Model 845HP Digital Shutter Sytem

INSTRUCTION MANUAL

Newport

Model 845HP Digital Shutter System

Warranty

Newport Corporation warrants this product to be free from defects in material and workmanship for a period of 1 year from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport office or representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the instrument, transportation prepaid, to the indicated service facility. Repairs will be made and the instrument returned, transportation prepaid. Repaired products are warranted for the balance of the original warranty period, or at least 90 days.

Repaired products are warranted for the balance of the original warranty period of 90 days, whichever is longer.

This warranty does not apply to defects resulting from modification or misuse of any product or part. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. Newport Corporation shall not be liable for any indirect, special, or consequential damages.

Irvine, CA. 92606 USA
Part No. 12944 (Rev. A)
IN-11894 (02-00)

Table of Contents

List of Figures

Specifications

Model 845HP Digital Shutter System:	
Operating Temperature	0° to 70° Centigrade
Operating Relative Humidity	10% to 90%, Noncondensing
Power Consumption	<14 Watts
Shipping Weight	3.5 lbs.
Controller: (Model 845HP)	
Exposure Duration	10 msec - 990 sec
Timing Accuracy	0.05% ± 10 microseconds
Max. Repetition Rate	10 Hz
Operating Modes:	
TIME:	Timed shutter opening
MANUAL:	Open and close shutter independent of time setting
START:	Initiates timed or manual shutter operation
RESET:	Closes shutter
DELAY:	Optional 10 second delay before opening
Pushbutton Cable Length	96 in. (2.44 m)
Power Requirements	115 VAC @ 0.1 A, or 220 VAC @ 0.05 A, 50/60 Hz
Controller Dimensions	3.25 x 6.0 x 6.25 in. (8.25 x 15.25 x 15.9 cm)
Shutter: (Model 846HP)	
Aperture	5.6 mm
Max. Incident Power (spread over total aperture)	5 Watts (846HP)
Response Time with Model 845HP controller	< 3 msec
Electrical Input	Positive (open) or negative (close) pulse, 5-30 V amplitude
Coil Impedance	13 Ohms
Coil Inductance	6.2 mH
Max. Coil Dissipation	3 Watts
Shutter Cable Length	Integral 96 in. w/ 4 pin DIN connector (2.44 m)
Head Dimensions	2.25 x 1.35 x 1.14 in. (57.2 x 34.3 x 29 mm)
Stand:	
Model	814 (English) or M-814 (Metric)
Height Adjustment	Min.: 4.875" (128.8mm) Max.: 7.875" (200.0mm)

Section 1
General Information

1.1 Introduction

This instruction manual contains the necessary information for operating and maintaining the Model 845HP Digital Shutter System. This information is divided into the following sections:

- Section 1 contains general information and provides guideline for using this manual. Important safety information is also presented here.
- Section 2 reviews the principles of the operation of the Shutter and the controller. This section defines terms which are used in later sections.
- Section 3 describes the procedures for operating the Model 845HP Digital Shutter System.
- Section 4 provides information for maintenance and trouble-shooting by the user.
- Section 5 gives information regarding factory service and repairs.
- Section 6 contains reference drawings.

1.2 Getting Started

Please carefully read and understand this instruction manual before using the Shutter System. Alignment of the Shutter requires care and patience for optimum performance. Be especially careful in observing the safety warnings and cautions throughout the manual (see Section 1.7). If any of the operating instructions are not clear, contact Newport Corporation before beginning to use the Shutter System.

1.3 Unpacking and Inspection

The Model 845HP Digital Shutter System was carefully inspected mechanically, electrically, and optically before shipment. Upon receiving the Shutter System, check for any obvious signs of physical damage that might have occurred during shipment. Report any such damage to the shipping agent immediately. Retain the original packing materials in case reshipment becomes necessary. The following items are included with every Model 845HP Shutter System order:

- Model 845HP Controller
- Model 846HP Shutter
- Remote Control Cable Assembly
- Instruction Manual

1.4 Specifications

Detailed Model 845HP Digital Shutter System specifications may be found immediately preceding this section of the instruction manual.

