Discontinued System

OPERATIONS MANUAL

PC-3 UV CURING LIGHT SOURCE

TM-021 PN 35933
Rev 05/06/97

DYMAX®

PC-3 TABLE OF CONTENTS

SAFETY

The meanings of **WARNINGS**, **CAUTIONS, AND NOTES** are:

WARNING

A **WARNING** indicates when failure to follow the instructions could result in injury to personnel.

CAUTION

A **CAUTION** indicates when failure to follow the instructions could result in damage to equipment.

NOTE

A **NOTE** is used to highlight an important procedure, practice or condition.

WARNING

READ, UNDERSTAND AND FOLLOW ALL the safety and operating instructions found in this manual.

SAFETY

Safety Precautions Must Be Observed By All Personnel Working Near Or Around Ultraviolet (UV) Light

UV Terminology

The portion of the Electromagnetic spectrum which falls between x-rays and visible light is called Ultraviolet or UV. Ultraviolet (UV) radiation can be classified into three categories: UV-C, UV-B, and UV-A. UV-C is for the wavelengths below 280 nm, UV-B is for the wavelengths between 280-315 nm, and UVA is for the wavelengths between 315-380 nm.

Exposure Hazards

Exposure to UV light, even for short periods of time, can be hazardous. The danger depends upon the exposure time, the intensity of the light, the wavelength, and the individual's sensitivity to UV. UV-B and UV-C can be considered the most hazardous to the skin, causing such effects as sunburn. UV-A, UV-B, and UV-C is considered to be hazardous to the eyes, and is why eye protection is important when working around UV light.

Ozone is a form of oxygen. Interaction of ultraviolet light below 220 nm with oxygen in the surrounding air produces ozone, which is a powerful, toxic agent. It has a characteristic pungent odor to which most people are quite sensitive (people can typically detect concentrations of several parts per million). At high concentrations, it can cause discomfort, or at sufficiently high levels, be dangerous. The PC-3 series of lamps produce minimal amounts of ozone during start-up and no ozone during operation. The radiation beneath the wavelength of about 240 nm, given off by the arc, is absorbed by the outer, colder gas layers and therefore, produce no ozone during operation.

Safety Guidelines

The National Institute for Occupational Safety and Health (NIOSH) recommends that exposure to UV energy be controlled and limited in the work place. Recommended maximum exposures are available, but do not apply to photosensitive individuals.

The total intensity from 320 to 400 nm hitting unprotected skin or eyes should not exceed 1 mW/cm^2 for periods longer than 1000 seconds. For shorter exposure times, the total radiant energy shall not exceed 1000 $mW \bullet sec/cm^2$.

SAFETY

WARNING

EYE PROTECTION

Always wear eye protection when working with or near UV equipment. Use goggles, safety spectacles (glasses) or a face shield to protect your eyes.

- Goggles should completely surround and protect your eyes. Many goggles will also fit over regular glasses. Be sure your goggles fit comfortably.
- Safety spectacles don't fog as easily as goggles and can be worn at all times.
- A face shield protects your entire face, not just your eyes.

It is important to verify that your selection of safety eyewear is approved for UV protection.

Individuals should wear protective UV glasses as a minimum precaution.

SKIN PROTECTION

Individuals exhibit different levels of photosensitivity. Therefore, even minimal periods of exposure of unprotected skin to direct UV light, which can cause sunburn, must be avoided.

- UV barrier creams should be used to protect all exposed skin including the face, neck and arms. UV blocking creams also provide protection to hands with minimal loss of tactile sensitivity or feel. It is, however, necessary to repeat application regularly because the cream wears off.
- Gloves which are opaque to UV light can be worn to protect the hands. Proper glove selection should also include protection from UV curing resins. Consult the resin manufacturer or product data sheets.
- Long sleeved shirts, or a lab coat, will protect the arms.

GENERAL

DESCRIPTION

The Light-Welder® PC-3 is a special purpose UV curing lamp used for pinpoint curing of UV adhesives, coatings, and potting materials. It emits a 5 mm diameter spot of UV light from a liquid light guide. This guide can be hand-held for complete mobility or clamped into position on assembly equipment or work stations for repetitive operations.

