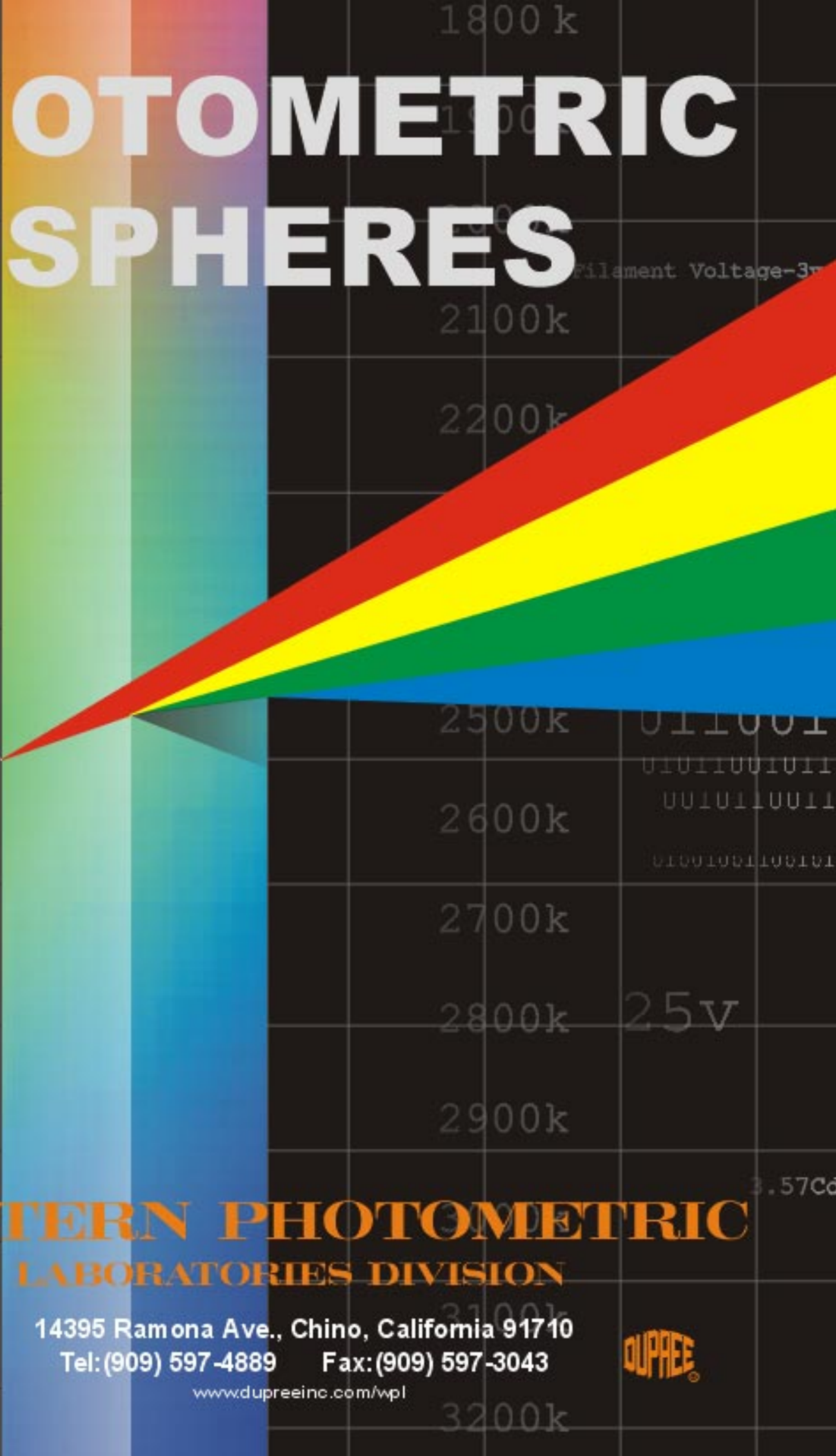


# PHOTOMETRIC SPHERES



**WESTERN PHOTOMETRIC  
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To our customers:

Western Photometric Laboratories (WPL) is proud to offer this catalog and the products listed in it as our contribution to the lighting industry. We recognize that we are serving a very specialized and demanding customer in our segment of the industry and have remained focused and dedicated to making continuous product improvements since we produced our first 4" diameter integrating sphere over 30 years ago.

