

# A User's View of

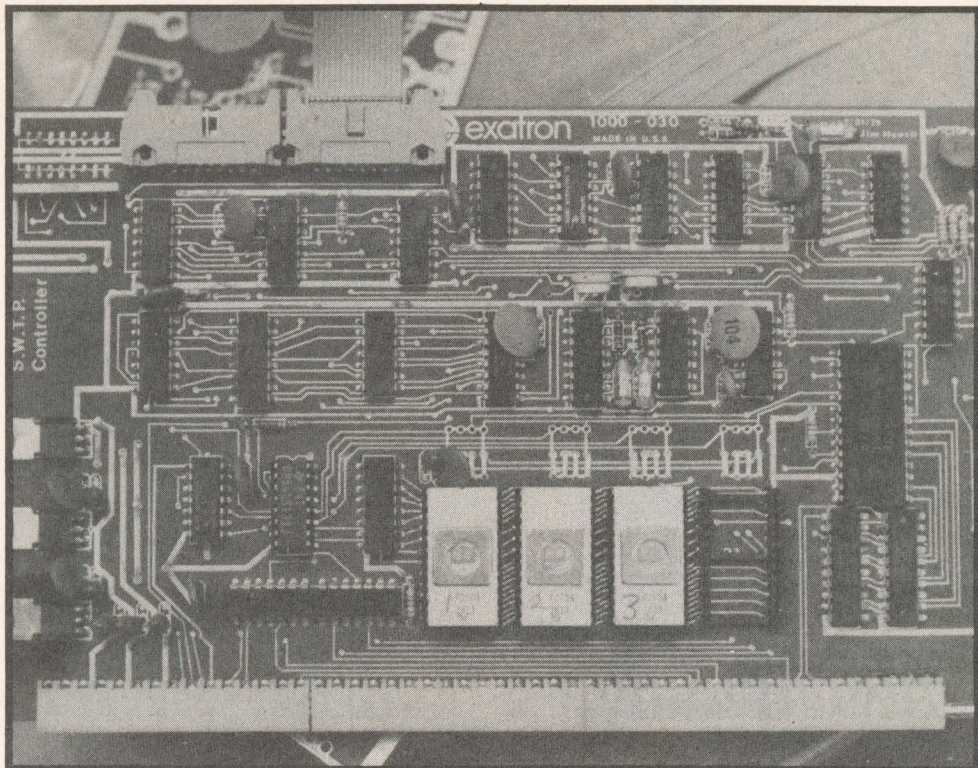


PHOTO 1

## Stringy Floppy for the 6800

By Tom Mattingly

Are you unwilling to "shell out" more than \$900 for a floppy disk? Don't despair because there is now an alternative: The Exatron Stringy Floppy. It is almost as fast, and just as reliable as the floppy disk. The cost is  $\frac{1}{2}$  to  $\frac{1}{3}$  less than a floppy disk.

As far as storage is concerned the stringy floppy can hold more than a cassette or single-density  $5\frac{1}{4}$ " disk. A 120-minute cassette using only one side at 30 characters per second can hold 108,000 total bytes. Only one side is used because a stringy floppy cannot be turned over. A floppy disk using the SWTPC model holds 70-86K total bytes according to my local SWTPC dealer. The stringy floppy in its longest length of 75 feet can hold 140,000 total bytes.

### COST COMPARISON

In the cassette's case, the total cost of the cassette and interface would be about 55% less than the stringy floppy. For 55% less the user gets 30 characters per second data transfer and lots of cords to keep untangled. On the other hand, for about six times more, the user could get a floppy disk with a little more loading and 188% greater access speed than a stringy floppy. Or the user could purchase a stringy floppy which is 34.6% the cost of a floppy disk and has the same reliability with a slightly slower loading and access speed.

The media used in each unit must be good quality to reduce errors to a minimum. The average cost for a floppy disk is 45% more than a stringy floppy wafer. A good quality cassette costs an average of 60% more than a stringy floppy wafer, which costs about \$2.

### RELIABILITY AND SPEED

The two most important things in auxiliary storage are reliability and speed. The error rate for a floppy disk is the lowest of all kinds of auxiliary storage, 1 in 100,000,000 bits. The cassette's error rate depends on the cassette and the cassette player used. Therefore it is really difficult to estimate the error rate of the cassette. The stringy floppy has an error rate of 1 in 100,000,000 bits, the same as a floppy disk. Speed is the next important factor.

