DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
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METHOD OF TEST FOR LUMINANCE OF PEDESTRIAN SIGNAL FACE

A. SCOPE

This method describes the procedure for determining the luminance (Candela/ft^2) of the area of a circle encompassing the don't walk "hand" symbol and the luminance of the area of a circle encompassing the walk "walking person" symbol on a pedestrian signal face.

B. APPARATUS

1. Spectra Scan Photometer, Model PR650.
2. ND2 Filter, x100 Neutral Density Filter.
3. Spectra LS-6 Luminance Standard
4. DC power supply, Electronic Measurements Inc., Model # SCR 150-10- DV.
5. AC Regulator, Sorensen Model 1000
6. Fluke Digital Multimeter, Model 8060A
7. Red Filter, NBS No. 3648-2-3
8. Photometer tunnel, 100 ft long, 11 ft high, and 11 ft wide.

C. TEST PROCEDURE

1. Turn ON Spectra Scan PR650.
2. Set pedestrian signal face on stand (Figure-1)
3. Place Spectra Scan PR650 photometer on the same line of sight and at a distance of 67 ft (based on a 14 in. symbol) from which the luminance of the pedestrian signal face is to be measured. The height of the photometer must be at the same height as the center of the pedestrian signal indication.
4. Move the PR650 Photometer to the minimum distance required, which covers approximately half of the area of interest inside the symbol. The aperture must be within the area of the lighted symbol or the reading will be in error.
5. Adjust the pedestrian signal lamp current to the value that provides the appropriate lumen output. For example, working standard #2 for 665 lumens is adjusted to 0.6916 ampere. When testing luminous tubing symbols, adjust the input voltage to 120 volts ± 0.5 volt.

6. Measure 13 points on the "walking person" and 12 points on the "hand" symbol. (See Figure 4 for location of points.) Calculate the average Candela/ft² for each symbol.

7. Take measurement Ws and Hs and record.

D. CALIBRATION

Color correction is necessary because the correction of most photometers to the CIE average observer curve is not perfect, especially in the red region. To prevent large errors in these regions, the photometer is calibrated to a standard which has approximately the same spectral distribution as the signal face. By using a luminance standard light source, a standard of luminance can be set up against which the photometer can be calibrated for white light. To calibrate the photometer for colored light, colored filters of known spectral transmission are added to the luminance standard to form the color standard.

Perform the calibration before and after finishing the test to ensure validmeasurements.

1. Position photometer objective lens over collar of Spectra LS-6 Luminance Standard (Figure 3).

2. Set the Spectra LS-6 Luminance Standard to standard luminance settings by adjusting micrometer and by applying rated voltage of 6.17 volts to its standard lamp. Follow manufacturer's instructions.

3. Record the reading of white light (Actual Candela/ft^2 - White).

4. Insert NBS filter No. 3648-2-3, which has a transmittance factor of T, between the photometer objective lens and the brightness source.

5. Record the Portland orange colored light (Actual Candela/ft^2 - Orange).

E. CALCULATIONS

1. Calculate Wc (white light color correction) using the following equation:

White light correction factor:

$$Wc = \frac{\text{Std Candela/ft}^2}{\text{Actual Candela/ft}^2 - \text{White}}$$

2. Calculate Rc (Portland orange color correction) using the following equation:

Portland orange correction factor:

$$Rc = \frac{\text{Std Candela/ft}^2}{\text{Actual Candela/ft}^2 - \text{Orange}}$$

3. The final correction calculations (in Candela/ft$^{2)}$ are:

   Walking person (candela/ft^2): Ws x Wc
   Hand (Candela/ft^2): Hs x Rc

4. Definitions:

Std. Candela/ft^2	=	Standard Value (in Candela/ft^2) to which Spectra brightness source is set.
Actual Candela/ft^2 White	=	Actual reading (Candela/ft^2) of Spectra brightness source.
Actual Candela/ft^2 Orange	=	Actual reading (Candela/ft^2) of Spectra brightness source with NBS orange filter in front of source.

