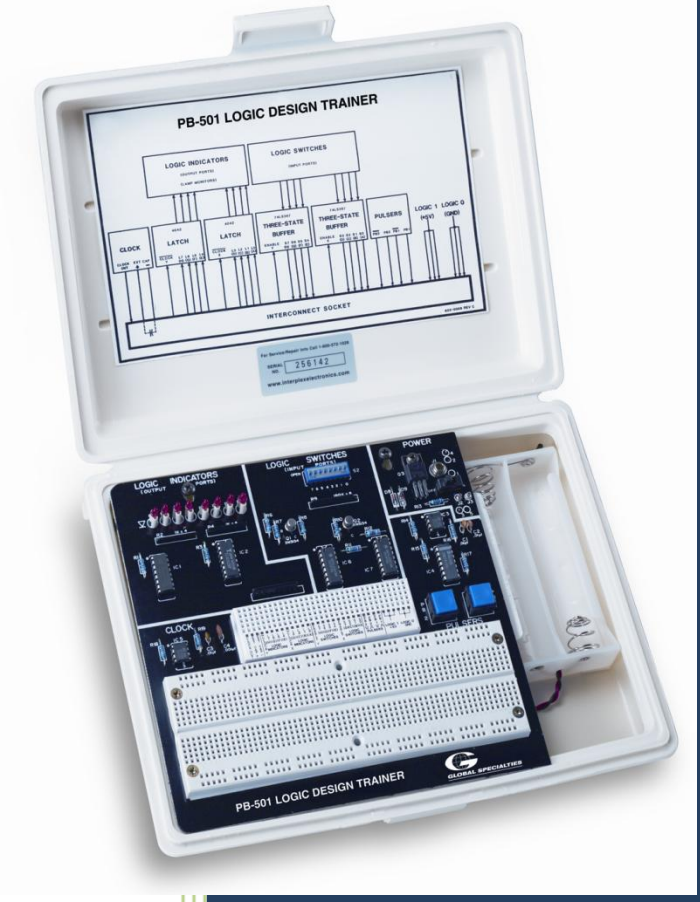
PB-501

Logic Design Trainer

Instruction Manual



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Global Specialties specifically warns the user of this instrument that it is intended for use in a classroom or laboratory environment for the purpose of learning and experimentation. When building experimental circuits, it may emit interference that will effect radio and television reception and the user may be required to stop operation until the interference problem is corrected. Home use of this equipment is discouraged since the likelihood of interference is increased by the close proximity of neighbors.

CORRECTIVE MEASURES:

Interference can be reduced by the following practices.

1) Install a commercially built RFI power filter in the power line at the point where the cord enters the unit.
2) Avoid long wires. They act as antennas.
3) If long wires must be used, use shielded cables or twisted pairs which are properly grounded and terminated.

ABOUT GLOBAL SPECIALTIES

Thank you for selecting this Global Specialties product. You won't be disappointed! Since 1973, Global Specialties has been the recognized leader in technical education courses, training equipment and tutorial materials. Our electronics and microcomputer teaching systems have proven to be effective in secondary schools, technical schools, colleges, universities and industrial training departments throughout the world.

We have been leaders in the development of integrated teaching systems and completely packaged courses which include everything required for effective instruction. Comprehensive textbooks and laboratory manuals have been written in a comfortable, non-intimidating style by experienced professional educators, specifically for use with our equipment.

Each course is designed to make selections appropriate for a variety of educational levels and course goals. Instructor's guides, audiovisual aids and other enhancements provide additional teaching efficiency and flexibility.

The central concept upon which we base our entire product line is education through application. We believe that relevant scientific and technical education is best when it involves permitting students to learn by actually doing. Our courses, equipment, instruments and tutorials have been developed with the hands-on approach.

You can count on Global to stand behind every product we sell. We offer a full three-year parts and labor warranty on every assembled product in our line. This means that any Global product which performs improperly can be returned for prompt repair or replacement, with no questions asked. Low per-student cost, durable and trouble-free hardware and proven tutorial materials combine to make technical and scientific courses from Global Specialties the most effective, economical way to upgrade your lab & curriculum.

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PRODUCT DESCRIPTION

The Global Specialties Model PB-501 Logic Designer is a complete digital circuit design instrument. It can full fill modest requirements for the design and study of gates, counters, multiplexers and can even interface directly to a microprocessor.

The unit contains 8 LED logic indicators, 8 logic switches, a clock and two debounced pushbuttons. The logic indicators are a "transparent latch" and thus serve the dual function of 8 independent logic probes or two four bit output ports which can be connected to a microcomputer. Similarly, the eight logic switches can serve the dual function of logic switches or two four bit input ports for interfacing to a microcomputer. The clock is fixed at approximately 1 KHZ but can be varied by adding an external capacitor. *See Addendum

All of these functions are internally connected to a solderless interconnect socket with 5 tie points for each signal, In addition, a “solderless breadboarding socket" is permanently attached to the unit, thus providing a convenient work area for the circuitry being designed or studied. Both sockets allow insertion of components or wires up to 20 gauge in size.

Power is supplied either internally by batteries or by an external 5 volt regulated supply.

The unit is housed in a durable and attractive plastic box with a hinged protective cover thus making it portable and stackable for storage purposes.