The unit consists of a housing containing a 50 watt power supply, circuit protection, lamp/reflector assembly, cooling fan, light guide mount, non resetable hour-meter, and shutter system. Electric shutters are supplied with timed and manual shutter operating modes. The light guide is separate and plugs into the mount. Light is not emitted from the unit when the light guide is removed. A separate filter mounts on the output end of the light guide to reduce visible light output where desired. Lamps are rated at 500 hours of life, however, a useful life of 1000 hours can be expected for most applications.

The power supply operates on line voltages of either 100, 120, or 220 Vac, and 50 or 60 Hz (factory set). AC voltage is stepped down and rectified to DC through a transformer and fullwave bridge rectifier. A separate high voltage winding on the transformer provides ignition voltage for the lamps. A blocking diode is located between the power regulator and the high voltage winding to prevent damage to the regulator circuit. When the lamp ignites, the high voltage is dissipated across the lamp, although the high voltage winding is always energized. If the lamp extinguishes due to a momentary power failure, it will reignite after it cools down if the power switch is left on.

A cooling fan is provided to keep the lamp housing and internal components of the power supply at the optimum operating temperature. The UV source is a 50 Watt short arc mercury vapor lamp mounted in a reflector and pre-focused to provide optimum light output. The unit is rated for continuous operation.

SPECIFICATIONS

PC-3
SPECIFICATIONS

Voltage*	120 Vac, 60 Hz
Current	2.5 Amp Max.
Fuse	3 Amp 5 x 20 mm
Lamp/Reflector	50 Watt (pre-focused)
Shutter Timer	1 to 50 sec. delay
Foot Switch	Rocker type
Hour-Meter	99,999.9 hours, non-resetable

* 100, 220 Vac and 50, 60 Hz Power Supplies are available.

Output Intensities (Typical)**

WAVELENGTH	FILTERED	UNFILTERED
320-390 nm	1.5+	2.5+

** Measured with an EIT Spotcure Radiometer. Values in W/cm^2.

CAUTION

With the filter installed, the PC-3 lamp emits only UV-A and UV-B light and a low amount of UV-C light. Without the filter, UV-A, UV-B, and UV-C, and visible light are emitted. **Never** look directly at the light source while the unit is in use.

UNPACKING & INSPECTION

Upon receipt of lamp, unpack unit and check for shipping damage. Report damage to freight carrier and make any claim for damage through them.

Check box for contents:

- ❑ 1 - Light-Welder® PC-3 Light Source
- ❑ 1 - Lamp/Reflector Assembly
- ❑ 1 - Power Cord
- ❑ 1 - Liquid Light Guide
- ❑ 1 - Filter Assembly
- ❑ 1 - Pair UV Goggles
- ❑ 1 - Warranty Card
- ❑ 1 - Operation Manual
- ❑ 1 - 1/8" Hex Wrench

NOTE

REPORT ANY SHORTAGE TO DYMAX CORPORATION CUSTOMER SERVICE
Phone: (860) 626-6326
Fax: (860) 496-0608

LAMPS ARE SHIPPED WITH THE LAMP REMOVED TO PREVENT BREAKAGE (REFER TO PAGE 9, **LAMP REPLACEMENT/INSTALLATION**).

INSTALLATION

1. Install lamp per **LAMP REPLACEMENT/INSTALLATION** (Page 9).

2. Connect power cord to rear of unit and plug into a grounded wall outlet.

3. Connect light guide to bezel mount by pressing down on lock and inserting guide.

4. Press power switch. Button will illuminate when power is on.

5. Allow lamp to warm up for 4-5 minutes to obtain maximum light output.

6. Locate foot switch where desired. (Electric shutter)

7. Operate shutter by pressing foot switch. With the timer selector switch in the manual position, the shutter operates directly from the foot switch. In the timed position, the shutter opening is determined by the setting of the potentiometer; clockwise increases the opening time and the foot switch must be released after each cycle.

