



**LOW COST – RELIABILITY – SPEED**

# **EXATRON STRINGY FLOPPY MASS STORAGE SYSTEM**

**The Exatron Stringy Floppy is the sensible alternative to the unreliability of cassette operation, and the cost of a disc system. Available NOW for your TRS-80, S-100 and 6800 systems—with Pet, Apple and several other models under development.**



*excellence in electronics*

## EXATRON—THE COMPANY

Exatron is a California based corporation that has been in business since 1974. As well as the Stringy Floppy, Exatron designs, manufactures and sells state-of-the-art electro-mechanical equipment for a variety of commercial and industrial applications. Exatron is an established supplier of automatic test equipment to manufacturers, and large OEM users, of integrated circuits world-wide.

## THE STRINGY FLOPPY—WHAT IS IT?

The Exatron Stringy Floppy (ESF) is an extremely fast, reliable, economical alternative to cassette or floppy disk storage of computer programs or data.

Totally self-contained, the ESF has no buttons, switches, knobs or levers to adjust or forget. All of the ESF's operations are under the computer's control.

In use the ESF saves and reads data at a rate of 7200 baud, for the non-technical this translates to 4K in an amazing 6 seconds! Even more amazingly, if your TRS-80 has had a high speed modification fitted, both access and save times can be halved — 14,400 baud or 4K in as little as 3 seconds.

## HOW DOES IT WORK?

The ESF uses a miniature tape cartridge (called a 'wafer') as the data storage medium, about the size of a business card and 3/16th of an inch thick. The tape used inside the wafer is a special Mylar based Chrome Dioxide type, specially developed for digital applications. Wafers are available in several lengths, 5 feet being the smallest and capable of holding up to 4 thousand bytes of information — the 75-foot wafer is the largest available and can hold up to 64 thousand bytes of data.

The wafers contain a single reel of the special tape connected as a continuous loop, the ends being spliced together with a piece of reflective tape. In operation the ESF drive unit pulls the tape from the center of the reel inside the wafer, causing the entire reel to rotate. Thus, the tape automatically winds itself around the outside of the reel at the same rate as which it is pulled from the center. This process is similar to that found in an 8-track cartridge.

The ESF transport mechanism is very simple, consisting of a precision die-cast aluminum block — with a capstan, drive motor and magnetic record/replay head mounted on it. The wafer loads into a slot in the casting (it will only fit the correct way) and the tape is driven at a single point by the capstan, past the record/replay head.



Comparison of the Stringy Floppy to cassette and disk storage systems.

Because the ESF was designed to record and replay digital data only, data is stored on tape in a very dense format (at normal speed 800 bytes per second, 1600 if your TRS-80 has a double speed modification). This compares with approximately 62 bytes per second for cassette operation.

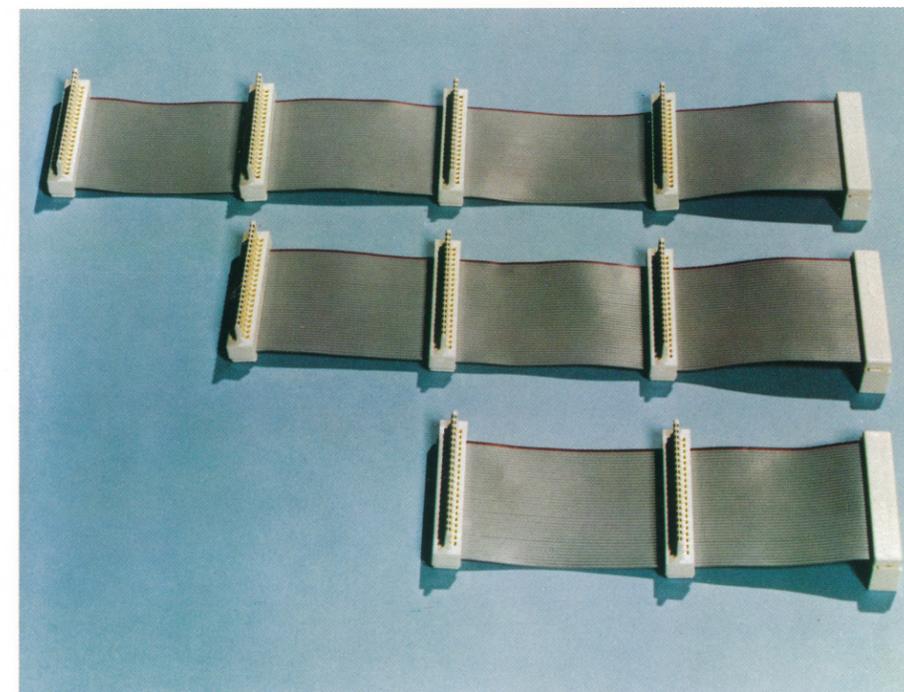
The software in every ESF adds a parity bit to every byte saved on tape, and a checksum to the end of every file. These are checked both after recording data and upon replay, any detected error is indicated by a message on the video display. This system of automatic error checking gives confidence in any data saved, also each wafer is rated for at least 2,000 complete passes past the record/replay head.