1.5 Warranty Information

Warranty information may be found on the page preceding the Table of Contents of this manual. Should it be necessary to exercise the warranty, contact your Newport representative or the factory to determine the correct course of action. Newport Corporation maintains offices worldwide. Information concerning the application, operation, or service of your instrument may be directed to any of these locations. Check the back cover of this manual for addresses.

1.6 Safety Terms

The following safety terms are used in this manual:

The **Warning** heading in this manual explains dangers that could result in personal injury or death.

The **Caution** heading in this manual explains hazards that could damage the instrument.

1.7 Options

The Model 845HP Digital Shutter System may be ordered with either a metric or English (Model 814 or M-814) detector stand. In addition, the Model 845HP can be configured for either 120VAC or 240VAC.

Section 2

Principles of Operation

2.1 Model 845HP Controller

The Newport Model 845HP Shutter Controller is a self-contained control unit. It uses discrete CMOS IC's to develop the necessary logic for control of the Model 846HP Shutter for a variety of applications. Figure 2-1 illustrates the layout of the controller. Reference drawing #1 (Section 6) contains the actual schematic layout of the controller.

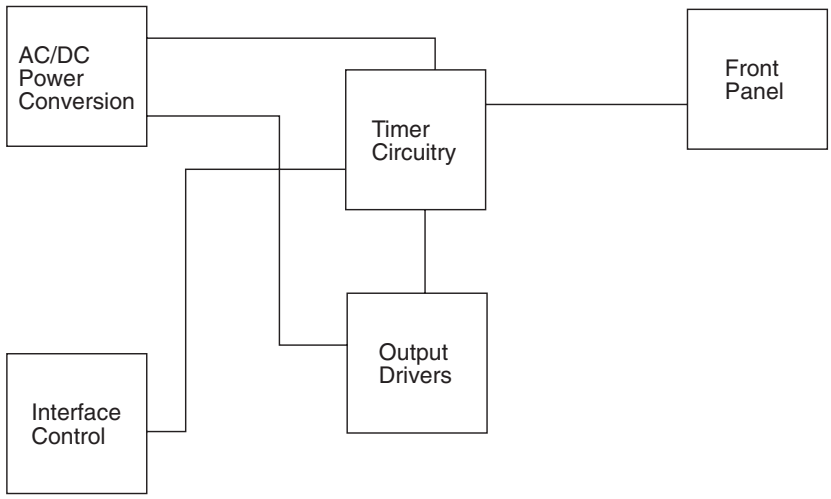


Figure 2-1 Model 845HP Controller Block Diagram

2.1.1 AC/DC Power Conversion

AC voltage from the plug is transformed into DC power for the driver circuitry and regulated down to +5VDC for the logic circuitry. The layout provides for selection of 110VAC or 220VAC operation by changing jumpers on the board.

2.1.2 Front Panel

Switches on the front panel of the 845HP Controller permit the user to turn the unit on and off, set the mode of operation, and, where allowed, program the time delay before operation. The length of programmed delay is manually set by using the digital rotary switches provided.

2.1.3 Timer Circuitry

The output of a precision 100KHz oscillator is divided down using the settings of the front panel digital rotary switches to provide a pulse of a programmed length to the output drivers. This pulse is accurate to 0.05% ± 10 microseconds.

2.1.4 Output Drivers

The high power output transistors are driven by the output logic circuitry in such a way that a positive power pulse is sent to the shutter in one of two directions, thereby controlling the opening and closing of the shutter. To open the shutter, the output control logic drives pin 1 of J2 (black) positive with respect to pin 4 of J2 (red). To close the shutter, the circuitry effectively reverses the polarity of these outputs, making pin 4 of J2 positive with respect to pin 1 of J2. J2 is a 4-pin "DIN" style connector located on the back panel with a pin-out defined as follows:

J2 Pin #	Function
1	Positive pulse with respect to pin 4 to open
2	No connection
3	No connection
4	Positive pulse with respect to pin 1 to close

The DIN plug output follows the standard DIN pin definition convention as in Figure 2.

