From PC To Digital Storage Scope With One Easy Step

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What has 84 keys, one eye and a whale of a lot of waveform measurement power? It could be your personal computer if you have one of the new computer scopes from Heath. The SC/IC–4802 Computer Scope and the SD/ID–4850 Digital Memory Scope are Heath's newest entries into a growing line of personal computer based instrumentation products.

Figure 1
The Computerscope

Just What Is A Personal Computer Based Instrument?

Well, as the name suggests, it's an instrument used for test and measurement which is somehow tied to the personal computer. Traditional instruments use knobs and buttons for the operator to set up and control the instrument and some form of display device to read data back to the operator. Personal computer based instruments may be either a card which plugs into an expansion slot or an external box which connects to the computer via an RS–232 port or some specialized interface. The computer's keyboard now performs the functions of set-up and control while the monitor becomes the readout device.

But look what else this does. The awesome power of the personal computer — its storage, programmability and computational capability — now become part of the instrument. A combination such as this results in a degree of flexibility and performance previously found only in instruments priced well up into the multi-thousand dollar range. Laboratory grade instruments have just become affordable to the personal computer owner. Let's take a closer look at Heath's computer scopes.

As shown in Figure 1, the SC–4802 Computer Scope is a rather plain looking box with an almost featureless front panel. This box connects to a computer via an RS–232 connector located at the back of the unit. Simply connect oscilloscope probes to the Y1 and Y2 input connectors on the front panel, boot up the disk furnished with the scope and presto! you've got a dual channel, 50 megahertz digital storage oscilloscope (DSO).

Figure 2 shows a typical display on the computer monitor with a triangle squarewave connected to the two vertical inputs on the computerscope. Notice that the graticule waveforms are displayed slightly to the left of the screen leaving room for all the familiar oscilloscope settings to be displayed to the right.

To change a setting (the vertical attenuation, for example) you use a function key to select vertical attenuation, then use an arrow key to either increment or decrement the setting. In the same manner, input mode, trigger mode, timebase and all the other traditional oscilloscope functions are selected and set to the desired value.

Any waveform which is displayed on the screen may be stored as a file on disk. The only limitation as to the number of waveforms that may be stored is the amount of disk space available.

Figure 3 shows how up to two stored and two "live" waveforms may be displayed simultaneously. The stored waveforms are displayed at the same timebase, vertical sensitivity and vertical position at which they were stored. This makes it easy to compare waveforms from different tests, check the effects of drift, or simply set a high and low limit on an adjustment. (No more grease pencil outlines on the oscilloscope screen.)

Cursors can be generated by the computer and superimposed on the waveform as shown in Figure 4. The cursors are positioned with the arrow keys, while the display at the bottom of the screen continuously reads out the amplitude difference between them, the time difference between them, and the frequency represented by this time difference. This permits small variations in the

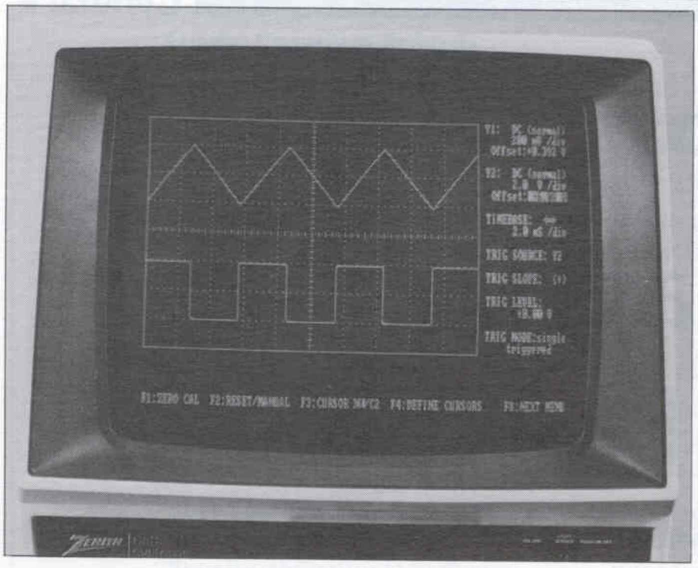

Figure 2
Typical Screen Display

waveform to be carefully scrutinized and measurements such as risetime to be easily made.