## HOW DO YOU CONNECT IT?

Connection of an ESF to your TRS-80 is extremely straight-forward, you just plug it into the expansion slot on the rear of your keyboard and a 115V ac outlet. If you have something already connected (such as an Expansion Interface) then a special 'bus extender' is available for connection of both units.

Once connected to your computer the ESF operating system needs to be activated — simple. Just type 'SYSTEM'(enter), and in response to the ? prompt type '/12345' (enter). Your TRS-80 will instantly display the ESF sign on message 'EXATRON STRINGY FLOPPY VERSION 3.2', and from this point onwards you will have the extra commands '@LOAD', '@SAVE' and '@NEW' recognized by your TRS-80.

The ESF's operating system is built into the electronics of the unit, in much the same way that BASIC is built into the computer, so it is always available — the SYSTEM command is to let your computer know that the ESF has been connected. If you normally reserve some memory for subroutines then the ESF software will relocate itself under your selected top of memory. The ESF uses only 4 bytes of your available RAM, these bytes are used to 'point' to the 2048 bytes of software in the ESF unit itself.



Bus Extenders for the Exatron Stringy Floppy.

## HOW TO USE IT

As stated above your TRS-80 will recognize three extra commands when the basic ESF is connected up, @NEW instructs the ESF to write a pattern of data onto a wafer and then read the pattern back. This does two things, checks that the wafer is not faulty, and finds out how long the tape is (in bytes). Thus the @NEW is used on every wafer to certify that it is physically and electrically all right, it can also be used as an electronic 'bulk eraser' if wafers are to be reused.

The second command added to your TRS-80's repertoire is @SAVE<sub>n</sub>, where <sub>n</sub> is a number between 1 and 99. This command instructs the ESF to save the program in memory onto the wafer in the drive, the equivalent of CSAVE in cassettes or SAVE with a disk system. The suffix number allows you to have many different programs on the same wafer (if they will all fit).

The third command added is @LOAD<sub>n</sub>, as with @SAVE 1 through 99 can be specified for <sub>n</sub>. As might be guessed the @LOAD<sub>n</sub> command is the equivalent of CLOAD in a cassette-based system or LOAD with a disk-based system.

