PROTO-BOARD©
INSTRUCTION MANUAL

CONGRATULATIONSI You now own the best electronic circuit design and prototyping aid available ...A Global proto-board©. All of Global's breadboarding sockets carries a LIFETIME GUARANTEE. If a socket ever fails to meet your requirements, return it to Global, postpaid, For a FREE replacement. No questions asked.

Before using your proto-board there are a few points of information worth noting. For example...

BINDING POSTS
The binding posts facilitate power, and ground connections to and from external sources on the proto-board. These posts can accept banana plugs, pin jacks, and spade lugs. They can also accept alligator clips, solid and stranded wire.

BUSES
Horizontal and vertical buses are provided on each proto-board. Depending on the proto-board model, both the number of buses and the number of contacts on each bus will vary. Typical Tie=point matrix schemes are shown in figure 1. If in doubt, a quick check with an ohmmeter will clarify the bus scheme for you.

COMPONENT INSERTION
IC's are mounted by lining up the leads with the contact holes on each side of the center of a 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.

Pre-forming the leads so they resemble a DIP pack can accommodate TO-5 case IC's. This is easily done with a pair of long nose pliers.

Transistors can be inserted bridging the center of a 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.

Special components such as switches, potentiometers, etc. can be used with sockets by simply soldering short lengths of #20-24 gauge solid wire to their terminals and then inserting them into a socket or bus strip.

JUMPER WIRE
The jumper wires should be #20-24 gauge solid hook-up wires. We suggest that the insulation on the jumper wires be stripped 1/4" to 3/16" from each end to insure easy insertion into the sockets and bus strips.

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

For your convenience, Global Specialties provides a kit of 350 pre-cut, pre-stripped, #22 gauge wires in 13 different lengths. Ask your Global Distributor for the WK-1 Wire kit.

BROKEN WIRES

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

1. Just push the broken wire into the socket. It will not affect the operation of the contact.

2. Dissemble the socket array as follows:
   a. Remove the screws holding the sockets to the base plate.
   b. Remove the vinyl label from the back of the socket containing the broken wire.
   c. Remove the terminal by inserting a round, stiff, 0.025" 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.
   d. Replace the vinyl label, and remount them on the plate.

By following the above suggestions, your Proto-board should provide you with many years of trouble free service.

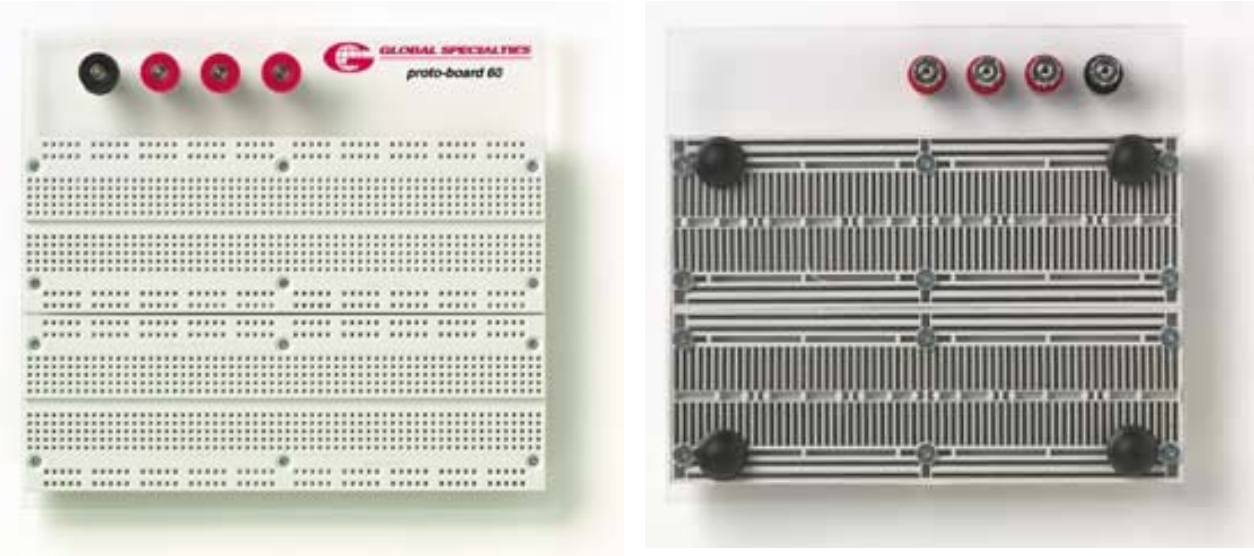

FIGURE 1. TYPICAL TIE-POINT MATRIX

RECOMMENDED PROCEDURES FOR BREADBOARDING

The following steps and procedures should be followed when breadboarding circuits. HOWEVER, you must make a judgment call between how much time you spend on neatness, and how much time you spend getting the circuit functioning correctly. Recommendation: lay out components neatly, then connect with jumper wires as quickly as possible. When circuit works, go back and route jumper wires, shortening and rerouting where necessary, using the balance of your time to improve neatness.

1. Remove any components or wires left from previous projects.

2. Place components on the breadboard in a visually pleasing manner, as closely as possible to the layout on the schematic. This makes troubleshooting easier for you and for the judges.

3. Trim leads of components so that components rest on or near the surface of the board. Use jumpers to connect components to other components rather than using leaded components (resistor, capacitors, diodes, transistors) as jumpers. This eliminates possible short circuits between bare leads.

4. Leaded components (resistor, capacitors, diodes) should be mounted either vertically or horizontally (not diagonally), and oriented in a consistent direction (i.e., with the first band of the color code, anode, or cathode at the top or on the left). Transistors should each be mounted into three consecutive rows (or every other row) with the collector at the top, base in the center, and emitter at the bottom.

5. Component leads should be bent in a rounded 90% turn (see comment on bending jumper leads) and be inserted straight down into the board, not angled out or in.

6. IC's should be aligned in a row where possible, with pin one on each chip at the upper left position.

7. Strip approximately 1/4" of insulation from jumper wires (never more than 5/16" nor less than 3/16") so as to allow as little bare wire to show between the insulation of the wire and the breadboard socket as possible, in no case should more than 1/8" of bare wire be exposed out of the breadboard socket. If prestripped wires are used, use the shortest wire which will make the connection. Neatly bend the excess out of the way or cut the wire and strip to an exact fit.

8. Jumper wires should be placed as flat and as close to the breadboard as possible, running parallel to each other and not crossing any more than necessary.

9. Jumper wires should be run neatly beside and between components, as straight and as short as possible. Do not use excessively long wires when short ones will do. Excessive wire causes electrical problems and makes troubleshooting more difficult.

10. Bends in jumper wires should be slightly rounded, to avoid stressing wire or insulation, but as tight as possible. Technically, minimum bend radius should be 1.5 times the wire diameter (National Electrical Code, 1996, National Fire Protection Association).

11. NEVER cross components with jumper wires. Routing wires around components simplifies measuring voltages at component leads and removing components for testing or replacement.