Sometimes a signal has a great deal of noise riding on it which obscures the details of interest. No problem for the DSO. You simply select the AVERAGE function and the computer averages successive samples of the waveform for up to 255 iterations. Since the noise is random, its average value is zero. This leaves the details of the signal completely unobscured.

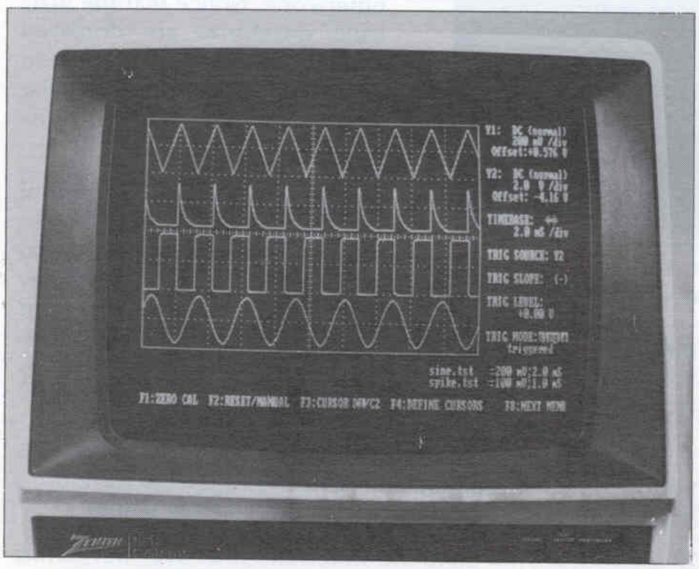

Figure 3
Displaying "live" and stored waveforms simultaneously.

Figure 5 shows an actual signal before and after the AVERAGE function has been used to eliminate the noise. Signals with noise level amplitudes in excess of the amplitude of the signal itself can be displayed completely noise free using this mode.

Hard copies are a snap, too. Using the print utilities in your operating system, anything displayed on the screen may be captured and printed as shown in Figure 6. This allows you to easily include copies of waveforms as part of a report, file them for later reference or as part of a preventive maintenance record.