Using the SWTPC AC-30 cassette unit is probably the slowest of all three (cassette, stringy floppy and floppy disk). As the name implies, the AC-30 loads at 30 characters per second. BASIC, for example, loads in five minutes using a binary loader. It would take 15 minutes to load BASIC if MIKBUG and a standard ASCII dump was used.

The stringy floppy loads programs at 14,400 bits per second or 1600 characters per second (9-bit bytes). BASIC will load into programmable memory from the stringy floppy in roughly six seconds.

The SWTPC floppy disk loads at 125,000 bits per second or 13,888 characters per second (assuming 9-bit bytes and no overhead for the Disk Operating System). The SWTPC floppy disk will load BASIC in roughly three seconds. That is slightly faster than the stringy floppy.

Although the stringy floppy matches the floppy disk in reliability and emerges second in speed, the stringy floppy is far preferable in terms of additional equipment required. The AC-30 requires a good cassette recorder which will record and playback without many mistakes. A good cassette recorder usually costs about \$50. The AC-30 also requires three audio cables for record, playback and motor control.

The floppy disk requires a 4K or 8K programmable memory board for the Disk Operating System. The board is only needed if the user wishes to keep the same amount of free programmable memory that existed prior to buying the floppy.

On the other hand, the stringy floppy requires no extra cables and only a small amount, 32 bytes, for the input buffer. The stack is also stored in this area, so a few bytes more would be used.

## SOFTWARE

After reliability and speed, software is the next important consideration. The cassette interface (AC-30) is supported with a BASIC, Assembler/Editor and Disassembler from

drives. Both drives can be accessed through the software. The controller also has room for four 2708s or four 4118 (1k x 8) programmable memories. As the board is shipped presently, it contains three 2708s. The board and erasable programmable read only memories (EPROM) are addressed at \$C000-CFFF. This addressing can easily be changed by a set of switches at the top of the board and reburning the read only memories.

In addition to the read only memories, the controller contains a synchronous serial interface, a data encoder, a clock recovery circuit, and the necessary latches for peripheral control. Wherever possible the board uses complementary metal oxide semiconductor (CMOS) and low power transistor transistor logic (LSTTL) to provide low power consumption.