Connector J2

PIN	Wire Color
1	Black
2	N/C
3	N/C
4	Red
Tab	Gray (case ground)

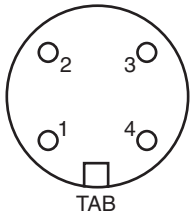


Figure 2-2. 4-PIN Standard "DIN" Connector viewed from back panel. This connector is the Shutter-to-Controller Interface

2.1.5 Interface Control

The Model 845HP Controller provides a capability for remote manual or computer operation through a 5-pin "DIN" style connector J1 on the back panel. Although initial set-up must be accomplished using the front panel to pre-program delay times, start, stop, and reset commands may be issued to the 845HP Controller through the interface. The inputs and outputs are "active high" and are protected at 5.1V maximum with zener diodes. +5VDC and ground pins are also provided on J1. The Pins are defined as follows:

J1 Pin #	Function
1	Signal Ground
2	Start (input) — opens shutter or begins automatic timer sequence
3	Reset (input) — closes shutter, resets timer
4	+5VDC (output) — for manual switch or relay operation of inputs
5	Busy (output) — controller is busy and unavailable for command inputs

The DIN plug output follows the standard DIN pin definition convention as in Figure 3.

Connector J1

PIN	Wire Color
1	Black
2	Blue
3	Green
4	Red
5	Yellow
Tab	Gray (case ground)

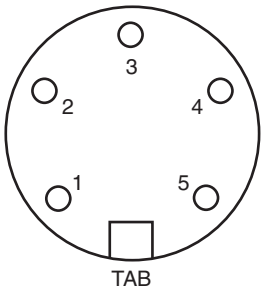


Figure 2-3. 5-PIN Standard "DIN" Connector viewed from the back panel. This connector is the Remote Conntrol Assy/Controller Interface as well as the Computer Interface.

2.2 Model 846HP Shutter

The Model 846HP Shutter is a simple but highly reliable design that contains only one moving part — the shutter blade. Tests of this design have shown a service life in excess of one million operations.

The shutter blade in this new design has only two positions — open and closed. Once moved into either the open or closed position, the blade will remain in that position without further application of power. The holding force in either of the two stable positions is such that only a high lateral acceleration will toggle the shutter in the absence of physical contact with the shutter blade.

In normal operation (such as with the Model 845HP Controller), +5VDC is applied to the actuator coil of the shutter as follows:

To open the shutter:	apply +5VDC on connector pin 1 with respect to pin 4.
To close the shutter:	apply +5VDC to connector pin 4 with respect to pin 1.

The shutter coil may be operated continuously at +5VDC without damage. At this voltage level, the shutter will open and close in approximately 10 milliseconds. For faster operation, it may be pulsed at higher voltages (up to 30VDC), but the 3 Watt maximum power dissipation limit must be observed. Using the Model 845HP Controller, the shutter will open and close in <3 msec.

CAUTION

Exceeding the 3 Watt power dissipation limit of the coil may result in shutter failure.

Section 3

System Operation

3.1 Introduction

The Model 845HP Digital Shutter System is composed of a Model 845HP Controller with integral AC power cable, a Model 846HP Shutter (black shutter blade) with integral cable, a remote cable assembly for manual start control, and instruction manual. It is designed for operation at 120VAC or 240VAC (jumper selectable), 50/60Hz.

CAUTION

The shutter blade is designed for a maximum power level of 5 Watts (Model 846HP) over the total aperture. Exceeding these power levels may both damage the driver coil and cause the blade to emit smoke due to oxidation. Pitting of the blade will also occur.

3.2 Preparations for Use

Set-up of the shutter in the working beam should be accomplished with the shutter open whenever possible to minimize or eliminate stray reflections from the housing or blade. Where possible, use an attenuated beam to set the optical axis height, rather than the full beam power.

WARNING

Wear laser eye protection when aligning and using this shutter. Even stray reflections can cause eye damage!

The minimum optical axis height of the Model 846HP on the 814 Stand is 6.750" (171.5mm). Other heights are available using different posts.

3.3 Manual Mode of Operation

The Manual mode of operation for the system is accessed by placing the Time/Man switch in the “down”, or “Man” position. A start command, generated by pressing the Reset/Start switch momentarily down (“Start”), opens the shutter. A reset command, generated by moving the Reset/Start switch momentarily into the up position (“Reset”) closes the shutter. In this mode, the Delay switch has no effect.