SPECIFICATIONS

Input Power Source	Battery - 4 "C" type 6VDC Adapter - Optional User Supplied 5V- Optional
Clock	Frequency - Fixed at 1Khz +/-50% Logic "1" output current 1.2mA @ 3.5V Logic "0" output current 1.2 mA @0.25V User variable with use of external capacitor
Pulsers	Fully debounced pushbuttons (2 each) with logic true and complementary outputs Logic '1" output current 400 µA @ 2.4V min Logic "0" output current 16mA max @ 0.4V max
Logic Switches	Dual Function: 8 switches buffered by two 4-bit tri-state buffers with separate enables Logic "1" output current 2.6mA max @2.4V min Logic "0" output current 24mA max @ 0.5V max Enables: Logic "1" input current 400µA @ 5V Logic "0" input current 20µ @ 0.2V
Logic Indicators	Dual Function: 8 LEDs driven by two 4-bit latches with separate enables Logic "1" input current 50µA @ 5V Logic "0" Input current not required
Breadboards	840 tie points with (8) 25 pin power rails and accommodates up to 8 (14 pin) ICs
Weight	1 lb, 6oz (less batteries and adapter)
Dimensions	10" x 7.5" x 2.6"

PB-501 CHECKOUT PROCEDURE

1. Install 4 “C” Cell batteries in accordance with the orientation indicated on the battery holder. If the optional Power Adapter is being used, plug into “J1”, and then to the wall outlet. Turn Power Switch to the “On” position and check for +5V between the “+5” and “GND” on the interconnect socket.

   User may also supply +5V for Trainer operation by performing the following:
   a. Remove batteries and power adapter.
   b. Install jumper between J2 & J3.
   c. Connect user power supply to a 1/8” phone plug with positive at tip of plug.
   d. Adjust user supply input voltage to +5VDC +/- 5%.
   e. Plug user supply to J1.

2. Connect Oscilloscope to the “clock out” pin on the interconnect socket. Verify the following:
   a. Frequency – 500Hz to 1500Hz
   b. Amplitude – 4V to 5.5VDC
   c. Duty Cycle – 40% to 60%

3. Logic Indicator Check:
   a. All 8 LEDs should be off.
   b. Jumper L0-A to Logic 1 on the interconnect socket
   c. “DO” should light up, all others should be off.
   d. Move jumper to L1 -B
   e. D1 should light up, all others should be off.
   f. Test remaining signals, L2-C through L7-G in same fashion.

4. Pulsers Check:
   a. Jumper L0-A to PB1.
   b. “DO” should light when PB1 is depressed.
   c. Move jumper to PB1.
   d. “DO” should go out when PB1 is pressed.
   e. Checkout PB2 in same fashion.

5. Logic Switch Check: ***DO NOT USE GRAPHITE PENCIL TO MOVE SWITCHES***
   a. Jumper L0-A to S0-A
   b. Set switch “0” so that “D)” is lit. This is defined as the “OPEN” position.
   c. Set all 8 switches to OPEN.
   d. Jumper all 8 indicators, L0-A through L7-H to corresponding switches SO-A through S&-H. Each LED should light up upon connection.
   e. Move each switch to NOT OPEN, and then to OPEN, noting that only the corresponding LED went out.

f. Leave wires connected.

6. LATCH TEST

a. Jumper CLOCK X to PB1. Jumper CLOCK Y to PB2. All LEDs should be lit.

b. Set switch "0" thru 3 to not OPEN. All LEDs should be lit. Press and release PB1; "D0" thru "D3" should go out.

c. Set switch 4 thru 7 to not OPEN. "D4" through "D7" should still be lit.
Press and release PB2; "D4" through "D7" should go out.
Remove CLOCK jumpers.

7. INPUT PORT TEST

a. Jumper ENABLE X to PB1. Jumper ENABLE Y to PB2. All LEDs should be out.

b. Set all 8 switches to OPEN. All LEDs should still be out.
Press and hold PB1: "D0"through "D3" should light.
Release PB1: "D0" through "D3" should go out.
Press and hold PB2: "D4" through "D7" should light.
Release PB2: "D4" through "D7" should go out.

8. Turn POWER switch OFF: Unit should not function.

CHECKOUT COMPLETE

ADDENDUM

For Capacitor C4 Installed

External capacitor	Frequency (HZ)
100 picofarad	917
.001 microfarad	505
.01 microfarad	92
. 1 microfarad	10
1.0 microfarad	1
10 microfarad	.1

For Capacitor C4 Removed

100 picofarad	10000
.001 microfarad	1000
.01 microfarad	100
. 1 microfarad	10
1.0 microfarad	1
10 microfarad	.1

SERVICE AND WARRANTY INFORMATION

For up-to-date product information, please visit www.globalspecialties.com.

For instructions on how to obtain a return merchandise authorization number (RMA), please visit our website, or call our customer service department.

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Global Specialties will service and repair this instrument free of charge for a period of 3 full years, subject to the warranty conditions below.

WARRANTY

Global Specialties warrants this device to be free from defective material or workmanship for a period of 3 full years from date of original purchase. Under this warranty, Global Specialties is limited to repairing the defective device when returned to the factory, shipping charges prepaid, within 3 full years from date of original purchase.

Units returned to Global Specialties that have been subject to abuse, misuse, damage or accident, or have been connected, installed or adjusted contrary to the instructions furnished by Global Specialties, or that have been repaired by unauthorized persons will not be covered by this warranty.

Global Specialties reserves the right to discontinue models, change specifications, price or design of this device at any time without notice and without incurring any obligation whatsoever.

The purchaser agrees to assume all liabilities for any damages and/or bodily injury which may result from the use or misuse of this device by the purchaser, his employees, or agents.

This warranty is in lieu of all other representations or warranties expressed or implied and no agent or representative of Global Specialties is authorized to assume any other obligation in connection with the sale and purchase of this device.

Specifications subject to change without notice.