CAUTION

THIS IS AN ARC, NOT A FILAMENT LAMP. ONCE IGNITED, IT MUST BE LEFT ON FOR A MINIMUM OF 5 MINUTES TO FULLY VAPORIZE ELEMENTS IN THE LAMP. IF NOT, THE LAMP MAY BE DIFFICULT TO REIGNITE.

NOTE

The lamp must cool before it can be reignited. Leave power switch on should the lamp extinguish. This operates the cooling fan and allows the lamp to relight when it has cooled sufficiently. If the lamp fails to ignite, refer to pages 11-14, **TROUBLESHOOTING**.
Lamp life is reduced approximately one hour each time the lamp is switched on and off. Avoid repeated cycles by leaving unit on through breaks.

LAMP REPLACEMENT / INSTALLATION

WARNING

BEFORE REPLACING THE LAMP, THE UNIT MUST BE "OFF" FOR A MINIMUM OF 5 MINUTES. THIS WILL ALLOW DANGEROUS CHARGES, WHICH ARE PRESENT FOR PROPER LAMP OPERATION, TO BLEED OFF.

LAMP REPLACEMENT PROCEDURE

1. Allow the unit to cool before removing the lamp/reflector assembly.
2. Unplug the power cord.
3. Remove the cover screws and cover.
4. Disconnect the lamp electrode wire from the positive electrode clip. Do not disconnect the wire from lamp.
5. Loosen the retaining nut (see Figure 1.1) and rotate the electrode to one side such that the lamp/reflector assembly can be removed from mount. Remove the lamp/reflector assembly.
6. Install the new lamp/reflector assembly into the mount and move the negative electrode (see Figure 1.1) into position. Tighten the screw. Do not bend the electrode to install the new lamp/reflector assembly.
7. Attach the electrode wire to the positive electrode clip (see Figure 1.1).
8. Replace the housing cover on the unit. If access to the unit is limited, use Allen head screws instead of thumbscrews.
9. Record the serial number of the unit and hour-meter reading on the Bulb History Record.

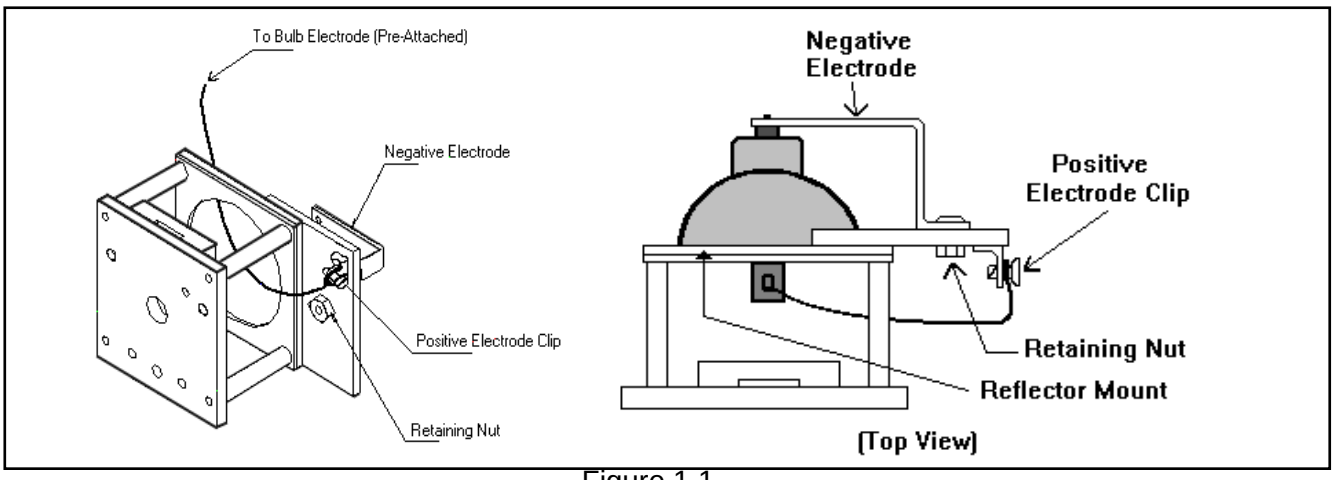


Figure 1.1

MAINTENANCE

LIGHT GUIDE

Operating temperature should not exceed 55°C. Ends of the guide should be kept clean to transmit as much light as possible. Cured adhesive can be removed with razor blade. Avoid sharp bends with the light guide since this reduces light output and damages guide.

