

PB-500

Analog Circuits Trainer Instruction Manual



10/2009

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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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INTRODUCT ION

The Global Specialties Model PB-500 Analog Circuits Trainer is an analog breadboarding instrument with built-in power supplies and function generator. It can be used for analog circuit design and training purposes and its unique combination of built-in functions and uncommitted devices makes it one of the most convenient breadboarding systems available.

Power supplies - The PB-500 has four regulated DC power supplies available for breadboarding. Two of the supplies are fixed at plus and minus 12 volts. The remaining two supplies are completely variable from 0 to +7.5 volts DC and 0 to (-) 7.5 volts DC respectively. All four supplies are short circuit protected.

Function Generator - The PB-500 is capable of producing sine, triangle, square and TTL signals over the range of 0.1Hz to 100KHz. An internal capacitor sets the frequency to 1KHz, but the full range can be attained by installing external capacitors of the appropriate value. (See addendum note #1).

Uncommitted devices – The PB-500 has a number of "uncommitted" devices installed in it to support your breadboarding needs:

1. Two Slide potentiometers, 10k and 100k
2. Two SPDT slide switches
3. Two BNC connectors
4. One 2 " Speaker

Breadboarding - All of the above functions are internally connected to a solderless interconnect socket with 5 tie points for each signal. In addition, a Global Specialties UBS-100 solderless breadboarding socket is attached to the unit, thus providing a convenient work area for circuitry being designed or studied. Both sockets allow insertion of components or wires up to #20 AWG.

The unit is housed in a durable plastic enclosure with a hinged protective cover thus making it portable and stack-able for storage purposes.

SPECIFICATIONS

Input Power Source	Regulated wall mount adapter with outputs of +/- 12VDC @ 200mA, 5VDC @ 250mA
Power Supplies	Fixed - 12VDC @ 200mA +/- 5% Fixed - (-)12VDC @ 200mA +/- 5% Variable - 0 to 7.5VDC @ 50mA +/- 10% Variable 0 to (-) 7.5VDC @ 50mA +/- 10%
Function Generator	Frequency - Factory set to 1Khz. Variable with use of external capacitor from 0.1Hz to 100Khz Sine Wave - 4V pk to pk in 10k ohm load Triangle Wave - 9V pk to pk in 10k ohm load Square Wave - 8V pk to peak in 10k ohm load TTL - Logic "0" @ 0.3V max, Logic "1" @ 1.4V min in TTL load. Rise and fall times less than 1µsec Duty Cycle - 50% for all Waveforms
Connectors	BNC Type - 2 each
Slide Potentiometers	(2) 1K & 10K
Slide Switches	(3) Single Pull Double Throw Type
Speaker	8 ohm, 2" diameter - 1 each
Breadboards	840 tie points with (8) 25 pin power rails and accommodates up to 8 (14 pin) ICs
Weight	1 lb, 10oz (minus adapter)
Dimensions	10" x 7.5" x 2.6"

PB-500 CHECKOUT

1. Power Section - AC Adaptor Operation
 - a) Plug AC adaptor into J1 then in wall outlet. Check for -12 volts between "-12 v" and "GND".
 - b) Check for +12 volts between "+12 v" and "GND". Voltages should measure +/-12 volts +/-5%.
2. Variable Supplies
 - a) Measure the voltage between "-V" and "GND", using the slide pot (R2) the supply voltage should vary from 0 to -7.5 volts +/-10%.
 - b) Measure the voltage between "+V" and "GND", using the slide potentiometer (R6) the supply voltage should vary from 0 to +7.5 volts +/-10%.
3. Short Circuit Indicators
 - a) Set both variable supplies to 7.5, place a jumper from "-V" to "GND" CR2 should light indicating a shorted condition.
 - b) Place a jumper from "+V" to "GND" CR4 should light indicating a shorted condition. Remove jumpers the LEDs should go out.
4. Function Generator

NOTE: All waveforms should be 1khz +/-20% with a 50% duty cycle

Triangle Wave

- a) Set S3 to "TRI" position.
- b) Attach an oscilloscope between "SIN/TRI" and "GND".
- c) Adjust R15 (located under PC board) for a symmetrical waveform with approximately a 9v pk to pk.