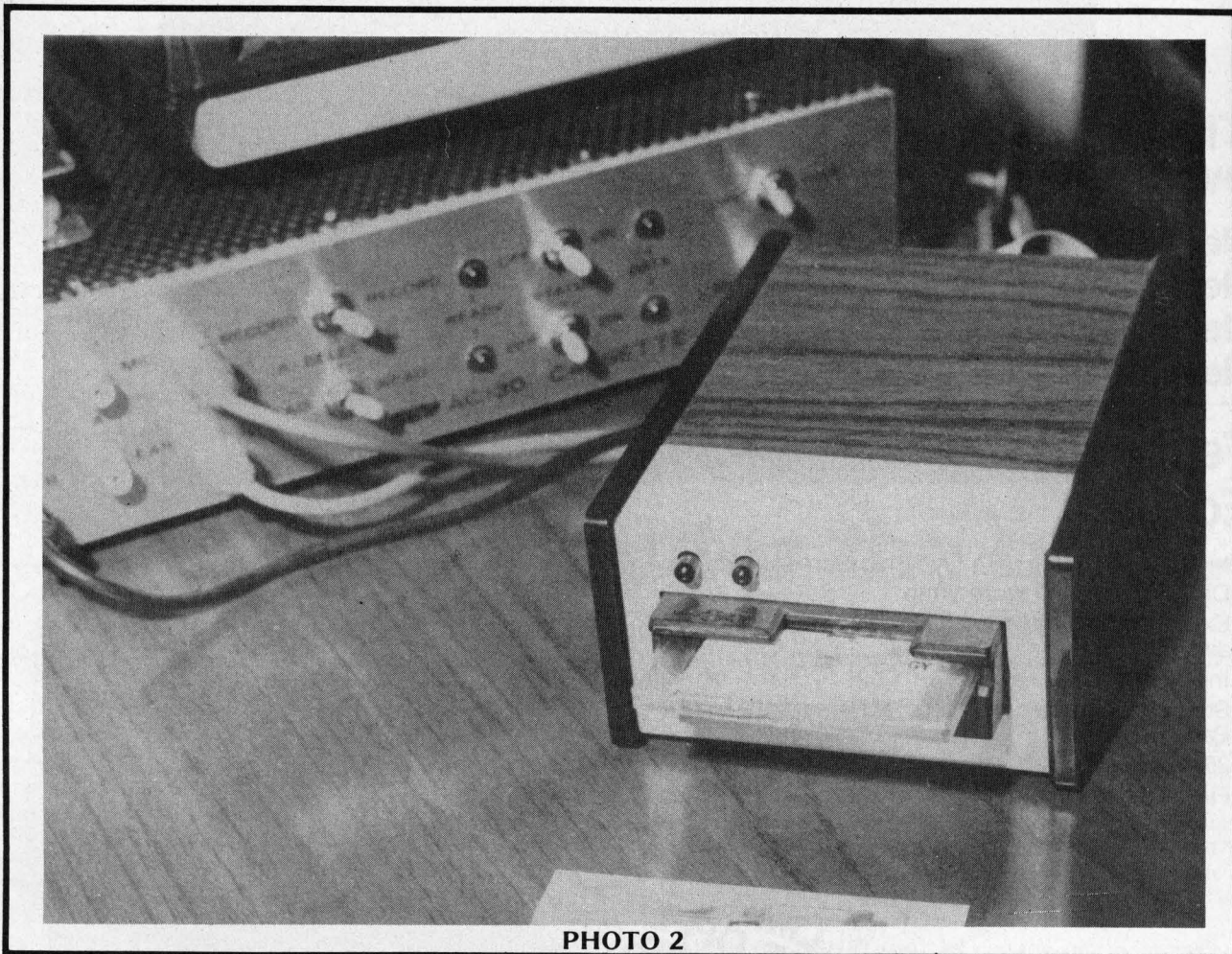


PHOTO 2

SWTPC. Also many other companies support the AC-30 with software. The floppy disk has come a long way in software. Random access and sequential files with BASIC plus other software has made the disk a valuable item.

The stringy floppy for the SS-50 bus is limited at the present time. Exatron (the company that makes the stringy floppy) does have TSC 9K super-fast BASIC patched and working. Although this BASIC does not have data files, Exatron has gone to Microsoft for a full-fledged BASIC with data files and many other good features. Computerware has also become interested in the stringy floppy and Exatron is also working on their BASIC.

In addition to two BASIC languages, Exatron has been working on the TSC Assembler and Editor. It should be released by publication of this article.

## HARDWARE

The controller board (see Photo 1) for the drive is a standard 50-pin, full-size board. The controller can handle two

The drive, Photo 2, itself measures  $4\frac{3}{16}$ " wide by  $5\frac{1}{2}$ " deep by  $2\frac{1}{4}$ " high (10.64cm x 13.97cm x 5.72cm). There are no switches on the drive; it simply includes two light emitting diodes (LEDs) and a slot to insert the wafer. The right LED indicates motor on. The left LED indicates data being written to the tape.

The media (what the program is actually stored on) that fits into this drive is called a stringy floppy wafer. I believe that it was given this name for two reasons: "Stringy" due to the use of digital tape and its size, "Floppy" because of its similarity in reliability and its closeness in speed to the floppy disk. The size of the stringy floppy wafer is  $1\frac{1}{16}$ " wide by  $2\frac{1}{16}$ " long by  $\frac{3}{16}$ " thick (3.97cm x 6.83cm x .48cm). The average life of the wafer is over 2500 hours. The drive has an average life of over 3500 hours.

## ADVANTAGES AND DISADVANTAGES

The first advantage of stringy floppy is that no extra programmable memory is needed except for a 32-byte input buffer that can be placed anywhere in memory. Further, part

# IT'S SUPERIOR AND IT'S HERE!

**ABSOLUTELY — THE Superior Mainframe**

□ A Superior Bus Design □ A Superior Cooling System

CMC Marketing has developed a superior mainframe incorporating all of the features you have ever wanted!

