# PROTO-BOARD PB-203A

Instruction, Operation and Application Manual



80-01-0008 5/86

# SPECIFICATIONS

The solderless breadboarding area includes three Model QT-59S Quick Test socket strips, four Model QT-59B Quick Test bus strips and one Model QT-47B Quick Test bus strips.

#### POWER SUPPLY

+5 VDC

Voltage: 5.0 + 0.2 VDC Current: 1.0 Amp max, current limited Regulation: Better than 0.8% load regulation, + 0.02%/°C

Ripple: Less than 4mVp-p at 1 Amp

+15 VDC

Voltage: Factory set to +15 VDC, adjustable internally +5.5 -18 VDC Current: 0.5 Amp max, 0 +15 VDC

Regulation: Better than 1% load regulation, + 0.04%/°C

Ripple: Less than 10mVp-p at 0.5 Amp

-15 VDC

Voltage: Factory set to -15 VDC, adjustable internally, -5.5 -18VDC Current: 0.5 Amp max, 0-15 VDC Regulation: Better than 1% load regulation,  $\pm 0.04\%$ °C

Ripple: Less than 10mVp-p at 0.5 Amp

#### CONTROLS

Power switch with pilot light

IC CAPACITY

24 14-pin DIPs

108-130 VAC, 60 Hz; better than 0.15% line regulation at 1 Amp output (215-250 VAC 50-60 Hz where applicable)

# DIMENSIONS

9.8 x 6.6 x 3.3 inches L x W x H (248 x 168 x 83 mm); 5.5 lbs (2.5 kg)

# USING YOUR PB-203A

# OPERATING INSTRUCTIONS

Uncoil the power cord and plug your PB-203A into a 115Y AC 60 Hz outlet.\* Push the power switch on.

Your power supply bank is now activated, giving you +5 Volts at one Amp for digital circuitry, and +15 and -15 Volt supplies at } Amp for linear and op-amp circuitry. All supplies are regulated and current limited for maximum performance and safety.

The black binding post is common ground to all power supplies.

<sup>\* 220</sup>V 50-60 Hz where applicable.

#### POWER DISTRIBUTION AND JUMPER WIRES

Ten distribution buses are provided on each PB-203A; two horizontal buses with 40 contacts each and eight vertical buses with 50 contacts each. One possible power distribution scheme for a single power supply is shown in Figure 1.

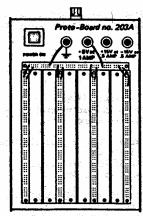


Figure 1

The jumper wires should be #22 gauge solid hook-up wire.\* We suggest that the insulation on the jumper wires should be stripped 1/2" to 3/8" from each end to insure easy insertion into the Quick Test Sockets and Bus Strips.

After you have built up a few circuits, you will have a good collection of prestripped jumper wires. Save them. By reusing these wires, you can save even more time and effort in assembling future circuits.

\* See Global Specialties WK-1 Wire Jumper Kit #11-0044

# COMPONENT INSERTION

ICs are mounted by lining up the leads with the contact holes on each side of the center of a Quick Test Socket, then pressing gently at the center of the IC until it clicks into position.

Withdrawing the IC can be tricky. You should use a thin-bladed screwdriver or similar object. Slide the end of the screwdriver blade under one end of the IC and lift gently. Repeat on the other side. Then remove the IC from the socket. By following this procedure, you will not bend the leads of the IC.

TO-5 case ICs can be accommodated by pre-forming the leads so that they resemble a DIP pack. This is easily done with a set of long-nose pliers.

Transistors can be inserted bridging the center of a Quick Test Socket, or with leads-in-line on one side of the socket.

Diodes, resistors, and capacitors may be inserted in the same manner as jumper wires.