3.4 Time Mode of Operation without Delay

The Time mode of operation for the system is accessed by placing the TIME/MAN switch in the "up", or "TIME" position. The DELAY/OFF switch is in the "OFF", or "down", position so there is no delay before the shutter opens when a start command is issued. In the Time mode, timed shutter openings from 10 msec to 990 seconds may be made with 0.05% ± 10 microsecond time accuracy. A start command (START/RESET switch momentarily pressed down) will begin the timed sequence. The timing sequence may be terminated immediately at any time by issuing a reset command (RESET switch moved momentarily into the "up" position).

NOTE

Repeated START commands during the timing sequence will be ignored. If the START switch is held in the start position, the controller may not be retriggered until the START switch has been released.

3.5 Time Mode of Operation with Delay

The Time mode of operation for the system is accessed by placing the TIME/MAN switch in the "up", or "TIME" position. In the Time mode, timed shutter openings from 10 msec to 990 seconds may be made with 0.05% ± 10 microsecond time accuracy. For delayed operation, the DELAY/OFF switch is in the "DELAY", or "up", position which inserts an 8 second delay before the shutter opens. A start command (Start/Reset switch momentarily pressed down) will begin the timed sequence. The timing sequence may be terminated immediately at any time by issuing a reset command (RESET switch moved momentarily into the "up" position).

NOTE

Repeated START commands during the timing sequence will be ignored. If the START switch is held in the start position, the controller may not be retriggered until the START switch has been released.

3.6 Remote Operation

As outlined in Section 2.1.5, the Model 845HP Digital Shutter System may be remotely controlled either manually or by a computer after the initial set-up is accomplished. A remote control cable and switch is provided by Newport as part of the system to manually trigger (open) the shutter. This cable plugs into the 5-pin "DIN" connector on the back of the 845HP Controller. Care should be taken to ensure that the user makes connection to the proper connector on the back of the controller (as there are two different but similar "DIN" connectors located on the rear panel).

To control the system by either a computer or other automated instrument using the remote control port (J1) on the back of the controller, a signal greater than +2.5VDC but not greater than +5.1VDC (referenced to ground — J1, pin 1) should be applied to the appropriate input pin on J1. Pin 4 of J1 provides +5VDC for this purpose if a relay or similar type of discrete switching device is used. Pin 5 of J1 provides the controlling instrument or driving device with status information as to the ability of the 845HP Controller to accept commands.

NOTE

When pin 5 of J1 is high (BUSY is active), the 845HP Controller will not accept commands from the driving device.

CAUTION

Pin 5 of J1 is a CMOS output. An external controller driving device should not put any voltage on this pin.

Section 4

Maintenance and Troubleshooting

4.1 Maintenance and Adjustment Procedures

Normal maintenance of the Model 845HP Digital Shutter System is minimal. General cleanliness should be observed. The cases of both the controller and shutter housings should be cleaned first with a soft brush (to remove dust) and then with alcohol or mild soap and water as necessary.

In general, the system is set at the factory to the specifications listed in the Specifications Section of this manual and requires no user adjustment. The Model 846HP Shutter blade is not field-replaceable.

4.2 Troubleshooting Guide

The following troubleshooting guide is intended to isolate problems with the system so that if a return of the system to Newport is necessary, it can be facilitated. For other problems that cannot be resolved, please see Section 5 for details on returning your entire system to Newport for service.

Symptom	Possible Fault/Corrective Action
Total system failure	Ensure power plug is connected.
	Ensure power switch is “on”.
	Check fuse for continuity, replace if defective
	Ensure AC Voltage jumpers are set properly — change if necessary, check fuse as above.
	If none of the above, return system to Newport for service
Shutter either will not open or will not close	Damaged output drivers or main transformer — return to Newport for service.
Blade smokes during operation	Optical power density exceeded— reduce power levels
Pitted or damaged blade	Maximum optical power density exceeded for blade type — order new 846HP as appropriate.

Section 5
Factory Service

5.1 Introduction

This section contains information regarding obtaining factory service for the Model 845HP Digital Shutter System and accessories. The user should not attempt any maintenance or service of the Model 845HP and/or accessories beyond the procedures given in Section 4: Maintenance and Trouble-Shooting. Any problems which cannot be resolved using the guideline listed in Section 4 should be referred to Newport Corporation factory service personnel. Contact Newport Corporation or your Newport representative for assistance.