T	=	Transmittance factor of filter.
d	=	Distance (ft) between pedestrian signal face and PR650 photometer.
Hs	=	"Hand" symbol, reading (Candela/ft^2) from PR650.
Ws	=	"Walking Person" symbol, reading (Candela/ft^2) from PR650.
Wc	=	White light correction factor.
Rc	=	Portland orange light correction factor.

F. HEALTH AND SAFETY

It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Prior to handling, testing or disposing of any materials, testers must be knowledgeable about safe laboratory practices, hazards and exposure, chemical procurement and storage, and personal protective apparel and equipment.

Caltrans Laboratory Safety Manual is available at:

http://www.dot.ca.gov/hq/esc/ctms/pdf/lab_safety_manual.pdf

End of Text
(California Test 606 contains 8 pages)

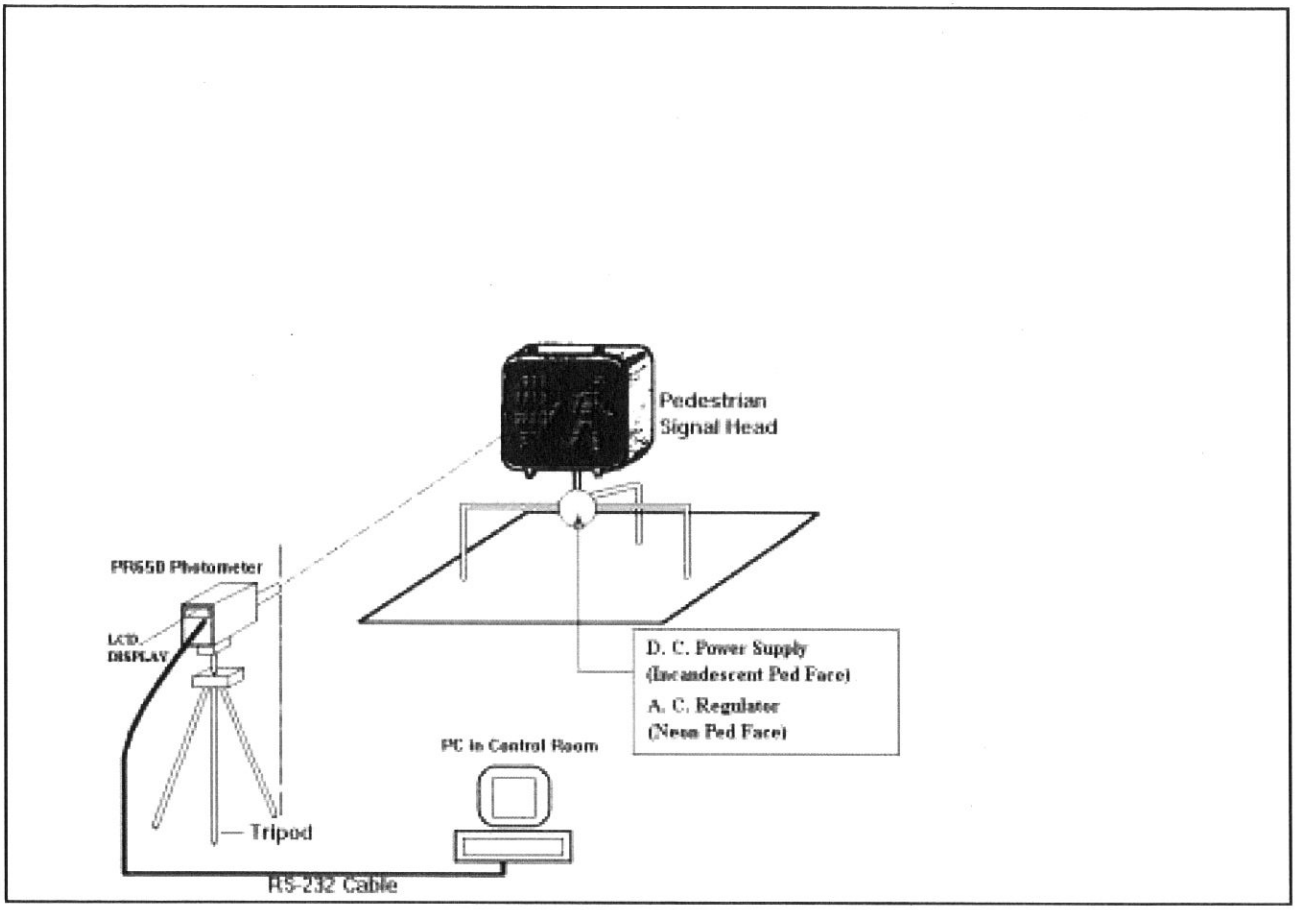


FIGURE 1. Test Setup for Testing Pedestrian Signal Head.