#### **BROKEN WIRES**

Sometimes a wire will break off at the surface of a contact hole. There are two ways of remedying this problem:

- 1. Just push the broken wire into the socket. It will not affect
- Just push the broken wire into the socket. It will not affect the operation of the contact.
  a. Remove the 4 screws on the bottom of the case. Remove the 2 flathead screws located on the black top surface of the PB-203A. The top and bottom case halves can now come apart. b. Remove the screws holding the sockets to the top cover. c. Unsnap the sockets. Remove the vinyl label from the socket containing the broken wire.
  d. Remove the terminal by inserting a round, stiff .025 pin into one of the unblocked holes. (A small paper clip, bent open, will also work.) Force the terminal completely out of the socket. Remove the broken wire, then replace the terminal. Be sure to press down firmly.
  e. Replace the vinyl label, snap the sockets together, and remount them on the cover.

WARNING! DO NOT TIGHTEN SCREWS TOO MUCH OR YOU MAY STRIP THE THREADS IN THE PLASTIC BODY.

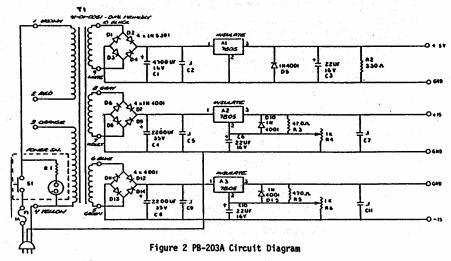
#### REGULATED POWER SUPPLIES

Figure 2 shows the circuit diagram of the PB-203A.

Each supply is IC regulated using a 7805 Integrated Circuit. This IC contains 18 transistors, 2 Zeners, and 20 resistors. All regulators are R.F. bypassed, both input and output, with .luf capacitors to prevent oscillation and reduce

The plus and minus 15 Volt power supplies are 7805 regulators in the self programming mode.

R4 and R6 are the programming pots, and are set at the factory for 15V outputs.



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### USING THE PB-203A

The PB-203A is ideally suited to virtually any type of IC bread-boarding from TTL, CMOS, and ECL to op-amps, audio, comparitors, video amps, microprocessor components, phase locks and more. However, certain normal bread-boarding precautions should be taken:

Ground Loops: A ground loop is a Voltage drop on a ground bus, caused by a power stage output ground, entering the ground bus some distance away from the power supply ground binding post.

This Voltage drop, though only milli or microVolts, is part of the output load. If a preamplifier input or circuit ground is connected to a portion of this ground bus, feedback and oscillation can occur. To prevent this, all output stages should be positioned closest to the ground terminal, preamps further away.

By observing this simple rule, you will save hours of troubleshooting. Many audio ICs have separate input and output grounds to prevent ground loops.

By-Pass Capacitors: Even though the PB-203A's power supplies are tightly regulated, a short length of power bus can look like enough inductance to cause a linear IC to break into oscillation at high frequencies.

For this reason, good by-pass capacitors are needed. They should by-pass the power buses as close to the IC's power supply pins as possible. .1 $\mu f$  disc ceramics work fine, and should be used across every IC.

Do not use electrolytic or paper capacitors as power bus by-pass caps. They have high inductances, and cease to act as by-passes above one or two mega-Hertz.

Good by-passing is required with digital ICs also. It can cause such problems as inability to reset or clear, and false triggering.

# COMBINING POWER SUPPLIES

By adding the 15 Volt supplies we can produce a 30 Volt supply at .5 Amp. This means that the load goes from the +15 Volt terminal to the -15 Volt terminal

We can also add the +5 Volt supply to the -15 Volt supply to make a 20 Volt supply. The load goes from the -15 Volt terminal to the +5 Volt terminal.

This gives us a total of 4 different Voltages: 5V, 15V, 20V, and 30V, and also  $\pm 15$  V for op-amps. Figure 3 shows all the possible combinations of power supplies.

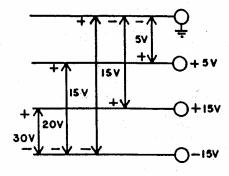


Figure 3