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CIRCLE NO. 24 ON FREE INFORMATION CARD

computers

PE Tests APF's "Imagination Machine"

IN THE "Imagination Machine" APF has a color-and-sound home computer with a strong video-games flavor. Built around an MC-6800 CPU, the basic system consists of two major parts: a stand-alone video-games-playing unit (MP1000) with handheld controllers that connects to a standard color or B&W TV receiver and uses ROM cartridges, and an interconnected base unit (MPA-10) with built-in cassette deck and keyboard that provides the "computer" portion of the system. Also supplied is a 12-kilobyte BASIC Interpreter cartridge that allows you to get the system up and running. In combination, the MP1000 nestles atop the MPA-10.

APF originally offered the MP1000 and MPA-10 separately for \$129.95 and \$499, respectively, or \$599 when purchased together. Now the company is marketing the two units together as the Model 1 for only \$399.

A number of options is available for expanding the Imagination Machine's computing abilities. Building Block 1 (BB1) at \$199.95 enables you to add a Model TM-150 telephone modem or a hard-copy printer (not yet available). More memory than is provided by the 14K of ROM and 9K of RAM is available with the 8K memory module (R8K for \$99.95). Building Block 2 (BB2) is a \$149.95 floppy-disk controller for adding the Model D-100



CP-184

5 1/4" floppy disk drive (\$399.95).

Software for the Imagination Machine is available in ROM cartridges and on cassette tapes. Like the BASIC interpreter, which comes with MP1000/MPA-10 system, most video games are stored in ROM cartridges; other programs (home finance, educational, etc.) are on tape. Prices for the software range from \$19.95 to \$29.95, with a "BASIC Tutor" on cassette at \$49.95.

General Description. The MP1000 (Fig. 1) comes with its own power supply, two joystick/keypad controllers, circuitry to produce eight colors (green, yellow, blue, red, black, cyan, purple, and orange), and a sound generator. It also contains 2K of ROM, 1K of screen-display RAM, a peripheral interface adaptor, and the MC6800 microprocessor. The MP1000 memory maps the display screen, which resides at memory locations 512 through 1023. A single ROM-cartridge slot is provided for plugging in any of the various games cartridges.

Connection of the MP1000 to a color-TV receiver is made through a supplied COMPUTER/TV isolation switch. After applying power, the TV selector should be set for channel 3, the switch on the isolation block to COMPUTER, and you're all set to go. Pushing RESET on the MP1000 brings up a Rocket Patrol game, which is built into every system.

The MP1000 can generate both alphanumeric characters and semigraphics, both a function of the internal ROM. A 5 x 7 dot matrix is used in generating the 64 ASCII characters, with one or two colors or in an inverse mode. The semigraphics mode is generated in an 8 x 12 box that is subdivided into four boxes, each four by six dots (Fig. 2). You can specify one of the eight available colors (dark green, yellow, blue, red, white, cyan, purple, or orange) for any given box and luminance on or luminance off to create specific effects.

Although the display is limited to 32 x 16 boxes per TV frame, the MP1000 can create "high-resolution" graphics with either 128 x 192 or 256 x 192 character dots. In this mode, the screen is mapped to 32 x 12 character boxes, each 8 or 4 dots wide by 16 dots high.

The joystick assemblies move the cursor up, down, left, and right on the TV screen. These are switch-type joysticks, rather than potentiometer types, which means that there are no intermediate points between left and right and top and bottom. The keypad is used for entering numbers (0 through 9), clearing the screen, and performing an implicit ENTER.

Using the optional games cartridges in the MP1000 is very simple. With the unit turned off, plug your choice of cartridge into the slot at the back of the player, power up, and press RESET. At this point, the menu of choices appears on-screen. Key in your choice and tell the computer how many players there will be.