The products included here are offered to manufacturers and end-users of miniature and subminiature incandescent lamps for measuring, analyzing, inspecting and selecting lamps in a number of different ways.

Lamp manufacturers use the equipment for quality control over their production. Users of large quantities of lamps utilize the equipment in their incoming inspection process. Customers with critical lighting applications requiring tighter tolerance than offered by industry standards may use the equipment for sorting lamps to meet their particular needs.

The Model 526B MOD 2 Lamp Analyzer is a laboratory quality instrument which uses a self-contained D.C. power supply and internal microcomputer to simultaneously measure average luminous intensity, color temperature, voltage, current and power supplied to the lamp filament.

The Model 504D MOD 1 Photometric Sphere features a rugged, simple-to-use design suitable for bench-mounted inspection of production quantities of subminiature incandescent lamps.

Lamp Adaptors are offered in a broad range of sizes and styles to increase the versatility of the spheres. New adaptors are developed on an on-going basis to support our sphere customers as new lamp base configurations are introduced to the industry.

Calibrated Lamp Standards are offered as a simple, low cost means for periodic calibration of photometric spheres.

We know that our success comes from the support of our customers, and thank you for the confidence you have placed in WPL and its products.

From the entire staff at Western Photometric Laboratories.

# 526B MOD 2 LAMP ANALYZER KIT



The Model 526B MOD 2 Lamp Analyzer (p/n 526B-MOD2-KIT) measures the average luminous intensity, color temperature, filament voltage and filament current of miniature and subminiature tungsten filament lamps. The lamp filament is energized from a self contained digitally programmable D.C. power supply. The four measured parameters are presented on a 1.5" x 5" Liquid Crystal Display (LCD) in units of Spherical Candelas, degrees Kelvin, Volts and Amperes.

Zeroing of all instrumentation functions, dark cell compensation, ranging and calibration are all automated functions. System operation is coordinated by a versatile custom microcomputer which allows any one of the four parameters listed above to be selected as the independent variable. After lamp stabilization the numerical values of the three dependent parameters are shown on the display.

## FEATURES

The Lamp Analyzer is operated from a twenty-button keypad by selecting constant voltage, current, candela or color temperature mode and entering the value of the selected parameter. Filament inrush current is limited by computer controlled ramping of the applied voltage.

A serial communication port (RS232C) is provided on the back panel for connection to an external computer system or printer. The communication port allows tabulation, analysis and printout of lamp data.

The light processing system consists of the 12" integrating sphere which has a special interior finish and an array of three optically filtered silicon photocells. One photocell has a photopic response for measurement of average luminous intensity and the other two are

fitted with red and blue filters to allow determination of lamp color temperature.

The photometric parameters and power supply voltage and current are factory calibrated. The calibration procedure is highly automated and may be performed in the field by using the recommended accessory standards.

In addition to the Lamp Analyzer, the Lamp Analyzer Kit includes the following accessory items, which can also be ordered as replacement parts:

Part No.	Description
526B-220	Calibration Lamp Set
526B-131-3.1	Lamp Analyzer Software Kit
530A-076	Subminiature Lamp Adaptor Transition
530A-118	S8 Single Filament Lamp Adaptor
530A-139	Power Supply Calibration Adaptor
WPL-EPZS17506C	Power Cord
526B-177	Owner/Operator Manual

## ACCESSORIES

Optional Lamp Base Adaptors are available, fitted with a wide selection of lamp sockets to accommodate the majority of miniature and subminiature lamp bases commonly used in aircraft automotive and electronic applications.

A set of three multi-point Calibrated Lamps (p/n 526B-220) are provided for periodic calibration of the instrument. The certified lamps, traceable to the National Institute of Standards and Technology (NIST), are calibrated for average luminous intensity and color temperature.

