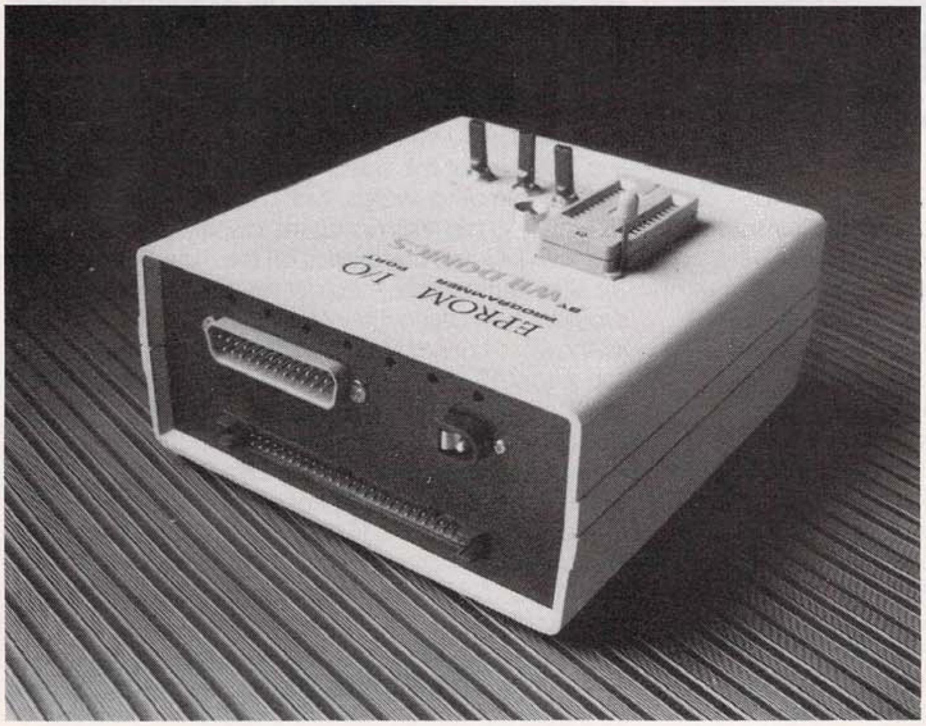
MACHINE CODE DEVELOPMENT SYSTEM
FOR YOUR TIMEX SINCLAIR 1000
PART II



BACK VIEW OF UNIT shows clean, uncluttered look. Refer to text for clarification of connectors.

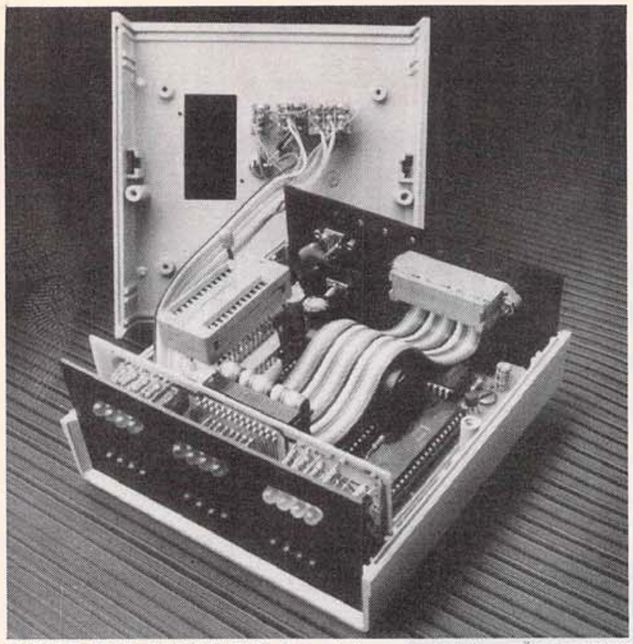
MARK W. LATHAM

Back in January, we started an interesting and important article on how to build a machine code development system for the Timex Sinclair 1000. We promised to complete the article with the second part, in the February Issue.

But something slipped, and the February Issue went to press without the rest of that important information.

For those of you who may have been wondering what happened to the rest of the article, or who had started it and were hoping to complete it, the remainder of the information is all here, in this issue. We apologise for any inconvenience that this may have caused.

The fact of the matter is, that while at one time, Timex was shipping 100,000 units a month. The price was right, and lots of people bought real keyboards and extra RAM to make thse units work like real business or entertainment machines. Others were content to simply fool around with whatever they could hook up to the back of the unit.



INSIDE THE EPROM I/O, the picture is total neatness that reflects care in assembly. Follow the layout guides and refer to the text for parts positioning.

The three tricolor LED's (LED3–LED5) are used to monitor the RAM $\overline{CS}$, EPROM $\overline{CS}$, and $\overline{OE}$ lines. Transistors Q5–Q7 reverse the current flow through those LED's when the associated outputs of IC6 are high. Those LED's will be green if the corresponding line is high (inactive) and red if the line is low (active). If the line is rapidly changing, the LED will appear to be yellow.

All the software for controlling the I/O port, block data moves, and EPROM programming can be permanently stored in IC8, the resident EPROM. IC1-b, IC2-a and IC2-b decode the Z80A $\overline{MREQ}$ and address A11–A15 signals to place the resident EPROM in the 8–10K area. IC1-a and D6 hold the computer's $\overline{ROMCS}$ line high during the resident EPROM read to prevent bus contention. (The computer is wired to see the 8K ROM anywhere in the 0–16K area.) If the program is written at the machine-language level (the EPROM I/O operating system provided by the supplier listed) you will have an I/O-port/EPROM-programmer that is fast, easy to use, and ready to go the second you plug it in.