Adding the MPA-10 (Fig. 3) to the

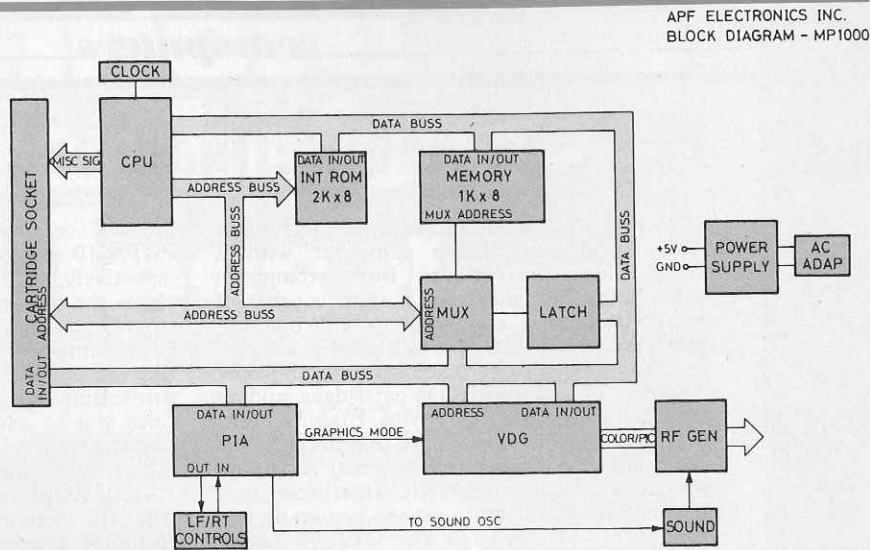


Fig. 1. Block Diagram of the MP1000. It contains 2K of ROM, 1K of screen-display RAM, and the MC 6800 microprocessor.

MP1000, via a J-shaped connector that also provides data and address buffering, brings computing capability. Basically, the MPA-10 permits programs on cassettes to be loaded into the computer and allows you to develop your own software and store it on tape. The MPA-10 also supplies the system's alphanumeric keyboard, a built-in cassette deck that operates under processor control, 8 kilobytes of RAM, and a 50-pin connector to accommodate optional peripherals. Interface with the TV receiver is still through the games-playing unit.

To connect the MPA-10, it is necessary to insert a grounding bar in the ROM cartridge slots. With this in place, the MP1000 sits in a dished-out area atop the MPA-10 and is electrically and mechanically secured by a special J-shaped connector. Then the 12-kilobyte BASIC Language Interpreter cartridge supplied with the MPA-10 plugs into a slot in the base unit.

Powering up both units and pressing ENTER causes the APF logo and "basic" (lower case, done in graphics) to be displayed in a rainbow of colors. To get into the BASIC command mode, the EN (enter) key on either joystick controller must be pressed, at which time, the computer clears the screen and places a block cursor in the upper left.

Programs can now be entered from the cassette deck or by typing them in from the keyboard. For tape operation, you must type in CLOAD or 1 CLOAD (depending on instructions supplied with the tape), followed by RETURN and RUN. A message then instructs you to rewind the tape, push PLAY on the cassette deck, and once again press RETURN. From here on, deck operation is under computer control, via the BASIC interpreter, until a prompt on the screen tells you to press STOP.

The MPA-10's keyboard is made up of 53 keys that generate only upper-case letters, numbers, and shifted characters.

Since it's set up in a manner similar to a standard Teletypewriter, such keys as HERE IS, BRK (break), and REPT (repeat) aren't used. Although an ESC (escape) key is provided and shown on the wiring matrix, it appears to be nonfunctional.

The keyboard setup includes 24 commonly used BASIC keyword commands that can be invoked with two simultaneous keystrokes. Above the keyboard are printed commands like CLOAD, PRINT, DIM, etc., that are invoked by holding down the CTRL (control) key and the key that corresponds to the desired command. This informs the computer of the command and spells out the command word on the screen.