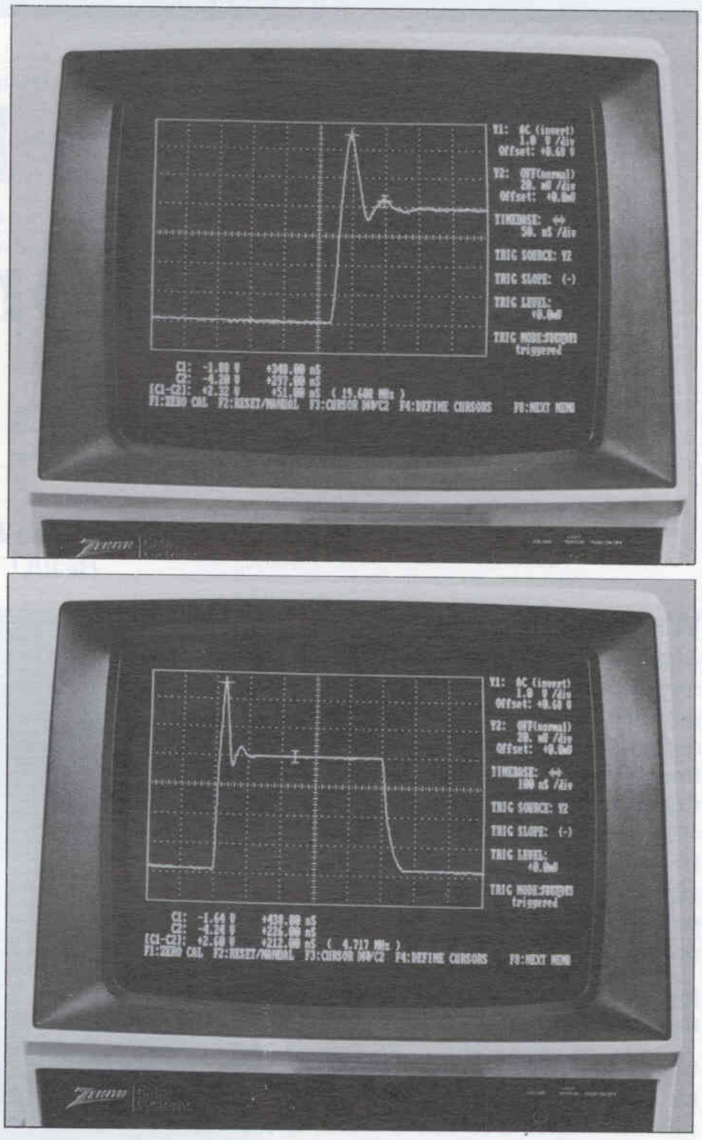

Figure 4
Using computer generated cursors to measure amplitude, time and frequency.

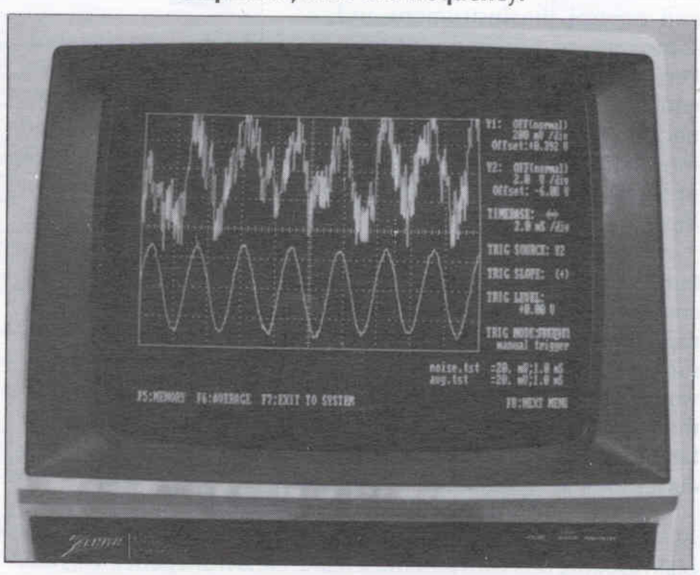

Figure 5
Using the computer to "average" a noisy waveform.

Since the computer is connected to the scope, via a data link, there is no reason why a modem can't become part of the link. Figure 7 shows such a set-up. With this arrangement, a computer can call up one or more scopes anywhere in the world and display what the scope is connected to, save waveforms from the remote scope or change settings on the remote scope.

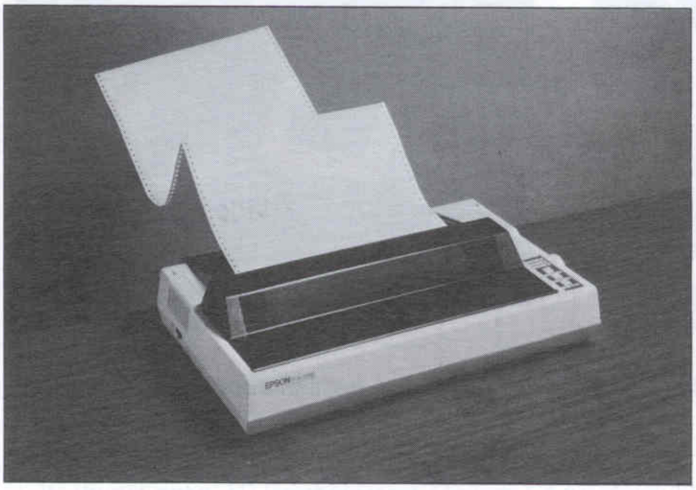

Figure 6
Generating a hardcopy.