## SPECIFICATIONS

### General:

**Input Power:** Instrument is powered from a single phase 3-wire grounded AC power line at nominal voltage of 115 VAC, (230 VAC available upon request) 50 or 60 Hz. Full load input power is approximately 100 Watts.

**Sphere:** Twelve inches in diameter. Interior is finished with a special durable flat spectral reflectance lusterless white coating.

### Average Luminous Intensity:

**Dual Autorange:** 0 to 1.9999 Spherical Candelas and 2.000 to 110.000 Spherical Candelas.

**Linearity:**  $\pm 0.1\%$  of reading,  $\pm 0.01\%$  of full scale.

**Spectral Response:** Optically filtered photo-detector provides accurate photopic optoelectric response from 380nm to 760nm. Deviation in readout due to change in color temperature of an incandescent source is within  $\pm 1\%$  over a color temperature range of  $2400^{\circ}\text{K} \pm 600^{\circ}\text{K}$ .

### Color Temperature:

**Range and Resolution:**  $1600^{\circ}\text{K}$  to  $3400^{\circ}\text{K}$ .

**Accuracy:**  $\pm 10^{\circ}\text{K}$ .

**Sensitivity:** Automatic shut-off below 0.01 spherical candela.

**Filament Voltage:**

**Range and Resolution:** 0 to 50.000 volts D.C.

**Linearity:**  $\pm .002\%$  of full scale.

**Input Impedance of Volt Meter:** 2.5 Megaohms.

### Filament Current:

**Range and Resolution:** 0 to 4.2000 Amperes from 0 to 13.25 volts; 2.1000 Amperes from 13.251 volts to 26.500 volts; 1.0500 Amperes from 26.501 volts to 50.000 volts, with automatic current limiting.

**Linearity:**  $\pm .005\%$  of full scale.

**Ammeter Shunt Resistance:** 0.01 ohm (voltage drop compensated by Control Circuitry).

### Filament Power Supply:

**Line and Load Regulation:** Digital correction of analog references holds regulated parameter (voltage or current) to within  $\pm 1$  least significant digit.

**Output Power:** 50 watts minimum at the top of each current range. Available power is a function of programmed output voltage.

# 504D MOD 1 PHOTOMETRIC SPHERE KIT



The Model 504D MOD 1 Photometric Integrating Sphere (p/n 504D-MOD1-KIT) is an AC operated bench mounted instrument, suitable for maintaining quality control over production quantities of miniature incandescent lamps. The unit measures average luminous intensity (mean spherical candlepower) expressed in spherical millicandelas (smcd) and has a maximum range of 1999.9 smcd.

The system features a photopically corrected silicon photosensor which yields rapid response without hysteresis, fatigue or memory errors. The photosensor is coupled with a chopper stabilized integrated circuit amplifier which optimizes sensor loading for linear conversion of luminous intensity to electrical output with excellent stability over the full range of the instrument. The amplifier analog output is digitized by a high linearity auto zero type A/D converter system which includes calibration circuitry and a driver for a  $4\frac{1}{2}$  digit liquid crystal display.

The front panel includes the spherical millicandela display and an illuminated rocker

type power switch. The right side panel of the instrument has an AC power receptacle which accepts the right-angle plug of a heavy duty 3-wire line cord set. The right side panel also includes a lamp power and voltage sense receptacle which connects to a locking right-angle plug with attached cable terminated in color coded banana plugs.

## REQUIRED ACCESSORIES

Regulated Power Supply (customer supplied) - Required to energize the lamp filament. We recommend a D.C. type with both voltage and current stabilization modes, an overall regulation to 0.01% or better and remote high impedance sensing with high resolution adjustments for output voltage and current.

Independent digital readout of voltage and current should be provided with an accuracy of 0.1% of the reading or better and to a resolution of  $4\frac{1}{2}$  digits.

Lamp Base Adaptors - Available with a wide variety of lamp sockets to accommodate the majority of miniature lamp bases commonly

used in aircraft and electronic applications. The adaptors are mounted on an energized tripod which locates the lamp filaments at the center of the sphere. For a complete listing of available Lamp Base Adaptors, see page 6 of this catalog.