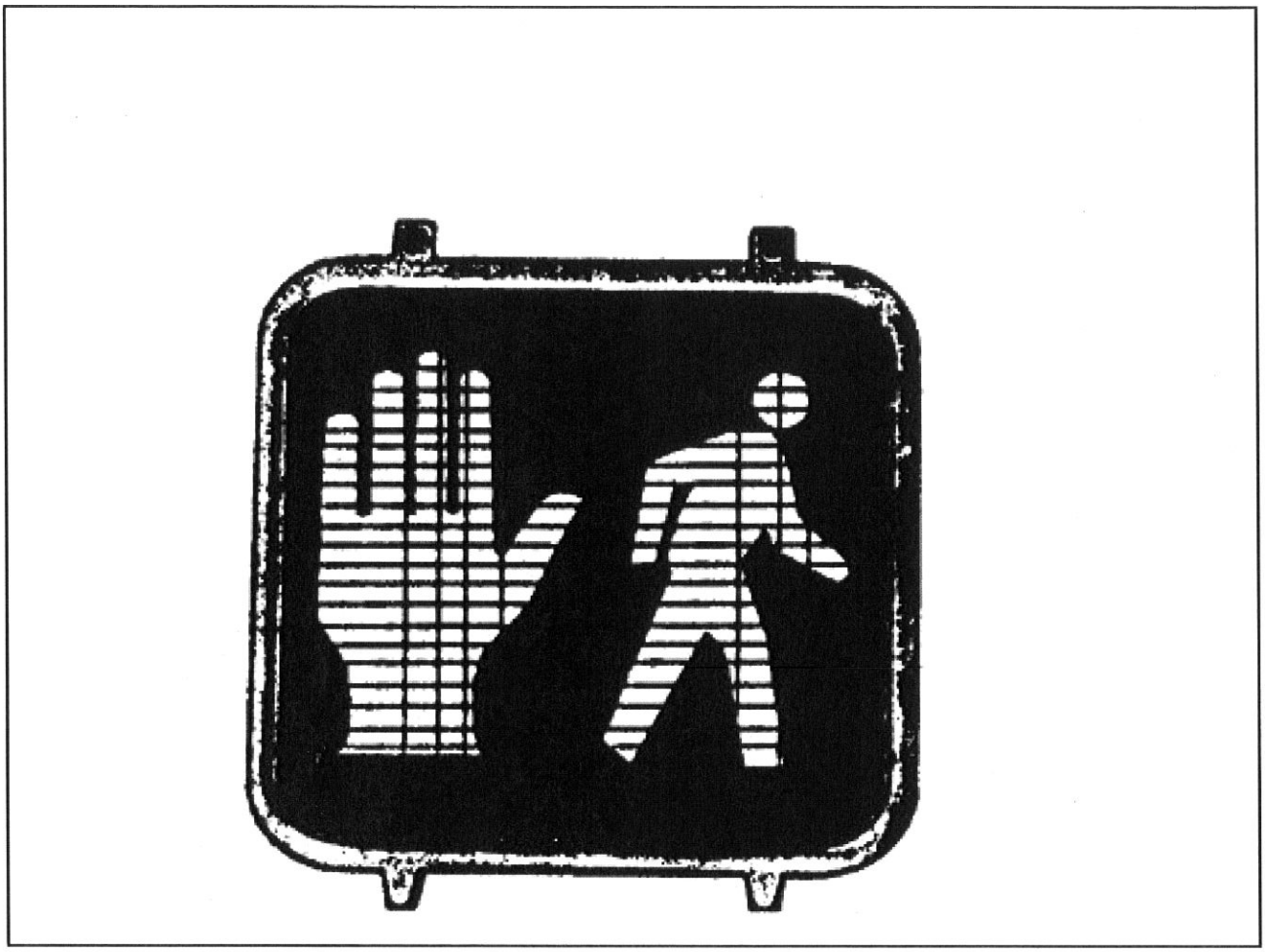


FIGURE 2. Pedestrian Signal Head.

