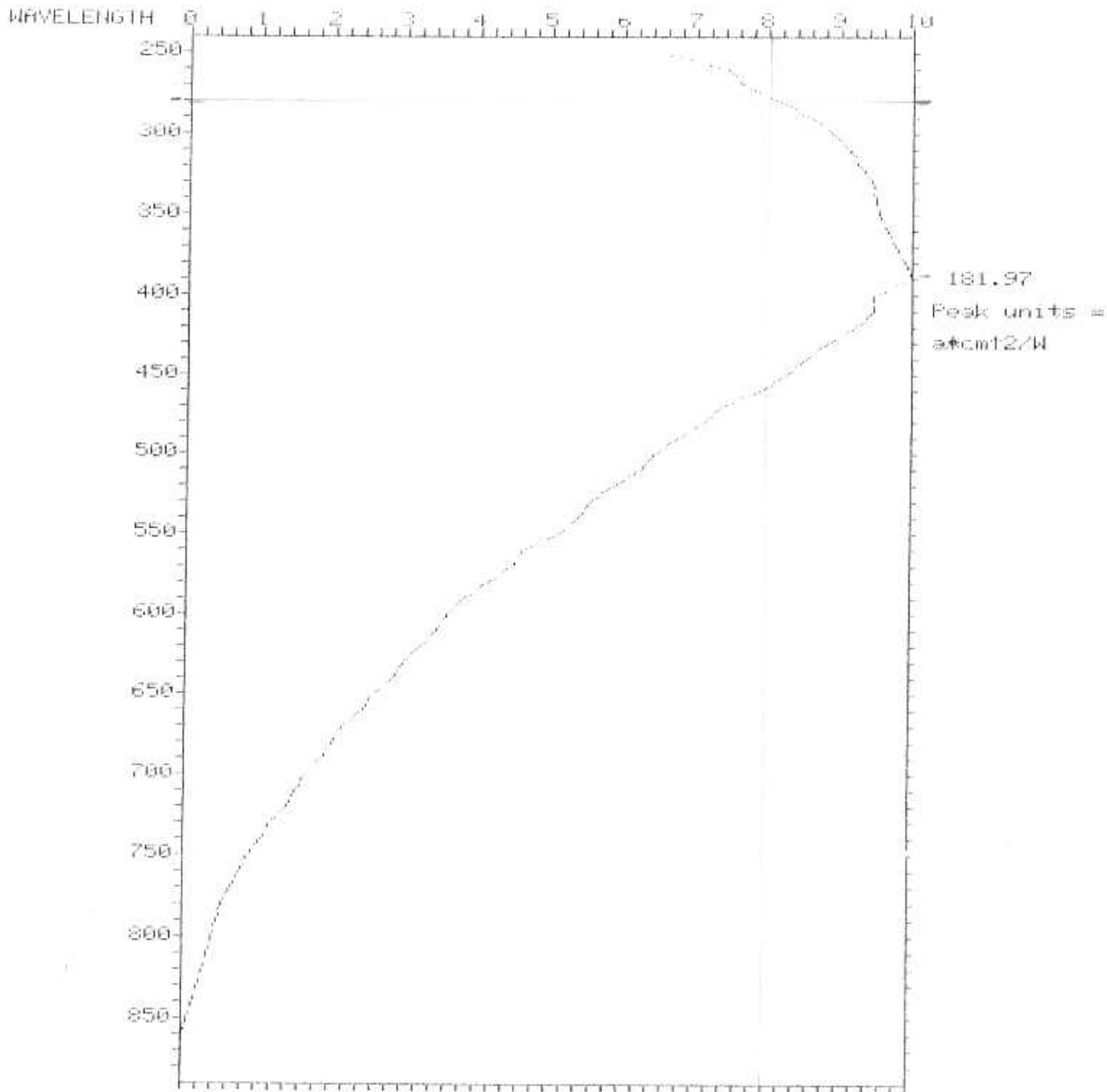


SED038 Y TYPICAL RESPONSIVITY 1/27/87

this is a spectral Plot of file 'test.y.filter' normalized to 100



This is a spectral plot of file '504086604' normalized to 10



The photodetector described on the front of this certificate is a delicate precision instrument and should be handled very, very carefully. Unusual stresses or sudden shocks can permanently damage the detector or at the least, render the calibration void. Discoloration, chips, cracks, and other physically evident signs of change should be checked out immediately. Below are a few helpful hints meant to aid in prolonging the quality and life of your detector.