TROUBLESHOOTING

CAUTION

ONLY QUALIFIED MAINTENANCE PERSONNEL SHOULD ATTEMPT THE FOLLOWING PROCEDURES:

Problem: Lamp Will Not Ignite

Possible Cause	Testing	Corrective Action
Improperly Fastened Connections	Visually inspect all input/output connections (i.e. power cord, lamp).	Secure all connections.
Lamp Beyond Useful Life	Replace with a known good lamp/reflector assembly and re-test unit.	Replace lamp/reflector assembly if defective (typical life = 1000 hours).
Corroded Negative Electrode (Brass Bracket)	Visually inspect the negative electrode for ANY signs of corrosion.	Replace, if corroded.
Main Line Fuse Blown (Nothing in Unit Operates)	Remove fuse from power receptacle and check with an ohmmeter.	Replace fuse, if defective.
No High Voltage Off Transformer Output	Verify ignition voltage off transformer (refer to Figure 2).	Replace transformer, if defective.
Insufficient Ignition Voltage	Verify ignition voltage being supplied to the lamp (refer to Figure 2 for location and Figure 3 for waveform).	Replace defective component (typically blocking diode).
No Operating Voltage (Lamp Flickers)	Verify the operating voltage (refer to Figure 2).	Replace defective component.

Problem: Shutter Fails To Open
Other Symptoms: Shutter Remains Open

Possible Cause	Testing	Corrective Action
Shutter Mechanism Binding	Remove power from unit and manually move the shutter and solenoid up and down (should move freely).	Replace component causing problem.
Solenoid Malfunctioned	Measure the voltage being delivered to the solenoid during operation (refer to Figure 2 - Auxiliary voltage). If good check solenoid resistance (≈120 ohms).	Replace solenoid, if defective.
Timer Malfunctioned	If shutter operates in manual mode but not in timed mode, timer is defective.	Replace defective timer.