- Optimum Design Using 18 Quality Edge Connectors
- Termination Optionally Grounded, Left Open or Made High

- Security Key Lock
- Constant Voltage Transformer (CVT)
- 110/220 VAC 50/60Hz Input
- Fully Fused With Input Power Circuit Breaker
- Unique Funnel Design Cooling System
- One Year Warranty
- Model 2018D (Desk Top) — 2018R (Rack Mount)

Exclusively Distributed By



10611 Harwin, Suite 406, Houston, Texas 77036  
(713) 995-4960 Telex:762072 TWX:910-881-7155

Dealer Inquiries Invited

CIRCLE INQUIRY NO. 78

## Tarbell Double Density Floppy Disk Interface

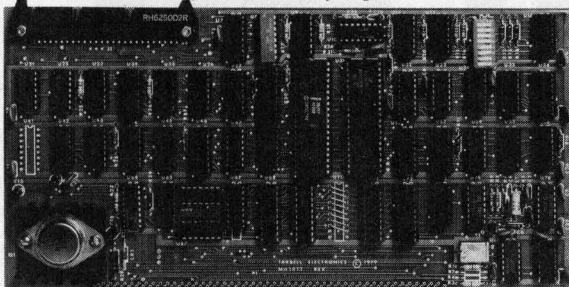
FOR 8" DISK DRIVES

Under Tarbell Double-Density CP/M, single and double density disks may be intermixed. The system automatically determines whether single or double density is in place.

- Software select single or double density.
- Phase-locked-loop and write precompensation for reliable data recovery and storage.
- On-board phantom bootstrap PROM is disabled after bootstrap operation so all 64K memory address space is available to user.
- DMA in single or double density permits multi-user operation.
- Extended addressing provides 8 extra address bits, permitting direct transfer anywhere in a 16 megabyte address range.
- Select up to 4 drives, single or double sided.
- New BIOS for CP/M included on single-density diskette.

Assembled and Tested . . . . . \$425

CP/M is a reg. trademark of Digital Research.



Tarbell Electronics

950 Dowlan Place, Suite B, Carson, Ca. 90746  
(213) 538-4251 (213) 538-2254

CIRCLE INQUIRY NO. 70

of the storage in the 6810 chip is used. Secondly, the operating system is always there and can be accessed by the 'Z' command of SWTBUG™. Third, the media is small and more compact than a cassette or floppy disk. Next, the speed of BASIC loading in six seconds instead of five minutes makes a significant difference.

Although the following may be considered disadvantages, they are tolerable. First and most important is search time. It is not a lengthy amount of time but not a close competitor to the floppy disk. Secondly, some prefer the operating system in programmable memory so it could be changed. My response is that there is usually someone in your town or area that has a 2708 burner. If nobody has a burner, you can send the 2708s back to Exatron and they will reprogram them for \$25. Third, this first version of the operating system does not have a CATALOG command. Note: Exatron is getting the bugs out of the second operating system which does have a CATALOG command.

Since the operating system is in erasable programmable read only memory, it does not have to be loaded but just jumped to by the 'Z' command of SWTBUG or by loading \$A048<sub>16</sub>, and \$A049<sub>16</sub> with \$C000<sub>16</sub> and typing G. Once in the Exatron Operating System, commands can be typed in and executed. The commands currently supported are:

- HSAVE,(filename) Saves a program on the wafer
- HLOAD,(filename) Loads a program from the wafer
- H Jumps to \$AD03 (Flex warms)
- G Jumps to \$0100- user program, BASIC
- EDIT Loads and executes the TSC Text Editor
- ASMB Load and executes the TSC Assembler
- ASN Sets the density. 1 for single density (7200 bits per second), 2 for double density (14,400 bits per second)
- NEWTAPE Formats the tape and checks for defective sections
- HOME Positions the wafer at the beginning of the tape to write the first program
- MON Jumps to \$E0E3 (SWTBUG)

The operating manual is small but compact and complete with all the information needed to use the system. Each of the above commands are explained in more depth in the manual. The manual also gives a brief explanation of the controller board and then explains how to access the Exatron Stringy Floppy Operating System.

Two things, though, should be mentioned that were not in the manual. One, the operating system and drive sometimes take more than one pass to certify the wafer is presently in the drive. This is mainly due to a normal "run-in" period similar to cassettes. Two, the tape can be write protected by removing the silver dot from the top of the wafer. Even when the operating system attempts to write and the left light emitting diode on the drive indicates a write, the drive does not write.

Due to the size and reliability of the drive, it is useful in some business applications. First, a small compact system using this drive as an auxiliary storage device would fit into any small business. Also, the system being used as a recorder of the daily transactions would work. Wordprocessing is another thought for the use of the system.

These are the benefits of the Exatron stringy floppy; forwards, backwards, software and hardware. As the software becomes more oriented toward a floppy disk type system with BASIC data files, and all the other features of a floppy disk type, the stringy floppy will become more popular. □