Got a custom application? The disk furnished with the computerscope contains a compiled version of the BASIC program which controls the operation of the scope for normal use. Source code is also provided so that anyone with a knowledge of BASIC programming may make modifications for custom applications or waveform analysis.

The SC-4850 Digital Memory Scope is shown in Figure 7. As you can see, this unit has a full front panel unlike its cousin the SC-4802. The Digital Memory Scope can be interfaced to a computer via the RS-232 connector and can perform all of the functions just described for the SC-4802. In addition, it can be used

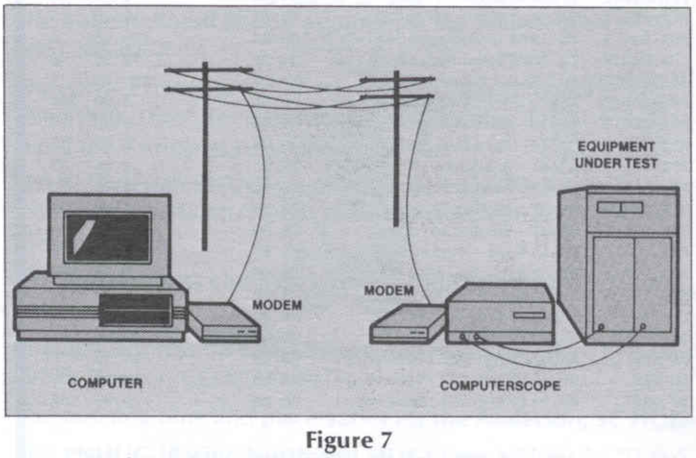

Figure 7
Linking the computer to the scope via modem.

without a computer to upgrade a single trace analog oscilloscope to a dual channel 50 megahertz digital storage scope. Simply connect the vertical output and trigger output from the digital memory scope to the vertical input and external trigger input on the analog oscilloscope and the conversion is complete. All set-up and adjustment is now done from the front panel of the SD-4850.

Programmable instrumentation has been around for more than five years. The price of such instrumentation started out high and has actually gone higher over those years. Watch for developments in personal computer based instrumentation over the next few years to completely revolutionize the instruments business. As the personal computer becomes as commonplace as the telephone in the engineering workplace, huge markets will develop for these innovative technological tools.

Figure 8
Customize the software for special testing or analysis.

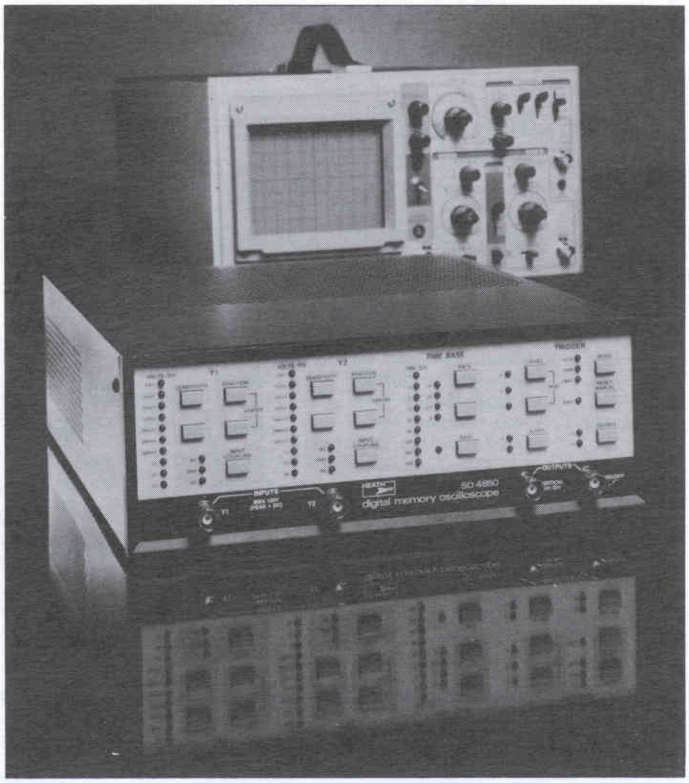

Figure 9
The Digital Memory Scope