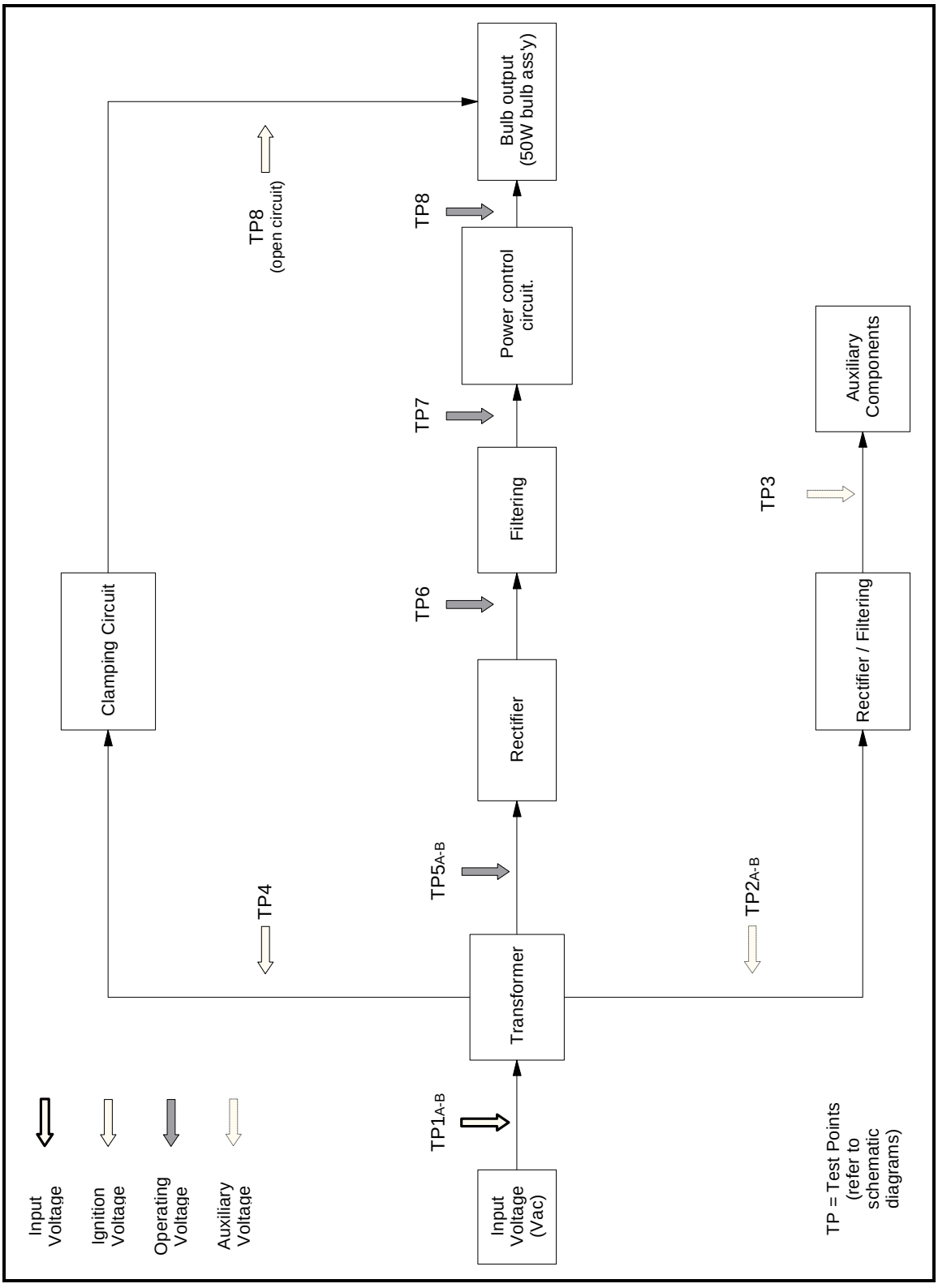
TROUBLESHOOTING

Problem: Low Output Intensity

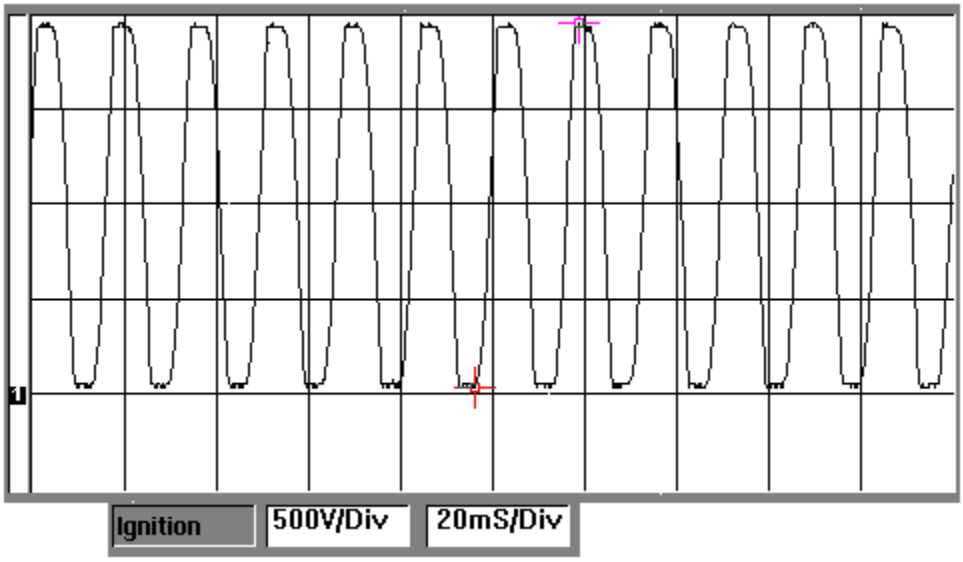
Other Symptoms: Fails To Cure Adhesive In Allotted Time

