TRS-80 Micro Color Computer

Radio Shack
One Tandy Center
Fort Worth, TX 76102
$119.95

RADIO SHACK has just given birth to a 29½ ounce baby brother to the Color Computer, called the TRS-80 MC-10. Designed to compete with computers such as the VIC-20, Sinclair/Timex 1000, and the Texas Instruments TI-99/2, the MC-10 is loaded with features that will please the experienced computer hobbyist, while maintaining a price low enough to remain accessible for the general public. For the price, we believe the MC-10 is a better buy than its competitors.

Hardware

The MC-10 packs a lot of power in its 2 inch by 8.5 inch by 7 inch shell. The video display generator is identical to that in the Color Computer: a Motorola 6847. The screen is hardwired for both text and graphics to start at memory location $4000. Micro Color Basic, used in the MC-10, does not support high resolution graphics, but by using machine language the programmer can get all the graphics modes possible with the Color Computer. The text screen is the familiar black on green; POKE 32768,64 provides the user with black on red. Lowercase is achieved, as in the Color Computer, by a Shift 0 command.

The keyboard seems to be the primary area of cost reduction. The MC-10 has an undersized calculator-style 48-key keyboard. Some of the keys are in annoying places; for example, the Control key is in the same spot most computers put their right shift key. For those who are used to the Color Computer's layout, other

0–127	6803 Input/Output
128–191	Internal CMOS Memory
192–255	Internal Scratchpad Memory
256–16383	Not Used
16384–16895	Text Video Memory
16384–20479	4K RAM
16384-32767	16K RAM
32768–49151	6847 VDG
49152–57343	Not Used
57344–65535	Micro Color Basic

Table 1. General Memory Map

poorly located placement is the Break key and the four arrow keys. On the plus side, the keyboard does have positive tactile feedback, unlike the Sinclair Computer. Some keys also have graphics symbols, which can be embedded in strings simply by pressing the Shift key along with the letter key. Another nice feature of the keyboard is that Basic words are assigned to individual letters on the keyboard, as on the Sinclair machine. For example: to use the word PRINT in a Basic program, the user can type either: control 9, ?, or PRINT (on the Sinclair, Basic words cannot be entered letter by letter).

The memory map for this computer was not available from Radio Shack at the time of this writing, but we believe we have a fairly accurate map derived from our experiences with the computer. This map is shown in Table 1.

One of the nicest features of the MC-10, that puts it out of the class of the other small microcomputers, is the built-in RS-232C serial interface. According to the users manual, the port is compatible

Suped-up 6800 CPU

ABX	Adds B to X
ADDD	Adds to D
ASLD	Arithmetic Shift Left D
BRN	Branch Never
LDD	Loads D Register
LSRD	Logical Shift Right D
MUL	Multiply A times B
PSHX	Pushes X to the Stack
PULX	Pulls X off the Stack
STD	Store Register D
SUBD	Subtract from D

Internal timer

$0008	Timer Control/Status
$0009	Counter's High Byte
$000A	Counter's Low Byte
$000B	Output Compare High Byte
$000C	Output Compare Low Byte
$000D	Input Capture High Byte
$000E	Input Capture Low Byte

128 bytes on Internal RAM

64 Bytes of Low Power RAM

Up to 13 Parallel I/O Lines

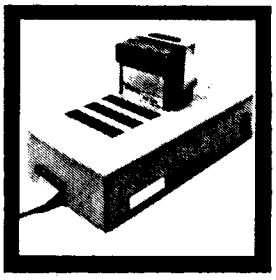
Serial Input/Output

$0010	Rate and Mode Control
$0011	Transmit and Receive Status
$0012	Receive Data Register
$0013	Transmit Data Register

Internal Clock

Table 2. 6803 Features

Switchable Expansion Is Here



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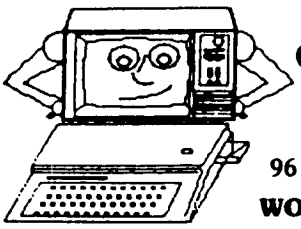

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with the Color Computer, has a baud rate of 600 bps (bits per second), one start bit, seven data bits, two stop bits, and no parity. When outputting to a printer, the computer is automatically set for 132 columns with a carriage return at the end of the line, as in the Color Computer.

Radio Shack has strayed away from the 6809 CPU in the Micro Color Computer. They did, however, stay within the 6800 family. The new processor is a Motorola 6803, a direct decendant of the 6801. Some of the features of the 6803 are listed in Tables 2 and 3.

The cassette interface on the MC-10 is *almost* fully compatible with the Color Computer. We have had success transferring machine language programs written in 6800 code from the Color Computer to the MC-10. Limited success has also been achieved transferring Basic files in ASCII format from the Color Computer to the MC-10, but not from the MC-10 to the Color Computer. One last difference between the two interfaces is the fact that the MC-10 does not shut the tape recorder off when it is not loading or saving.