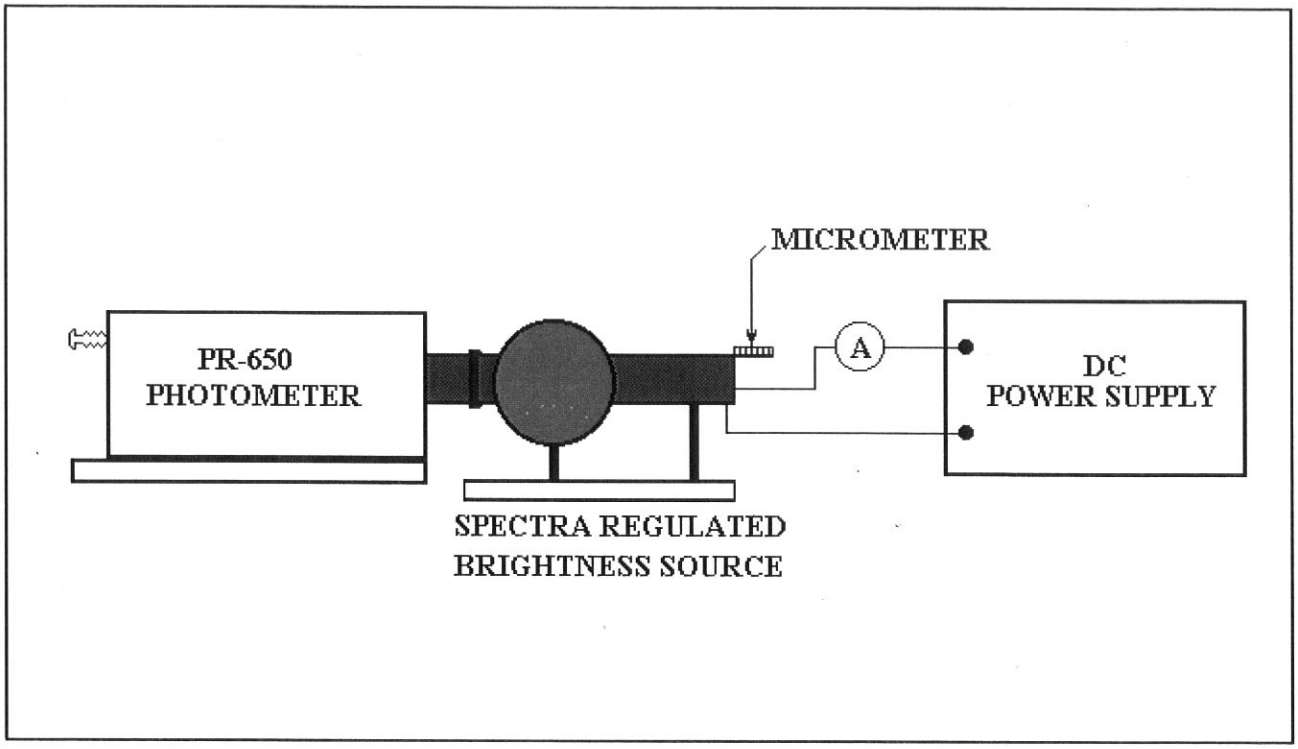
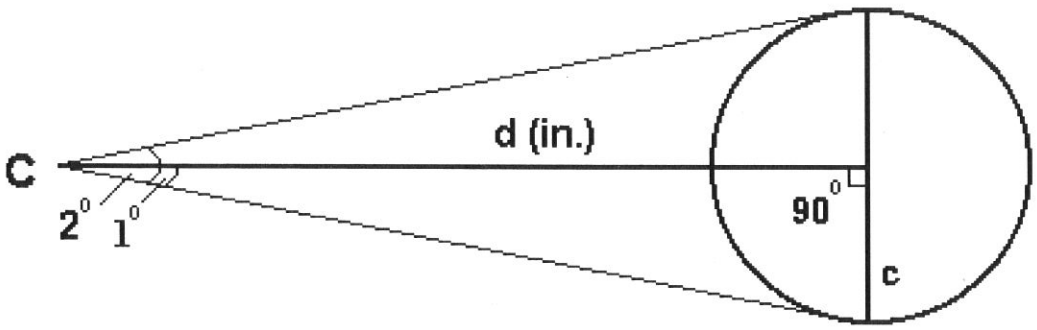