Possible Cause	Testing	Corrective Action
Lamp Beyond Useful Life	Use a radiometer (model Dymax Accu-Cal 20) to measure actual output intensity. Consult manual for proper output.	Replace lamp/reflector assembly if beyond useful life (typical = 1000 hours).
Transmission loss In Light Guide Too Great	Compare light guide output against new light guide (or use the Dymax Light Guide Simulator - P/N 36987) to determine transmission loss.	Replace light guide.
Transmission loss In Filter (Blue Filter At End Of Light Guide) Too Great	Compare filter output against new filter to determine transmission loss.	Replace filter.
Contaminants On Light Guide Or Light Guide Filter	Visually examine ends of light guide and filter for contaminants.	Clean with isopropyl alcohol (or equivalent) or replace light guide filter if it can not be cleaned.
Lamp/Reflector Assembly Not Installed Properly	Visually check to make sure the lamp/reflector assembly is seated flush in the lamp mount assembly (any error in installation could cause a low output).	Properly install lamp/reflector assembly.

TROUBLESHOOTING (Figure 2)



TROUBLESHOOTING (Figure 3)



Open Circuit Voltage From Lamp Output

Test Configuration: **Remove Power**
Remove Lamp/Reflector Assembly From Unit
Measurement Taken Across Lamp Output From Unit

Oscilloscope Setting: **DC Coupling**
20 ms / Div
500V / Div
Probe Connected Across Lamp Output (*Use a High Voltage Probe*)

Open Circuit Voltage: **≈ 1900V peak**

PC-3
SPARE PARTS

Item	Part Number
Lamp/Reflector Assembly	35003
Fuse: 3A 250 Vac	35254
2A 250 Vac	35636
5A 250 Vac	35574
Filter (Light Guide)	35301
Liquid Light Guide, 1 Meter	35102
Solenoid Assembly	35928
Blocking Diode	35660

OPTIONS

PC-3
ACCESSORIES

Item	Part Number
Liquid Light Guide, 1/2 meter*	35101
Liquid Light Guide, 3 mm x 1 meter	36619
UV Goggles: Yellow	35284
Amber	35285
Smoke	35286
Face Shield	35186
Accu-Cal 10 Radiometer	35191
Light Guide Simulator	36987

- Longer Light Guides Also Available

WARRANTY

WARRANTY POLICY

DYMAX CORPORATION RESERVES THE RIGHT TO INVALIDATE ANY WARRANTIES, EXPRESSED OR IMPLIED, DUE TO ANY REPAIRS PERFORMED OR ATTEMPTED ON EC-SERIES LIGHT SOURCES WITHOUT WRITTEN AUTHORIZATION FROM DYMAX. THOSE CORRECTIVE ACTIONS LISTED BELOW ARE LIMITED TO THIS AUTHORIZATION.