Data transfer rate for the cassette system is approximately 1500 baud, which allows an 8-kilobyte tape to load in about 2 minutes. In addition, the tape system permits use of an audio track to create a voice header (via a microphone, not supplied) that can be heard from the

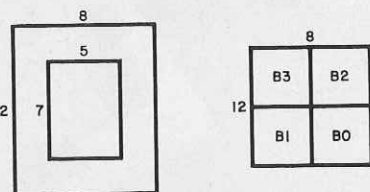
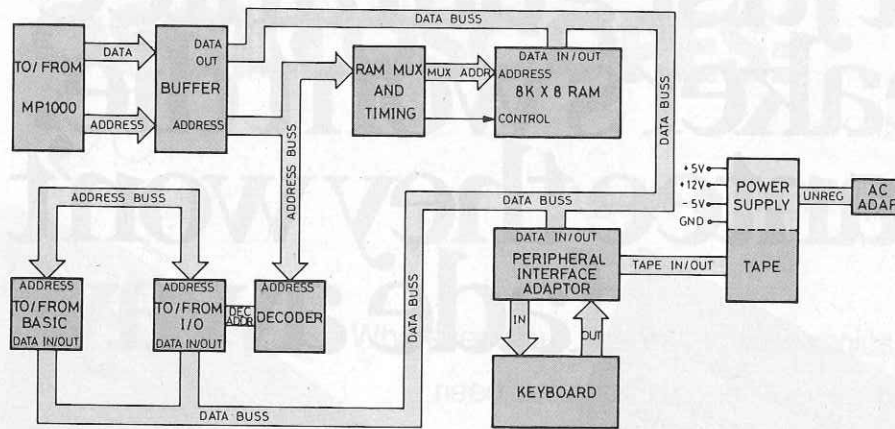


Fig. 2. Either alphanumeric characters (left) or semigraphics can be generated.

deck's built-in speaker. Since tape system operation is under program control, data can be loaded and saved while a program is operating.

The BASIC interpreter permits access to the processor by a specific call and can handle BASIC statements in tandem with machine-language programs. To enter a machine-language routine from BASIC, you simply call location at 28672. Then, after entering your routine, typing G8894 tells the monitor to go back to the entry point of

APF ELECTRONICS INC.
BLOCK DIAGRAM - MP1000



APF ELECTRONICS INC.
BLOCK DIAGRAM - MPA10

Fig. 3. Block diagram of the MPA-10 base unit with built-in tape deck and keyboard. A plug connects to the MP1000.

BASIC at location 8894. At this point, you can write a BASIC program that calls the machine-language routine. One of the things you can do using machine-language routines is divide the screen into four quadrants and have activity occur in each. Incidentally, more than one machine-language routine can be written and called from BASIC as needed.

The built-in sound generator can add an extra dimension to your programs. Sound can be created using either machine-language routines or the POKE command in BASIC. Should you decide to add the optional floppy-disk system to your Imagination Machine (we didn't have it for this review), APF's Basic interpreter already contains the necessary disk operating system (DOS).

Evaluation. Taken as a whole, the basic MP1000/MPA-10 Imagination Machine performed as described in the well-written and comprehensive literature. (We didn't have the optional building blocks for this report.) Machine- and BASIC-language programs, including those that use graphics and color, were easy to load, run, and save on tape.

During our initial evaluation, however, a few annoying bugs showed up. One was erratic operation of the joystick/keypad controllers. Most of the key-sticking problem cleared up after several hours of exercise, but a multiple-entry problem persisted. When queried about this, APF informed us that our evaluation unit was part of an early production run and was fitted with older controllers. We've been assured that all Imagination Machines manufactured since last November have been fitted with newly designed controllers that have looser-fitting keys and full debouncing.

Another minor annoyance we encountered was in cassette-deck operation. We found that, even when a program tape was fully rewound, we still had to run the rewind sequence before it would load.

Most of the games cartridges we tried were apparently geared to the younger

set. Only four games—Hangman, Tic-Tac-Toe, Breakdown, and Pinball—offered more than passing challenge.

