USE AN INTERFACE PANEL
And End Test-Lead Clutter

BY ROBERT SHAW

ONE OF THE biggest problems when working with two or more pieces of test equipment at the same time is the messy tangle of test leads that often results. Because most test leads look alike, it is easy to lose track of which set goes to a given instrument. One practical way to avoid this mess and confusion is to use a "patch panel." What makes this scheme practical is the fact that most test instruments have unbalanced inputs and/or outputs.

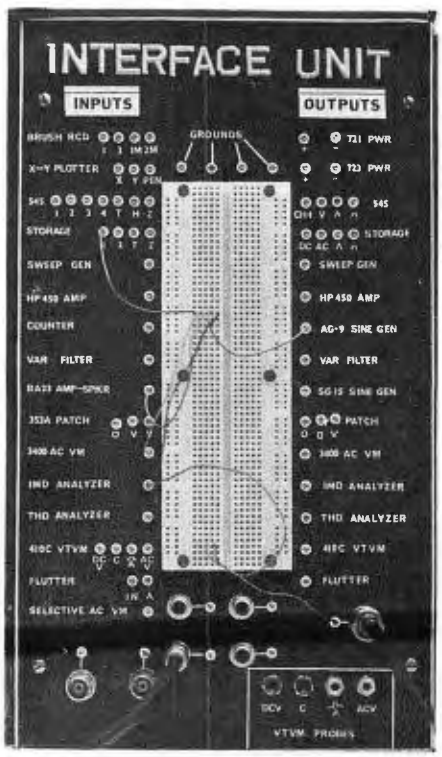
The secret to making a reliable patch panel is to employ good grounding and shielding practices. A properly fabricated patch panel will accommodate audio signal levels as low as −70 dB at 1 megohm impedance, provided all outputs are spaced at least 1" (25.4mm) away from the low-level inputs. For higher levels, between −60 and +45 dB, no special precautions are required, even at high impedances. The only time safety becomes a factor is when signal levels approach 100 volts. And the patch panel can easily handle signal frequencies up to about 500 kHz.

Putting It Together. The prototype patch panel, shown in the photo, was built on a front-panel plate taken from a sturdy steel instrument enclosure. At the center of the panel is a large solderless socket that greatly simplifies hook-ups to instruments and has the added advantage of providing a breadboarding medium for inserting all types of networks between instruments and equipment under test. The solderless socket selected for the prototype was the largest one available. It has 64 sets of five parallel-connected solderless plug-in holes on each side of a center slot, plus a number of parallel-connected "buses" running down each side of the main socket. Of course, smaller sockets can be used in less elaborate setups.

The best way to mount the solderless socket is to orient it vertically on the panel's plate. The bottom of the socket is fully insulated. So there is no need to use spacers; just bolt it directly to the plate. Label one side of the panel INPUTS, and label the other side OUTPUTS.

Now, determine which items of test equipment you have to go to the patch panel, keeping in mind the upper frequency limit of 500 kHz. Such equipment might include: VOM's; VTVM's, TVM's, or DMM's; audio signal generators; low-frequency oscilloscopes; sweep generators; intermodulation and total-harmonic distortion meters; power meters; low-voltage power supplies; etc. Account for every input and output (if any) for each instrument. (Don't forget the Z-axis input for the oscilloscope.)

Once you know how many input and output tie points you need, drill holes for mounting standard push-in solderless terminal pins in the panel. Use a 0.136" (3.454-mm) drill for the holes. Push the pins into the holes until they are solidly seated against the panel. The insulating plastic around the pins will swell to form a tight mechanical fit. Mount some BNC and phono-jack connectors along the bottom of the panel, with the "hot" lead of each connector going to a separate press-in terminal. Then use a good-quality dry-transfer lettering kit to label all input and output points on the panel.



The test instruments are connected to the solderless pins from the back of the patch panel via high-quality slender coaxial cable that is properly terminated at the instrument ends. The shields of the cable go to a common ground bus, while the hot conductors go to the appropriate press-in pins. Plan to have all multimeter test-lead points "floating." You can use the BNC and phono-jack connectors for the cables going to and coming from the equipment being serviced and for test equipment not otherwise terminated on the patch panel.

Using the Patch Panel. Because all the front panel terminations are solderless, you will need a supply of short lengths of No. 22 or No. 24 solid insulated hook-up wire for making the various interconnections between solderless pins and the socket. Strip about ¼" to ⅜" (6.35 to 9.53 mm) of insulation from each end of the wires.

Mount the patch panel on your workbench in a location where it will be conveniently accessible under all working conditions. Place the device or equipment to be tested on the bench and connect its inputs and outputs to the BNC and/or phono-jack connectors, or simply plug them into the holes in the large socket. Then, using lengths of prepared hookup wire, it becomes very simple to interconnect the test instruments as needed. Because each row of connectors on the socket has five parallel-connected tie points, you can couple to the equipment being tested up to four instruments to the inputs and four more to the outputs without having to jumper to another set of terminals.

The solderless socket is designed to accommodate the leads of low-wattage resistors, most capacitors, transistors, diodes, and the pins of IC's. The solderless socket and connector pins (from E&L, Continental Specialties, or AP Products), and the other connectors, are available at most electronic parts stores or in hobby electronics catalogs. ◇