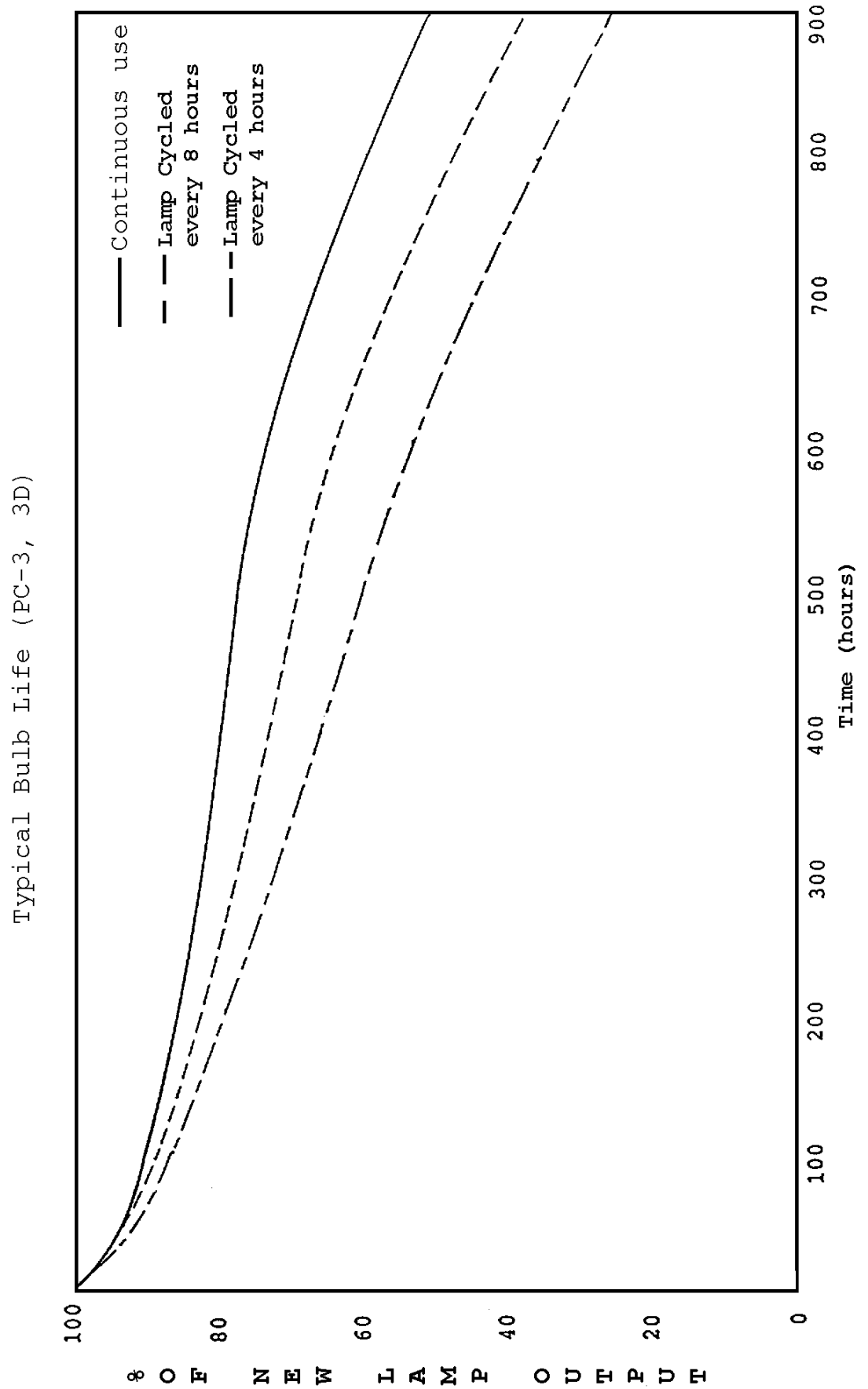
Light Sources:

Warranty is granted for one year from the date of the equipment shipment from Dymax to the distributor or customer. The warranty start date can be extended to the date of shipment from the distributor stock to the end-user.