Construction

The circuit shown in Fig 1 can be built using perforated construction boards. A better method, however, would be to use double-sided printed-circuit boards such as the ones shown in Figs. 2 and 3.

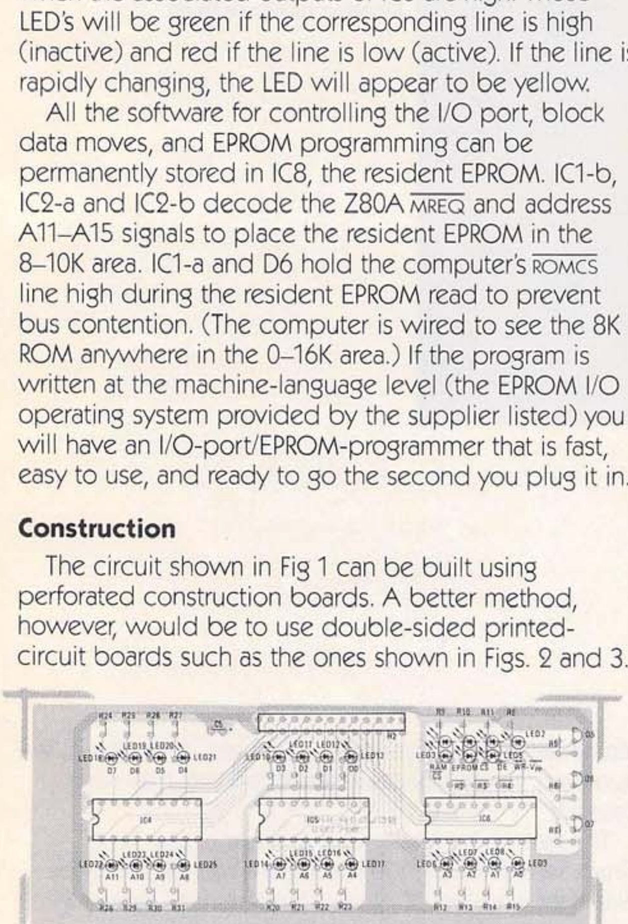


FIG. 5—PARTS POSITIONING ON THE SMALL BOARD is shown here. Placement of the LED's is fairly critical as they must show through front panel holes.

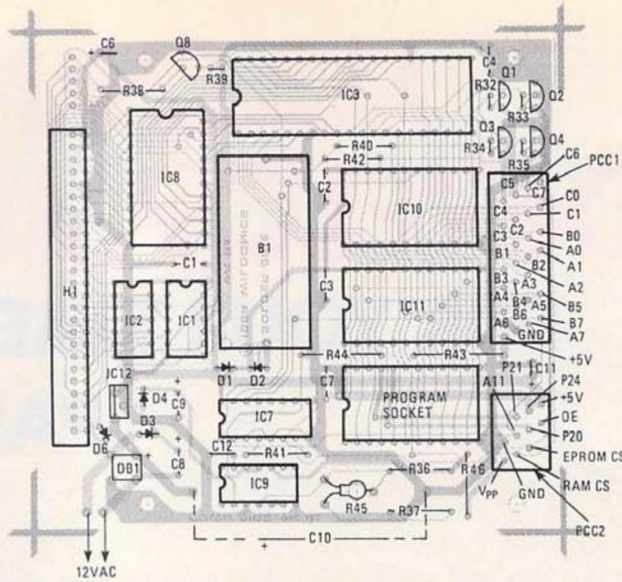


FIG. 4—PARTS PLACEMENT ON THE MAIN BOARD is shown in this diagram. Take care to observe the proper polarities for all components.

Using the PC boards is the easiest way to go. A parts-placement diagram for those boards is shown in Figs. 4 and 5. Note that the board identifies the functions of the LED's (in other words, which lines they monitor). Note that all the resistors on the display board (Fig. 4) and R39–R43 and the diodes on the main board (Fig. 5) are all end-mounted. A holder for the lithium battery should be used-and 4/32-inch alignment holes is drilled as shown. Depending on the case you use, filter capacitor C10 can be positioned either to the side or above IC9 and R45. A 1/8-inch hole through the PC board and the bottom of the case will allow you to adjust R45 without opening the enclosure.

Mount all of the passive components first, then the diodes, transistors and IC's. A heat sink for IC12 can be made of angle aluminum and placed above H1. Sockets for the IC's are recommended. If you are going to mount the CMOS IC's directly to the board, save them for last and be sure to ground the soldering iron to the board's ground (alligator clips work fine.) With a 26-conductor ribbon cable you can daisy chain the main board (via PCC1) to the display board (H2) to the DB-25 connector at the back of the unit (in this application the DB-25 is not used as an RS-232 connector). The outside wire, 5-volts, should be torn away from the others before insertion into the DB-25 connector.

If you are going to place the PC boards in a project case you will need to raise the program socket through the top by replacing it with its wire wrap counterpart or by soldering extended posts to its base. The switches and LED1 (in a panel clip) can be mounted directly to the top of the case and wired to the board with a 10-conductor ribbon cable PC board connector assembly. The ribbon cable connects to the board at PCC1; which wires connect to which pads is shown in the parts-placement diagram. The switches, which are mounted on the case, should be wired according to the schematic diagram. Note that R1, R47, C13, and D5 are mounted directly on the switches at the top of the case.