Sine Wave

- a) Set S3 to "SIN" position.
- b) The wave form on your oscilloscope should be a symmetrical sinusoid with approximately a 4v pk to pk. amplitude

Square Wave

- a) Move oscilloscope lead from "SIN/TRI" to "SOR".
- b) The waveform on your oscilloscope should be a symmetrical square wave with an 8v pk to pk. Amplitude.

TTL

- a) Move the oscilloscope lead from "SOR" to "TTL".
- b) The waveform on your oscilloscope should be a pulse train going from 0 to +5 volts. Disconnect oscilloscope from unit.

5. Speaker

- a) Jumper "SPKR-" to "GND" and "SPKR+" to "SOR".
- b) A 1KHz tone should be audible from the speaker.
- c) Remove the jumper between "SPKR+" and "SOR" and the tone should no longer be audible

6. Uncommitted Switches (S1 & S2)

(S1)

- a) Set S1 to the "1,2" position.
- b) Jumper "SQR" to "SI-2" and "SPKR+" to "SI-1"
- c) A 1KHz tone should be audible from the speaker.
- d) Set S1 to the "2,3" position.
- e) The tone should no longer be audible
- f) Move the jumper from "SI-1" to "SI-3".
- g) The tone should be audible.
- h) Set S1 to the "1,2" position,
- i) The tone should no longer be audible.
- j) Remove jumpers (except for "SPKR-" to "GND").

(S2)

- a) Set S2 to the "1,2" position.
- b) Jumper "SOR" to "S2-2" and "SPKR+" to "S2-1".
- c) A 1KHz tone should be audible from the speaker.
- d) Set S2 to the "2,3" position.
- e) The tone should no longer be audible
- f) Move the jumper from "S2-1" to "S2-3".
- g) The tone should be audible.
- h) Set S2 to the "1,2" position.
- i) The tone should no longer be audible.
- j) Remove all jumpers.

7. Uncommitted Pots (R21 & R22)

10k (R21)

- a) Set the 10k slider to it's left-most position.
- b) Connect an ohmmeter (10k range) between "10k-1" and "10k-2".
- c) The meter should read zero ohms.
- d) Move the slider gradually to the right and observe the ohmmeter.
- e) The reading on the meter should increase from 0 to 10k ohms in proportion to the movement of the slider.
- f) Move the ohmmeter lead from "10k-2" to "10k-3" and check for approximately 10k ohms.

100k (R22)

- a) Set the 100k slider to its left-most position.

- b) Connect an ohmmeter (100k range) between "100k-1" and "100k-2".
- c) The meter should read 0 ohms.
- d) Move the slider gradually to the right and observe the ohmmeter.
- e) The reading on the meter should increase from 0 to 100k ohms in proportion to the movement of the slider.
- f) Move the ohmmeter lead from "100k-2" to "100k-3" and check for approximately 100k ohms.

8. BNC Connectors (BNC-1 & BNC-2)

(BNC-1)

- a) Check for continuity between "BNC-1-" and the metal shell of BNC-1.
- b) Check for continuity between "BNC-1+" and the center pin of BNC-1.
- c) Check for an open circuit between "BNC-1-" and "BNC-1+".

(BNC-2)

- a) Check for continuity between "BNC-2-" and the metal shell of BNC-2.
- b) Check for continuity between "BNC-2+" and the center pin of BNC-2.
- c) Check for an open circuit between "BNC-2-" and "BNC-2+".

CHECKOUT COMPLETE

ADDENDUM

NOTE 1:

Function Generator operating frequency with "INT" to "COM" jumper removed and external capacitor installed.

External capacitor (microfarads)	Frequency (Hertz)
1000	0.1
100	1
10	10
1	100
.1	1K
.01	10K
.001	100K

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.

GLOBAL SPECIALTIES
22820 Savi Ranch Parkway
Yorba Linda, CA 92887
800-572-1028
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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.