Both the @SAVE and @LOAD commands can be used with machine

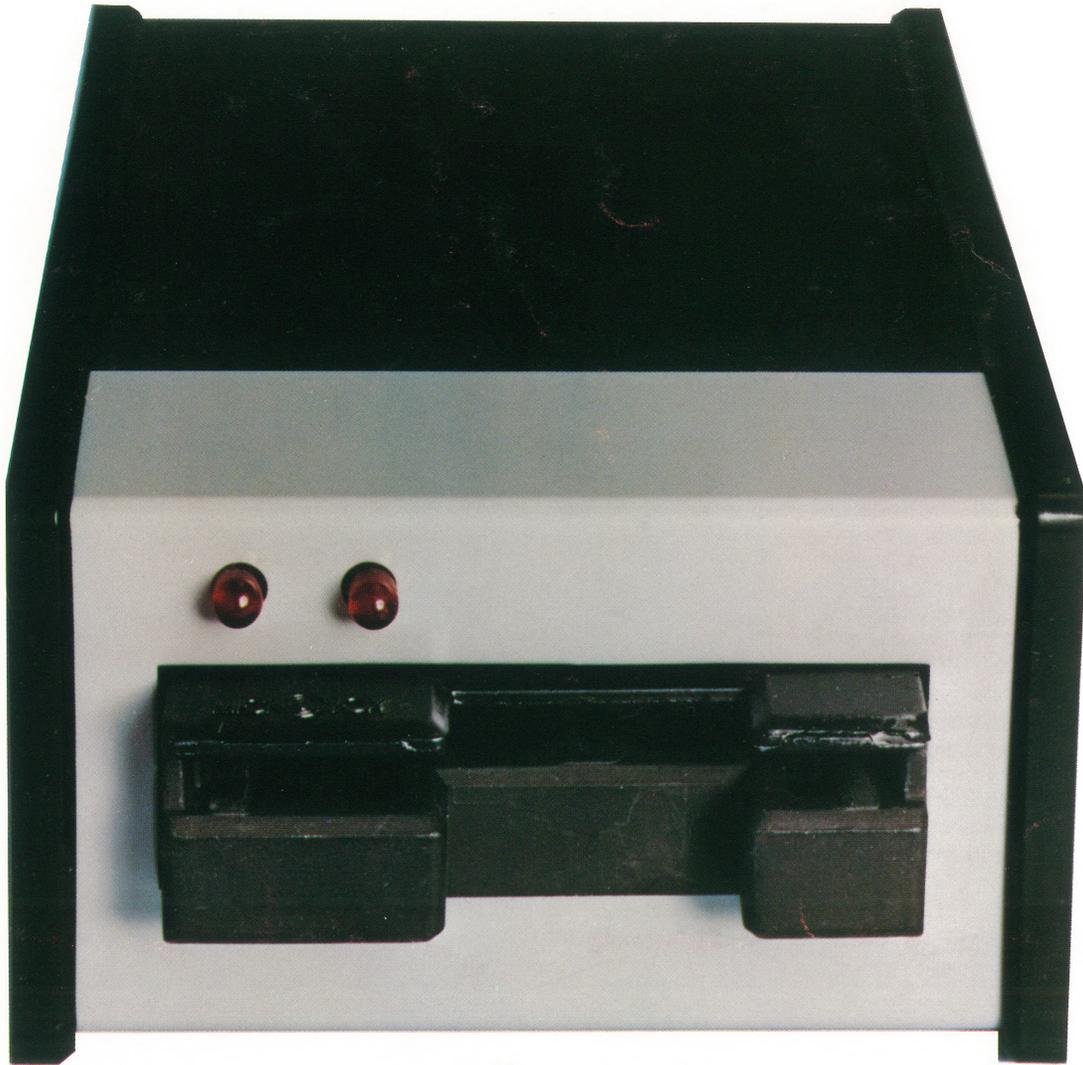
language programs. For example, @SAVE1,17152,3200,18000 would save the machine language program starting at address 17152 that is 3200 bytes long, and has an autostart address of 18000 as the first program on the wafer. In fact the specified memory locations are dumped onto the wafer, it is not required that a machine language program be present.

As an added bonus you can have up to 8 ESF units connected to the same TRS-80, then the drive number needs to be specified in the command (for example: @#3LOAD<sub>n</sub>).

## WHAT ABOUT DATA FILES?

The big advantage of disk systems over cassettes is their ability to handle files easily, well with the ESF Data I/O program the Stringy Floppy can handle them easily as well!

Supplied as an assembly language program on a wafer, when loaded into your TRS-80 it adds five more commands to your repertoire and only uses 1K of your RAM. The commands added are @OPEN, @PRINT, @CLOSE, @INPUT and @CLEAR. By OPENing a file you can then PRINT to it, then CLOSE it. To read back a file it is OPENed then INPUT from, and then CLOSED.



*The Exatron Stringy Floppy Mass Storage System*

## FEATURES AND BENEFITS    WHAT'S THE CATCH?

- Assembled and tested
- Ready-to-run when connected
- All operating software in ROM
- Continuous error checking
- Fully automatic operation
- Up to 99 files per wafer
- Professional quality
- Low cost
- No Expansion Interface required
- Large Owners Association
- High speed operation
- Extremely reliable
- No technical knowledge needed
- Toll-free Hot Line for any problems

Well, the only catch that most people find is that they have to actually pay Exatron for their unit! Even this is no big deal. See current price list for details.

Starter Kits are available with the Exatron Stringy Floppy, a supply of wafers, a bus extender and a selection of useful programs.

Exatron also gives a 30-day full money-back guarantee, with a 1 year parts and labor warranty on the unit.

Through regular advertisements in both Kilobaud Microcomputing and 80 Microcomputing, owners are kept informed of the latest developments in wafer-based software. Plus hundreds of user 'workshops' are starting up over the country, so you can always be sure of being near to another ESF owner.

If you have any questions about the ESF then give Exatron a call on the Hot Line (outside CA) 800-538-8559.

Stringy Floppy is a trademark of Exatron Corporation.

**exatron**

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