FIGURE 3. Test Setup for Calibration of PR-650 Photometer.

APPENDIX

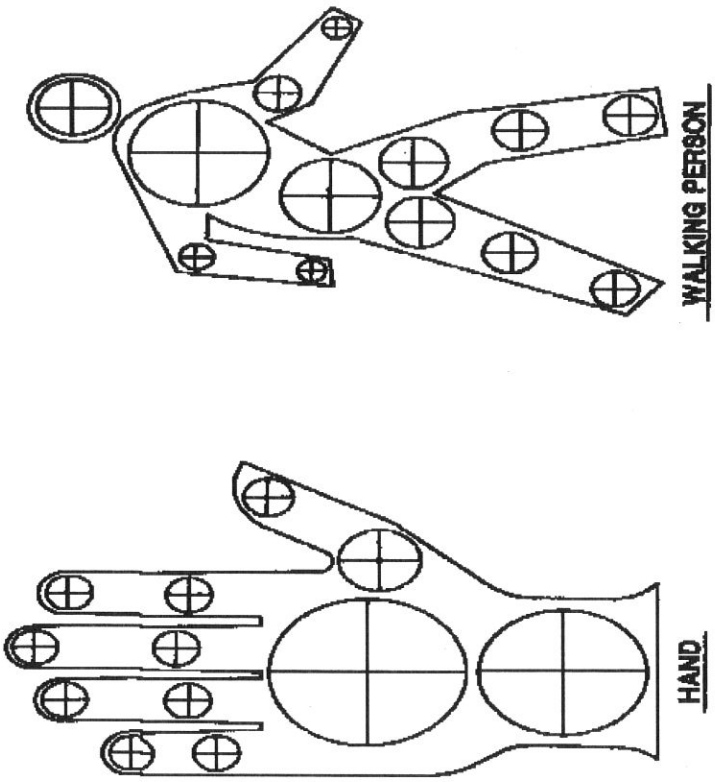


C = Measuring field setting fixed 2^0 (PR650)

C = Radius of measuring aperature at distance d.

$c = d \tan \frac{1}{2} C$

$$d = \frac{c}{\tan \frac{1}{2} C}$$



Blank Form for recording test parameters.
FIGURE 4.