PHOTODETECTOR ELEMENT PLACEMENT, DIFFUSERS, ATTENUATORS & FILTERS! All calibrations are performed with diffusers, attenuators and filters in a specific order. Unless otherwise specified, the light flux should first come in contact with the diffuser, then the attenuator, and last of all the filters before coming in contact with the sensitive surface of the cell or tube. It is important that the above order be followed for two reasons: (1) Changing the order of the elements can change the calibration slightly. (2) Placing an attenuator after a filter can accelerate degradation of that filter.

SPECIAL NOTE: For the PT100 and PT170 series detectors, filters and attenuators should be screwed into the diffuser cap (attenuators first) so that the stamped serial numbers are facing out of the back of the cap toward the sensitive area of the detector.

CLEANING DIFFUSERS: The diffuser surface (sandblasted side) on all diffusers should be kept as clean and dust free as possible. Dust, finger prints, or any other contaminants can change the transmission and/or spectral response of a diffuser drastically. This can void the calibration. The best way to care for a diffuser is not to handle it at all. If, however, the diffuser side of a diffuser does become contaminated you can reasonably restore the surface by washing it off with a high grade Freon (Trichlorotrifluoroethane) solvent or methanol alcohol. DO NOT attempt to wipe the surface dry, but allow it to dry on its own. NOTE: The process can be improved by drying it off with an air hose. Before using an air hose, check the air system that you are about to use to see that it has a moisture oil filter which keeps the air free of any contaminants.

FILTERS: Filters and the polished side of a diffuser, may be cleaned using the above method or with a more readily available glass and/or plastic cleaner. In all cases the cleaner should not be the type that will leave behind a film of its own or contain strong solvents which can attack the filter and its cementing compounds.

CALIBRATION SCHEDULE: In most cases detectors should be calibrated at least once yearly. Detectors that are used daily on production line or for quality control and health hazard measurements should be checked and/or calibrated more often (usually once every six months).

ALTERNATE METHOD: One method for checking detector calibrations which is used, is to purchase two detectors. One detector is kept stored in an out of the way place while the second is used to work with. Whenever the calibration of the "work" detector is to be checked or is in question, the "stored" detector is then taken out of storage and the results from the two are compared. If they compare, it is reasonable to assume that both detectors still have valid calibrations. If both detectors do not compare, the two detectors and instrument should be sent back for repair and calibration.

(NOTE: The above check does not tell you which detector has changed, only that one detector has. However, when one is familiar with the detectors and the source he is measuring, it is highly possible to determine which detector has changed. The detector that has changed now can be sent back for repair and calibration while the second detector is used to take its place).

TYPICAL SYMBOLS AND PREFIXES

SYMBOLS & PREFIXES

nm = nanometers = (m μ) = 10⁹(Å)
W = Watts
cm = centimeters
Å = Angstroms
sr = Steradian
ft = feet
lm = lumens
lx = lux
cd = candela

A = Amperes
m μ = Millimicrons
sec = second
fc = foot-candle
s = distance source to detector
J = Joules
 μ = Micron
y = Standard Observer Curve

fL = Foot Lamberts
m = Meter
m = Milli = (10⁻³)
k = kilo = (10⁺³)
 μ = micro = (10⁻⁶)
M = Mega = (10⁺⁶)
n = nano = (10⁻⁹)
G = Giga = (10⁺⁹)