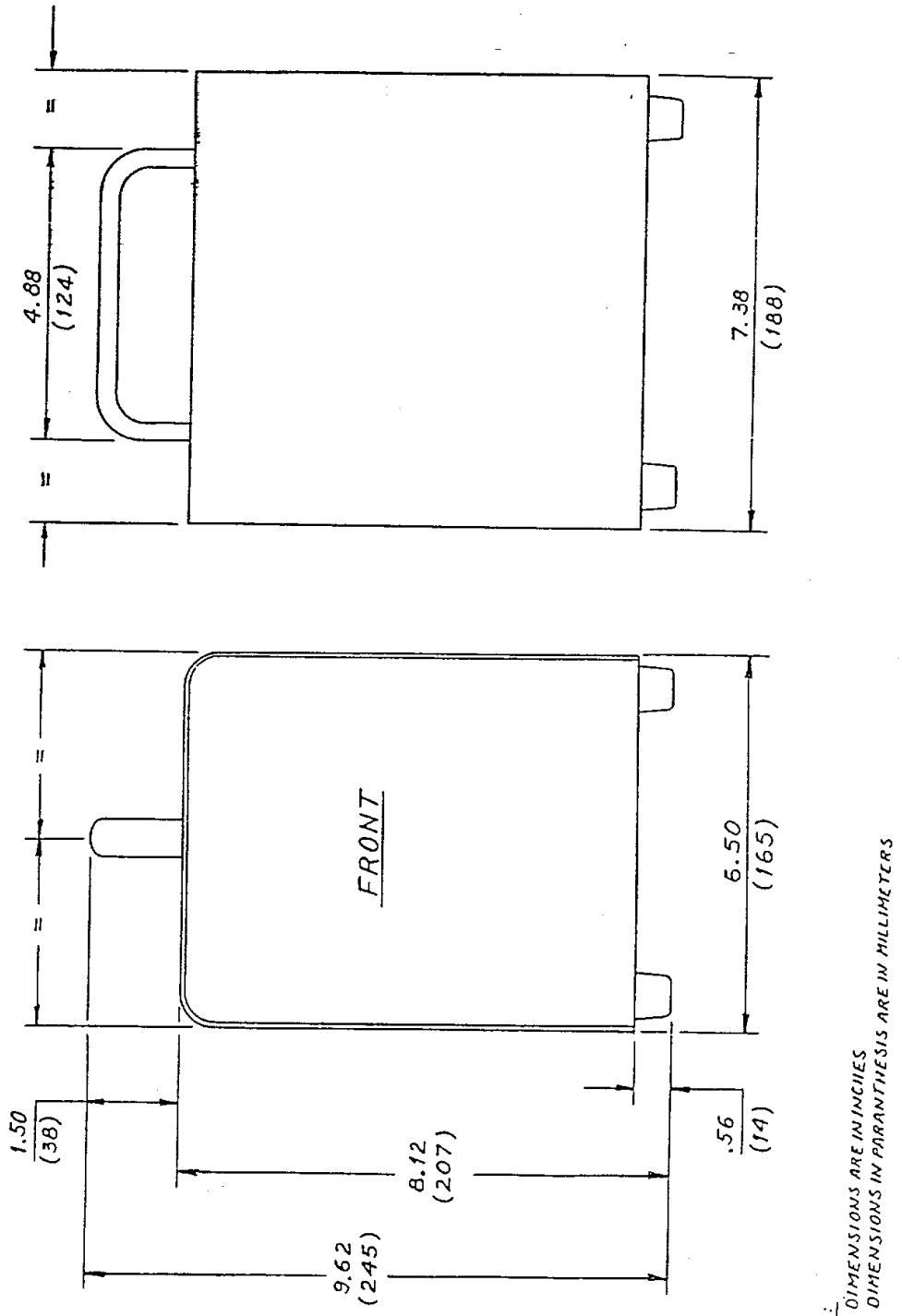
Lamps and Lamp Assemblies:

Warranty will be honored only if the defective lamp/reflector assembly is returned with a filled out Bulb History Record. The form will be provided with each lamp/reflector assembly.

The 50 Watt lamp/reflector assemblies are warranted for 500 hours of useful life. Lamps are not warranted against breakage from handling and shipping.


Typical Bulb Life (PC-3, 3D)
Continuous use
Lamp Cycled every 8 hours
Lamp Cycled every 4 hours
% OF NEW LAMP OUTPUT
100
80
60
40
20
0
100
200
300
400
500
600
700
800
900
Time (hours)

LAMP DIMENSIONS



NOTE:
- DIMENSIONS ARE IN INCHES
- DIMENSIONS IN PARANTHESIS ARE IN MILLIMETERS