Calibrated Lamps - For periodic calibration checks. These lamps should be maintained in sets of three to provide for detection of drift or damage. To optimize accuracy, the calibrated lamp should closely simulate the lamps being measured in candela, color temperature and geometric configuration. Certified lamps, calibrated for average luminous intensity and traceable to the National Institute of Standards and Technology (NIST) are listed on our calibration lamp data sheet.

## **SPECIFICATIONS**

Power: Instrument is powered from 50/60 Hertz AC power line with operation on 115 volts or 100 volts through selection of internal

transformer taps. Operation on 230V AC is available by request at the time of order.

Sphere: Approximately 4 inches in diameter (100 mm). Interior finished with flat spectral reflectance lusterless white coating.

Display: 4½ digit 0.4 inch (10mm) high LCD type with triplexed temperature compensated drive.

Range and Resolution: Single range, 0 to 1999.9 smcd.

Linearity: ± 0.1% of the reading, ± 0.001% of full scale. Absolute accuracy depends upon the accuracy of the lamp standard, voltmeter and ammeter used for calibration.

Spectral Response: Optically filtered silicon photosensor is trimmed to match the photooptic (tristimulus "Y") curve with an accuracy that allows no more than 2% candela deviation due to change in color temperature over a range of 1800 to 3000 Kelvins.

# LAMP ADAPTORS

The Sub-Miniature Lamp Adaptors shown may be used interchangeably in all model 504D or 526B Photometric Spheres. The Lamp Adaptors are mounted using 3 button head recess screws.

All Lamp Adaptors incorporate a standard printed circuit mounting board and are designed to position the lamp filament at the center of the sphere. The Lamp Adaptors shown include selected standard lamp base designs and are available for delivery from stock. Upon request, we are prepared to design and supply Lamp Adaptors to accommodate other lamp base types.

All electrical contacting surfaces are plated with gold over nickel, thereby eliminating contact resistance problems. The Lamp Adaptors are similar in geometric configuration to minimize variations when interchanged in a calibrated WPL Photometric Sphere.

## SUB-MINIATURE LAMP ADAPTORS

The following Lamp Adaptors can be used with the 504D and the 526 Series instruments.



