

SUPERPRESSURE

PHOTOMETER FOR THE NBS (NIST) SMOKE CHAMBER INSTRUCTION MANUAL

Catalog No. 4-5807

(REPLACES MODEL 4-5805)

Customer Name: _____

Purchase Order #: _____

Sales Order#: _____

Serial #: _____

Date of Manufacture: _____

NEWPORT SCIENTIFIC, INC.
formerly AMINCO
8246-E SANDY COURT
JESSUP, MARYLAND 20794-9632
PHONE (301) 498-6700 FAX (301) 490-2313
EMAIL: newport888@aol.com WEBSITE: www.newport-scientific.com

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I. INTRODUCTION

A. Application

This instrument is designed for the measurement and comparison of light levels in the range from below 1 picolumen to several lumens. It is especially suitable for low light levels, and may be used for:

Fluorescence
Phosphorescence
Reflectance
Light Scattering

Scintillation efficiency
Stellar Photometry
Film Densitometry
Paper Chromatography

In general, the Photometer can be used for measuring light intensities in broad or narrow spectral regions with such instruments as spectrophotometers, monochromators, microscopes, polariscopes, and interferometers within a wavelength from 186 nm in the UV to 1.2 microns in the IR.

B. Special Features

The 4-5807 Photometer is built around a simple, high performance circuit using only the finest components for exceptional stability and reliability. High quality materials and fabrication insure minimal drift due to aging and environmental conditions.

A front panel switch allows display of either percent transmittance (relative intensity) or optical density. "Dark Current" cancellation is accomplished electronically by a front panel adjustment. A milli volt output allows recorder connection for documenting test results.

C. Specifications

Power Requirements:	100/130VAC, 0.1Amps
Decade Ranges:	100, 10, 1, 0.1
Tracking:	<u>+2%</u>
Operating Ambient:	60°F to 90°F, 10% - 60%RH
MilliVolt Output Impedance:	5K Typical

II. CONTROLS AND CONNECTORS

A. Front Panel

ITEM	NAME	FUNCTION
1	POWER SWITCH	Turns Photometer ON (1) and OFF (0)
2	SENSITIVITY ADJUST	Controls Meter Sensitivity
3	MULTIPLIER SWITCH	Selects the Meter Full Scale Range
4	ZERO ADJUST	Offsets Photomultiplier Tube Dark Current for Low Light Measurement
5	DISPLAY SWITCH	Selects Parameter to be Displayed on Meter
6	METER	Displays Either Relative Intensity or Optical Density

B. Rear Panel

ITEM	NAME	FUNCTION
7	mV OUTPUT	Used for Recorder Connection
8	LINE CORD	Connects Photometer to Line Voltage
9	OUTPUT ADJUST	Used for Adjusting the Milli Volt Output
10	PM TUBE RECEPTACLE	Accepts PM Tube Connector

See Drawing Number 4-5807PAN on Page 3 for item number references.

III. INSTALLATION

A. PM Tube Housing

1. Insert the PM tube into its housing so that the pin on the tube enters the slot in the housing. Tighten the side screw to lock tube in place.
2. Insert the PM tube connector into the PM tube receptacle on the rear panel of the Photometer.
3. Insure that the ND-2 filter is in the Filter-Shutter Assembly and install into the PM Tube Housing.
4. If a recorder is to be used, use a 50mV full-scale recorder. Connect the recorder input to the mV output on the Photometer rear panel.

PRECAUTION: THE HIGH VOLTAGE MUST BE OFF TO ENSURE THAT THE HIGH VOLTAGE IS NOT APPLIED TO THE PM TUBE WHILE IT IS OUT OF ITS HOLDER. EXPOSING THE PM TUBE TO ROOM LIGHT WITH THE HIGH VOLTAGE APPLIED WILL PERMANENTLY DAMAGE THE NEW PM TUBE.

B. Check-out Procedure

1. Insure that the ND-2 filter is in the light path and that the shutter is closed. (Both rods in the out position.) Insure that the PM tube is installed into the PM Tube Housing before turning on the Photometer. Exposing the PM tube to room light with the power on will permanently damage it.
2. Turn on the light source and the Photometer.
3. Turn the **MULTIPLIER SWITCH** to 100 and the **DISPLAY SWITCH** to **RELATIVE INTENSITY**.
4. Open the PM Tube shutter (push lower rod in).
5. Adjust the meter to 100.0 by rotating the **SENSITIVITY ADJUST** knob on the face of the Photometer. If the meter cannot be adjusted to 100.0, first wipe clean both optic windows then check the light beam alignment. The Photometer should be left on and allowed to stabilize for about an hour.
6. Close the PM Tube Shutter. Turn the **MULTIPLIER SWITCH** to 0.1. Adjust the meter to 0.0 by rotating the **ZERO ADJUST** knob on the face of the Photometer. This adjustment is extremely sensitive and may take some practice.

7. After zeroing the dark current turn the **MULTIPLIER SWITCH** to 100. Open the PM Tube shutter and readjust the meter to 100.0 by rotating the **SENSITIVITY ADJUST** knob. If a recorder is used, set the recorder pen to the 100% line on the chart using the **OUTPUT ADJUST** on the rear panel.

IV. OPERATION

The following operational procedure is to be used when using the Photometer with the Superpressure NBS Smoke Density Chamber. The procedure is essentially the same for other applications.

- A. The Photometer is now ready for operation. As the percent of transmittance of the light beam decreases due to smoke generation, increase the Photometer sensitivity with the **MULTIPLIER SWITCH** labeled 100, 10, 1 and 0.1. For each range allow the meter reading to decrease to about 10.0 before selecting the next range. With the **MULTIPLIER SWITCH** AT 100, switch to the 10 position when the meter reading falls to 10.0. Cover the chamber door window if the light level decreases into the 4th decade (0.1 scale). When the meter reading falls to 10.0 in the 4th decade, return to the 1 scale and remove the ND-2 filter from the light path by pushing the upper filter rod in and turning to lock. When the meter decreases to 10.0 again, switch back to the 0.1 scale.
- B. When minimum light transmittance is reached or after 20 minutes, terminate the test as follows. Displace the sample holder from the front of the furnace by pulling the sample positioning rod. Return the ND-2 filter into the light path if removed. Set the Photometer **MULTIPLIER SWITCH** to the 100 position. Exhaust the chamber of all smoke. Close the PM Tube Shutter

Wipe clean both optical windows. Open the PM Tube Shutter. Readjust the Photometer to 100.0 by rotating the **SENSITIVITY ADJUST** knob. Zero the dark current as in III B, Step 6 before testing another sample.

V. PARTS REQUIREMENTS AND ACCESSORIES

PARTS REQUIREMENTS:

The Superpressure photometer requires the following additional items for operation in most usage configurations:

PART**CATALOG NO.**

1 ea Photomultiplier Tube	47-16216
1 ea Photomultiplier Tube Housing	68086014000
1 ea Shutter Assembly	68086017500

ACCESSORIES:

These parts should be purchased when using the data collection option.

1 ea SCIP-Program-Communication-Interface Option	4-5812
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