68000	
6809	
6801	
6803	Increasing Power
6802	
6808	
6800	

Table 3. 6800 Family Tree

Micro Basic Words Not in Color Basic:

CLOAD*	Loads data from cassette into an array
CSAVE*	Saves data from an array to cassette
LPRINT	Same as Color Basic's PRINT#–2

Micro Basic Words Not in the Reference Manual

EXEC	Transfers control of a program to machine language at the specified address
CLOADM	Loads a machine language program from cassette tape

Color Basic Words Not in Micro Basic

AUDIO ON	**JOYSTK**
AUDIO OFF	**MOTOR ON**
CLOSE	**MOTOR OFF**
CSAVEM	**OPEN**
EOF	**USR**

Table 4. Micro Color Basic

Software

The Basic interpreter for the MC-10 was written by Microsoft, and greatly resembles non-Extended Color Basic on the bigger machine. A complete list of all the Basic commands and functions in Micro Basic, along with the commands unique to each computer, are listed in Table 4. As mentioned before, Micro Color Basic has no provisions for high resolution graphics, but in Program Listing 1 we show how you can accomplish high resolution using POKEs. We have obtained a complete disassembly of the Basic interpreter using Philip Lucido's FLEX program "Dynamite" (Phil is our club president), and in future articles we will disclose more of this information, along with some useful programs.

Many programs written for the Color Computer will run on the MC-10 with little or no modification necessary, as long as the original programs do not require graphics. Although 6809 and 6800 machine code are different, their source code is similar and should be able to be adapted to each other.

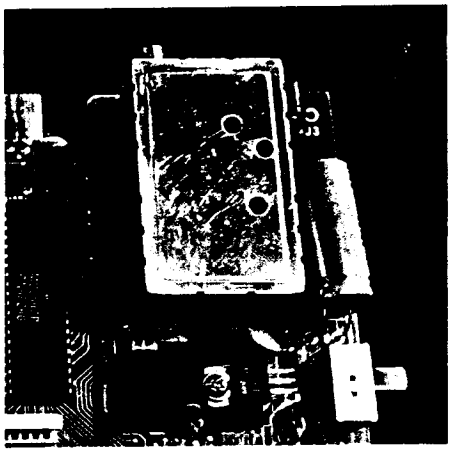
The documentation for the MC-10 is sketchy but adequate. In Chapters 1–4, the manual goes into details of how to set up and operate the computer. In Chapters 5–16, a Basic tutorial is given which is better than that provided for the VIC-20 and the Sinclair/Timex, but is not as good as the Color Computer's. The Appendix has sections on sample programs, error codes, ASCII, trouble-shooting, systems specificiations, and a command summary. Unfortunately, nothing is mentioned with respect to machine language, ROM entry points, or system variables. Also included is a handy reference card which beginners may use until they get used to Basic.

Performance

Speed is the primary attribute of the MC-10. In our benchmark tests, shown in Program Listing 2 and 3, the MC-10 performed almost 20 percent faster than the Color Computer. Although the exact clock speed is unknown, we suspect that a high clock speed would be the only way a 6803 can beat a 6809.

The cost of the MC-10 is $119.95. For an additional fee of $49.95, 16K of RAM can be added. This brings the cost of a fairly powerful microcomputer down to the level where nearly everyone can afford one. ■ ■ ■

— by Tim McFadden and Doug Kelley



```
10  'DRAW A SPACE INVADER IN
20  'HI-RESOLUTION GRAPHICS
30  POKE 32768, 255
40  FOR C = 16384 TO 16384 + 511
50  POKE C,0
60  NEXT C
70  FOR A = 16384 + 32*5 TO 16384 + 32*11
    STEP 32
80  READ Z: POKE A + 14,Z
90  NEXT A
100 GOTO 100
110 DATA 24,102,255,60,36,66,129,66
```

Program Listing 1

```
10  'PRIME NUMBER GENERATOR
20  FOR X = 1 TO 1000
30  FOR Y = 2 TO X - 1
40  IF X/Y = INT(X/Y) THEN 70
50  NEXT Y
60  PRINT X
70  NEXT X
```

Time to run on MC-10: 16:07
Time to run on Color Computer: 21:40

Program Listing 2

```
5   'FACTORIAL GENERATOR
10  FOR Z = 1 TO 100
20  FOR X = 0 TO 33
30  GOSUB 80
40  PRINT Z;X;A
50  NEXT X
60  NEXT Z
70  END
80  A = 1
90  IF X = 0 THEN RETURN
100 FOR C = 1 TO X
110 A = A*C
120 NEXT C
130 RETURN
```

Time to run on MC-10: 5:42
Time to run on Color Computer: 8:14

Program Listing 3