5.2 Obtaining Service

To obtain information concerning factory service, contact Newport Corporation or your Newport representative. Please have the following information available:

1. Instrument Model Number
2. Instrument Serial Number
3. Description of the problem.

If the instrument is to be returned to Newport Corporation, you will be given a Return Number, which you should reference in your shipping documents.

Please fill out the service form, located on page 13, and have the information ready when contacting Newport Corporation. Return the completed service from with the instrument.

5.3 Service Form

NEWPORT CORPORATION
U.S.A. Office: (949) 863-3144
FAX: (949) 253-1800

RETURN AUTHORIZATION #_____
(Please obtain prior to return of item)

Name _____ Date _____

Company _____ Phone Number _____

Address _____

_____

Country _____

P.O. Number _____

Item(s) Being Returned:

Model # _____ Serial # _____

Description: _____

Reason for return of goods (please list any specific problems) _____

_____

Please complete the below, as appropriate.

List all control settings and describe problem: _____

_____

_____

_____ (Attach additional sheets as necessary).

Show a block diagram of your measurement system including all instruments connected (whether power is turned on or not). Describe signal source. If source is a laser, describe output mode, peak power, pulse width, repetition rate and energy density.

Where is the measurement being performed?

(factory, controlled laboratory, out-of-doors, etc.) _____

What power line voltage is used? _____ Variation? _____

Frequency? _____ Ambient Temperature? _____

Variation? _____ °F. Rel. Humidity? _____ Other? _____

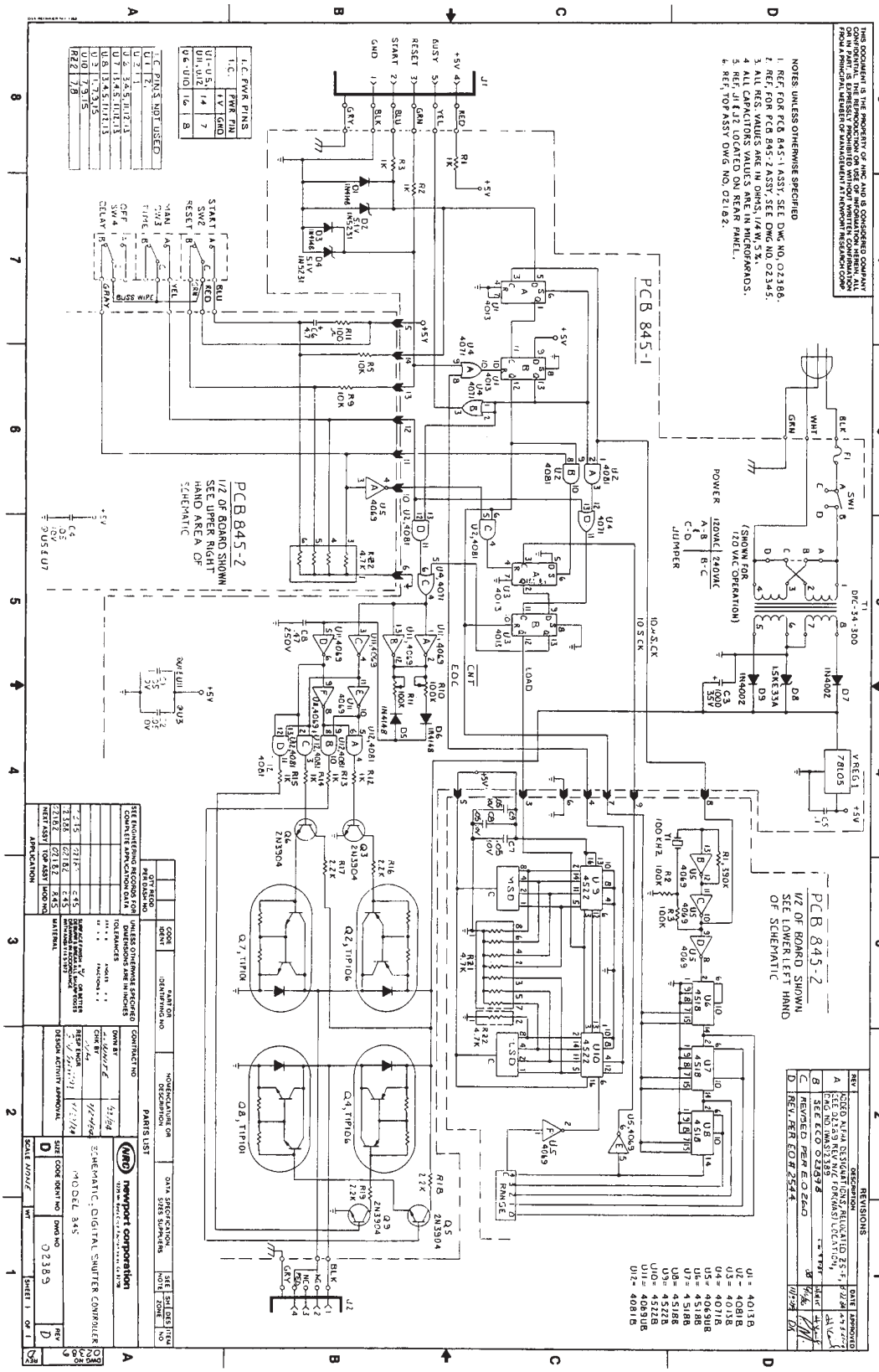
Any additional information. (If special modifications have been made by the user, please describe below).