**T-1<sup>1</sup>/<sub>4</sub> MIDGET SCREW**  
Part No. 530A-102



**T-1 POGO BAYONET BASE**  
Part No. 530A-103



**T-3<sup>1</sup>/<sub>4</sub> MINIATURE BAYONET BASE**  
Part No. 530A-104



**T-1<sup>3</sup>/<sub>4</sub> FLANGE BASE**  
Part No. 530A-105



**T-1<sup>1</sup>/<sub>4</sub> FLANGE BASE**  
Part No. 530A-106



**T-1 FLANGE BASE**  
Part No. 530A-107



**T-1  $\frac{3}{4}$  GROOVE BASE**  
Part No. 530A-108



**T-2 TELEPHONE SLIDE BASE (Short)**  
Part No. 530A-109



**T-2 TELEPHONE SLIDE BASE (Long)**  
Part No. 530A-110



**T-1 BIPIN & UNBASED**  
Part No. 530A-111



**T-3  $\frac{1}{4}$  SCREW BASE**  
Part No. 530A-113



**T-1  $\frac{3}{4}$  WEDGE BASE**  
Part No. 530A-114



**T- $\frac{3}{4}$  FLANGE BASE**  
Part No. 530A-115



**T- $\frac{7}{8}$  FLANGE BASE**  
Part No. 530A-116



**S.C. MINIATURE FLANGE BASE**  
Part No. 530A-120



**CANDELABRA SCREW BASE**  
Part No. 530A-121



**T-3 NEO WEDGE BASE**  
Part No. 530A-123



**T-4.2 & T-5 NEO WEDGE BASE**  
Part No. 530A-124

**Lamp Adaptors**



**T-4.7 NEO WEDGE BASE**  
Part No. 530A-125



**T-4.6 BELL LILLIPUT BASE**  
Part No. 530A-126



**T-5.5 BELL LILLIPUT BASE**  
Part No. 530A-127



**T-1.5 DRG (FEMALE BIPIN) BASE**  
Part No. 530A-128



**MEDICAL SCREW BASE**  
Part No. 530A-129



**T-1<sup>1</sup>/<sub>4</sub> KNURLED SCREW BASE**  
Part No. 530A-135



**T-1 BIPIN & UNBASED (Polarity Marked)**  
Part No. 530A-136



**S-3<sup>1</sup>/<sub>4</sub> WEDGE BASE**  
Part No. 530A-140



**SMT LAMP**  
Part No. 530A-145



**T-1 WITH SILICONE RUBBER FILTER BOOT**  
Part No. 530A-154



**BIPIN HEADER CONNECTOR**  
Part No. 530A-160

## MINIATURE LAMP ADAPTORS

The following Lamp Adaptors can only be used with the 526 Series instruments.



**S8-5 FESTOON FUSE  
LAMP BASE**  
Part No. 530A-112



**S-8 DUAL FILAMENT, DUAL  
CONTACT, INDEXED BASE**  
Part No. 530A-117



**S-8 SINGLE FILAMENT, SINGLE  
CONTACT, NON-INDEXED BASE**  
Part No. 530A-118



**S-8 SINGLE FILAMENT, DUAL  
CONTACT, NON-INDEXED BASE**  
Part No. 530A-122



**S-8 PRE-FOCUS, SINGLE FILAMENT,  
DUAL CONTACT, INDEXED BASE**  
Part No. 530A-130



**S-8 PRE-FOCUS, SINGLE FILAMENT,  
SINGLE CONTACT, INDEXED BASE**  
Part No. 530A-131

**Lamp Adaptors**



**T-3 SPECIAL BASE**  
Part No. 530A-132



**T-4 TAB BASE**  
Part No. 530A-133



**S-8 STAGGERED BAYONET SOCKET,  
SINGLE CONTACT, INDEXED BASE**  
Part No. 530A-134



**S-8 DUAL FILAMENT, DUAL  
CONTACT, NON-INDEXED BASE**  
Part No. 530A-137



**S-11 INTERMEDIATE SCREW BASE**  
Part No. 530A-138



**MEDIUM SCREW BASE**  
Part No. 530A-144



**FESTOON FUSE LAMP SINGLE**  
**ADJUSTABLE 28 mm- 41 mm**  
Part No. 530A-152

## 526B ACCESSORIES



**CALIBRATION ADAPTOR**  
Part No. 530A-139



**SUBMINIATURE LAMP**  
**ADAPTOR TRANSITION**  
Part No. 530A-076

# CALIBRATED LAMP SETS



Calibrated Lamps are used to assure photometric accuracy of spheres that are in field use. The calibrated lamps are calibrated in a Master 12" sphere using reference lamps traceable to the NIST. The light output of each lamp is certified to be accurate within 3% of absolute.

Each calibrated lamp set is furnished in a protective wooden case with foam inserts and space for storing the calibration certificate. Each lamp is marked with a unique serial number to allow traceability.

## Subminiature Adaptor Plate Calibrated Lamp Sets

Designed for use with WPL Model 526B MOD 2 and Model 504D MOD 1 Photometric Spheres. We offer subminiature Adaptor Plate calibrated lamps in serialized sets of three (for drift detection). The calibrated lamps are carefully aged and selected before being permanently affixed to an adaptor board which features gold plated electrical contacts. The lamp filaments are selected to have a low voltage/high current relationship to provide ruggedness and long-term stability.

Part Number	Description
530A-0100	100 Spherical Millicandela Calibrated Lamp Set
530A-0250	250 Spherical Millicandela Calibrated Lamp Set
530A-1000	1000 Spherical Millicandela Calibrated Lamp Set

## Unbased and Miniature Calibrated Lamp Sets

We offer unbased subminiature and based miniature calibrated lamps in serialized sets of three. The calibrated lamps are carefully aged and selected before calibration. The subminiature lamps come in a bi-pin configuration and the miniature lamps have industry standard S8 bayonet bases.