Of the taped programs we reviewed, "Music Composer and Piano Player" and "Artist and Easel" were the best in terms of demonstrating what you can do with the computer's hardware and software. On the whole, however, the taped programs fell short of their potential for producing three-dimensional graphics, though they made good use of the computer's two-dimensional graphics, color, and sound-generating capabilities.

APF's BASIC interpreter is fairly good and comes with an easy-to-follow manual that spells out every step of its use in detail, but it does have limitations. For example, the BASIC doesn't provide such attributes as editing functions, renumbering, and automatic line numbering. Trig functions aren't provided, either, but they can be written as subroutines and called by a program as needed. Curiously, no "scratch" or "kill" command can be invoked to erase a BASIC program once it has been entered. If you wish to erase a program, you must either write a new program over it or press RESET on the MP1000 and the EN key on either controller. We suggest the latter, since it's a two-key operation and the BASIC in ROM is available immediately.

Comment. The ready-to-go Imagination Machine offers a fairly inexpensive entry to the world of microcomputing. This is especially true when considering its built-in features such as video color and sound generation, cassette deck, and hand controllers. It has a growing software support base and a nice list of optional accessories that will allow you to expand to a reasonably powerful computer system, though it is clearly not designed for serious business or professional use. As a low-priced home computer, sophisticated video games player and computer trainer, the Imagination Machine is difficult to beat.

—Carl Warren

CIRCLE NO. 103 ON FREE INFORMATION CARD

NEW!!! THE ELECTRIC MOUTH*



For \$100, Elf II, Apple, TRS-80 Level II*

From \$99.95 kit
Now — teach your computer to talk, dramatically increasing the interaction between you and your machine.

That's right: the ELECTRIC MOUTH actually lets your computer talk! Installed and on-line in just minutes, it's ready for spoken-language use in office, business, industrial and commercial applications, in games, special projects, R&D, education, security devices — there's no end to the ELECTRIC MOUTH's usefulness. Look at these features:

- * Supplied with 143 words/letters/phonemes/numbers, capable of producing hundreds of words and phrases.
- * Expandable on-board up to thousands of words and phrases (just add additional speech ROMs as they become available).
- * Four models, which plug directly into S100, Apple, Elf II and TRS-80 Level II computers.
- * Get it to talk by using either Basic or machine language (very easy to use, complete instructions with examples included).
- * Uses National Semiconductor's "Digitaltalker" system.
- * Includes on-board audio amplifier and speaker, with provisions for external speakers and amplifier.
- * Adds a new dimension and excitement to programming; lets you modify existing programs and games to add spoken announcements of results, warnings, etc.
- * Installs in just minutes.

Principle of Operation: The ELECTRIC MOUTH stores words in their digital equivalents in ROMs. When words, phrases, and phonemes are desired, they are simply called for by your program and then synthesized into speech. The ELECTRIC MOUTH system requires none of your valuable memory space except for a few addresses if used in memory mapped mode. In most cases, output ports (user selectable) are used.

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four	thirty	cent	error	kilo	on	space	f	w	
five	forty	400hertz	tone	foot	left	out	speed	g	x
six	500hertz	tone	flow	less	over	star	h	y	
seven	sixty	20ms	silence	fuel	lesser	parenthesis	start	i	z
eight	seventy	40ms	silence	gallon	limit	percent	stop		
nine	eighty	60ms	silence	go	low	please	than	k	
ten	ninety	180ms	silence	gram	lower	plus	the	l	
eleven	hundred	320ms	silence	great	mark	point	time	m	
twelve	thousand	centil	greater	meter	pound	try	n		
thirteen	million	check	have	mile	pulses	up	o		
fourteen	zero	comma	high	milli	volt		p		
fifteen	again	control	higher	minus	re	weight	q		
sixteen	ampere	danger	hour	minute	ready	a	r		
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