_____

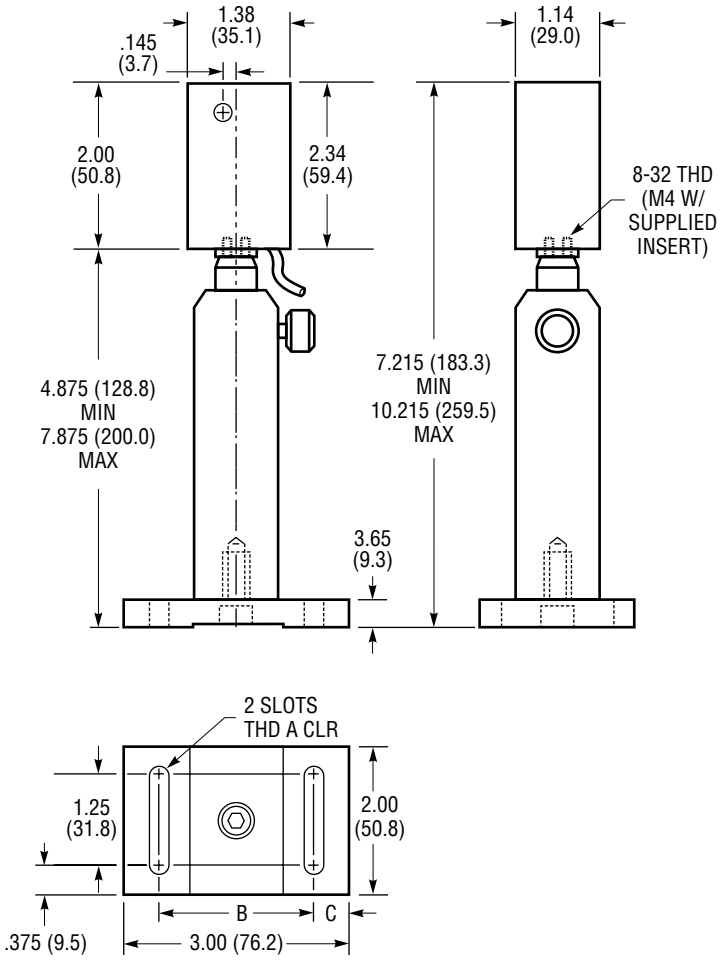
_____

Section 6 Reference Drawings

6.1 Reference #1: Drawing No. 02389, Model 845 Controller Electrical Schematic



6.2 Reference #2: Outline Drawing of 846HP and Model 814 Stand



		DIMENSION [in. (mm)]	
	THREAD		
MODEL	A	B	C
814	1/4-20	2.000	.50
M-814	M6	(50.0)	(13.1)

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