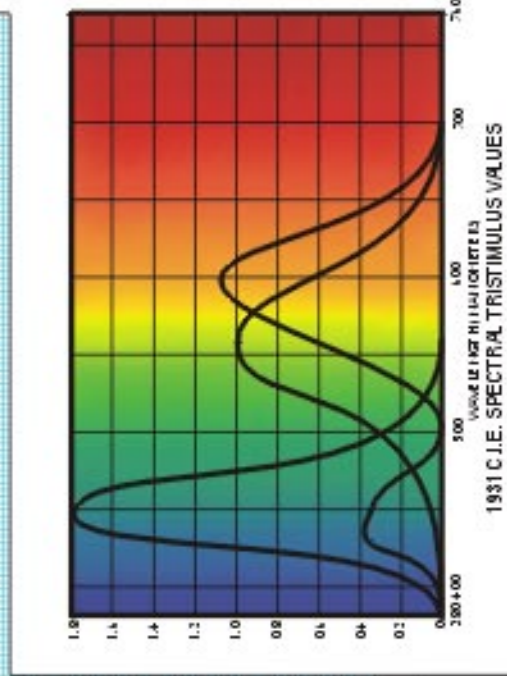
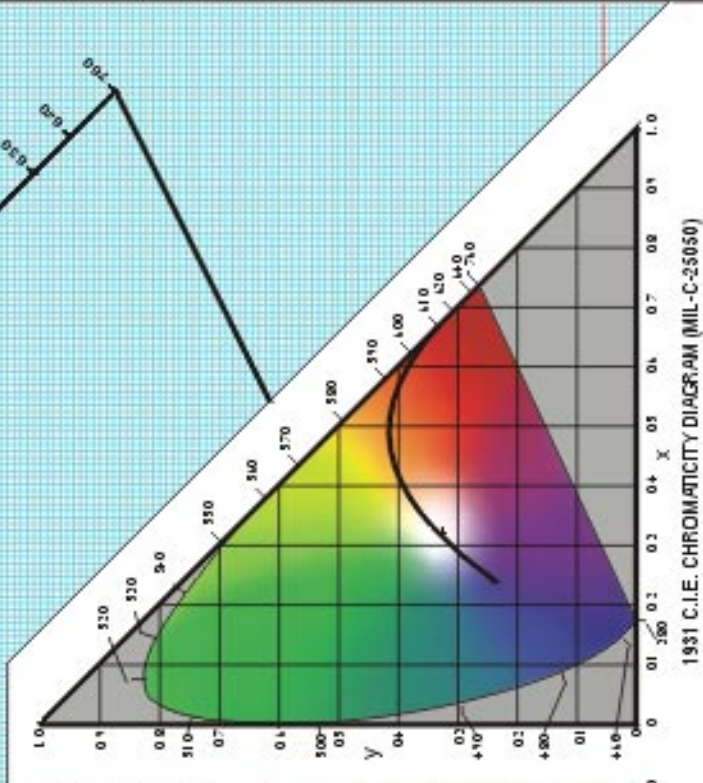
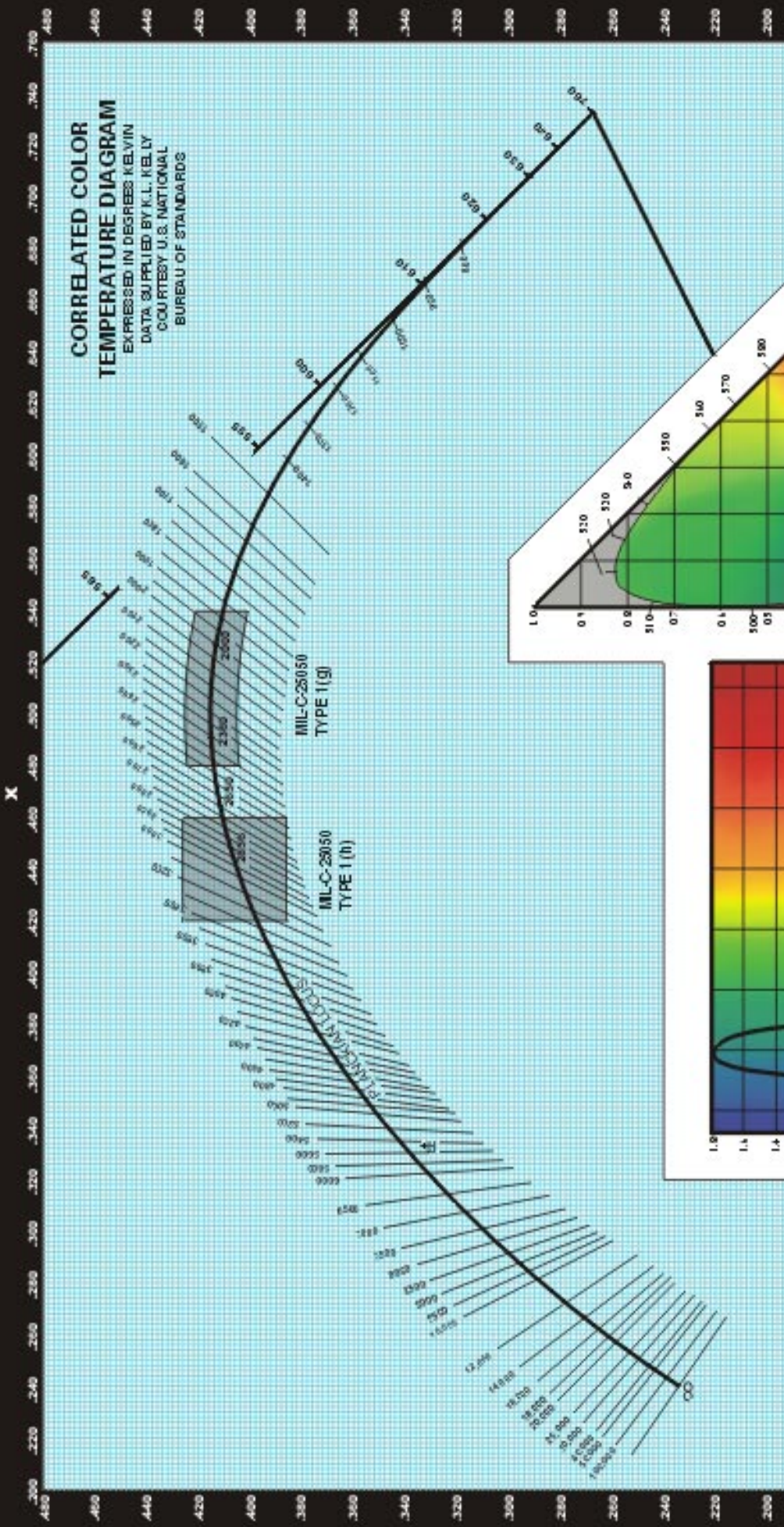
Part Number	Description	Base Type	Recommended WPL Lamp Base Adaptor
530A-155-100	100 Millicandela	Bi-Pin	530A-111
526A-216	3.0 Candela	S8	530A-118
526A-215	10.0 Candela	S8	530A-118
526A-219	50.0 Candela	S8	530A-118

## 526B-220 Mixed Set (3 Calibrated Lamps)

The 526B-220 Mixed Calibration Lamp Set is specifically designed for calibration of the Model 526B MOD 2 Lamp Analyzer. This set comprises three different lamps with multiple calibrations on each lamp. The information on the calibration certificate can be directly entered into the 526B MOD 2 for use with its automated calibration procedure.

Lamp	MSCD (Mean Spherical Candela)	Base Type	Recommended WPL Lamp Base Adaptor
# 1	.010, 1.000	Adaptor Plate	N/A
# 2	.025, 0.100, 0.250	Adaptor Plate	N/A
# 3	10.0, 100.0	S8	530A-118





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