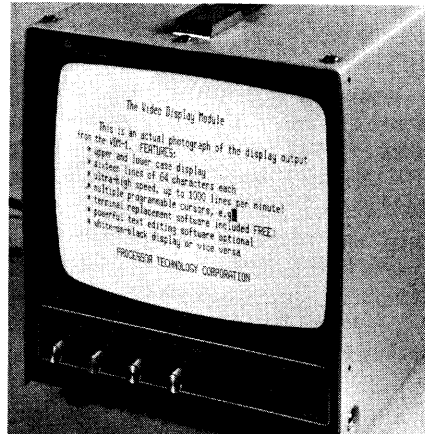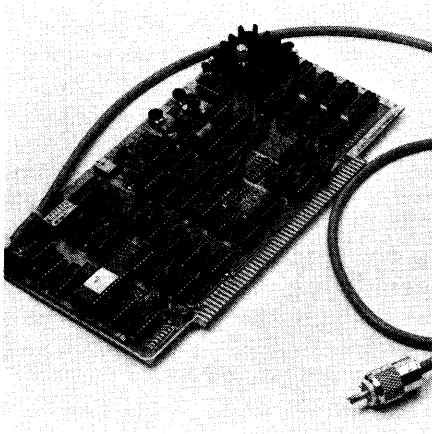## PROCESSOR TECHNOLOGY MODEL VDM-1

VIDEO DISPLAY MODULE

Plugs into busline to provide 16 lines, 64 characters wide.

THE TYPE of computer busline used in the Altair 8800 and Imsai 8080 has become one of the most popular elements in the area of hobby type minicomputers. A number of devices have been designed to plug directly into this bus, a very useful one being the Processor Technology Model VDM-1 video display module, which occupies a single slot in the computer.

The video display module generates a page of text consisting of 16 lines by 64 characters wide. It provides the full 128 upper- and lower-case and control ASCII character set in a 7 × 9 dot matrix format and has an on-board memory system consisting of 1024 8-bit bytes of RAM. The two-port memory permits random read/write access to the screen from the CPU.

The VDM offers a choice of white-on-black or black-on-white switch-selectable for the entire screen or separately program controlled for each individual character; switch-selectable horizontal and vertical display position; switch-selectable text blanking for the CR control character to the end of the line or from the VT

character to the end of the screen; program control for scrolling in increments of one to 16 lines without rewriting memory; and "window-shade" blanking of the text above the desired starting location under program control.

The Model VDM-1 is available only in kit form through most computer stores for $199.

General Information. The output of the video display module is a standard video signal. It couples directly to a video monitor or converted TV receiver via a coaxial cable that comes with the kit. (The assembly manual provides an extract from the Howard W. Sams book *TVT Cookbook* by Don Lancaster to illustrate some methods of converting TV receivers into video monitors.)

The assembled VDM can be installed and tested in an operating and running Altair-8800 or Imsai-8080 minicomputer without a language. All you need to get the system running is the computer and a video monitor. The manual illustrates some simple programs that can be fed into the

computer with front-panel switches to completely test the video display module and provide some familiarity with using it.

Processor Technology provides two types of software. The first is a machine language VDM driver that requires 512 bytes located anywhere but at the beginning of the computer's memory. (The company recommends the use of the last 512 bytes of the memory block.) All documentation is provided for this program. If you have BASIC, you use the BASIC-VDM driver tape. In this case, you also use the last 512 bytes of memory and run the tape. In essence, the BASIC program peeks and pokes around the language, determining the status and I/O values and patch points and loading the software into memory.

Once the driver software is loaded into the computer, everything thereafter is automatic. Following a brief pause, the system is coupled to the VDM. You then have a choice of output to either the VDM or the original input port for hard copy. To make your choice, you simply set switch A8 on the computer up or down.

One very interesting command that the VDM provides is "speed control." Simply by pressing any numeral key on the keyboard, you can control the speed of the program. Hitting the 1 key introduces no delay, and the characters on the screen whiz by at a rate of 2000 64-character lines/minute. As you proceed upward in numbers, the speed slows down until at 8, the characters move by at a rate of about 1.5/second. To stop the display at any time, you press the space bar. The space bar also lets you single-step through the program.

User Comment. The VDM is entirely assembled on a single, very large printed circuit board that has conductors on both sides and plated-through

holes. The top of the board is silk-screened to show component locations. Mounted on the board are 49 IC's, including the voltage regulator, plus a number of resistors and capacitors, two miniature potentiometers, a crystal, a couple of transistors and diodes, and a miniature DIP switch. The finished board, needless to say, is rather crowded.

Assembly itself is quite straightforward if you use a low-wattage soldering pencil or iron and fine wire solder. The manual is so well written and well illustrated that the VDM can be assembled and put into service in a single evening. The kit is complete, right down to the solder. The only things you need to put it together are a soldering iron, longnose pliers, and wire cutters.

The basic kit comes without IC sockets. However, Processor Technology offers an optional IC socket package that we decided to use with our VDM and highly recommend to anyone else who plans to build the video display module.

The board is wired according to a set sequence, as described in the manual. Initially, all parts except the IC's are mounted and soldered into place. Then, the IC's are installed in groups in a specific order. After the first group is installed, a test is performed. If the results of the test are correct as described in the manual, you go on to install the next set of IC's and perform the test for them, and so on until all IC's have been installed and tested. In this manner, if any problems develop, you can quickly pinpoint where they exist. If all IC's were installed before any tests were made and a problem cropped up, troubleshooting the VDM would be a frustrating, time-consuming procedure.

We have been using the Model VDM-1 for a couple of months and have had flawless operation from it during the whole time. Having used 32-character-wide terminals in the past, we always had to rewrite programs originally written for TTY to get them to run in our computer. Now that we have a 64-character-wide VDM, we do not have to go through the painstaking rewriting of programs.

If you have a compatible operating computer system or are planning to buy one, we highly recommend a Model VDM-1 to use with it. For the performance it provides, the VDM-1 is very inexpensively priced.