REVIEWS

Exatron Stringy Floppy For VIC-20 And 64

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One of the most common dilemmas faced by home computer owners is whether to invest several hundred dollars in a disk drive or to stick with cassette tapes for storing programs.

A lot of trade-offs are involved: cassette recorders are much cheaper (under $75 for a Commodore Datassette), generally reliable, and the cassettes themselves are fairly rugged. But they are also slow.

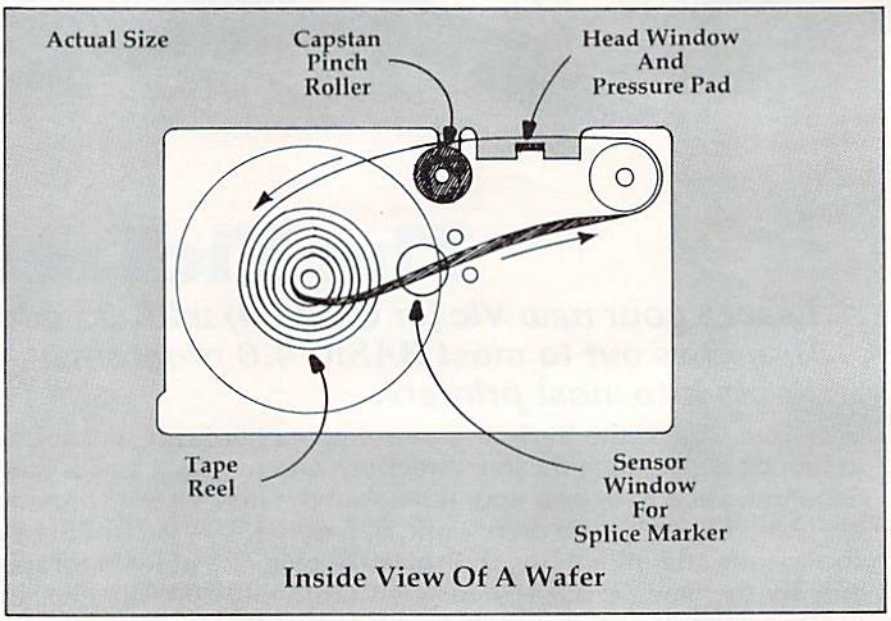
Disk drives are very fast, can store many programs per disk, run a wider variety of commercial software, and make possible certain advanced techniques with the new "expanded" memory available to the computer. But they are also expensive ($375 and up).

Some people have sought alternatives to both storage methods, turning to add-on devices which speed up cassette recorders, among other things. The newest alternative for VIC-20 and Commodore 64 users is the Exatron Stringy Floppy.

The Exatron Stringy Floppy isn't really new; it's been widely used since 1978, mostly by owners of Radio Shack TRS-80 computers. It was only recently made available for the VIC-20 and 64. At $199.50, it could be an attractive alternative to a disk drive.

The Idea Behind Stringy Floppies

Exactly what is a Stringy Floppy? It's a mass storage device that's sort of halfway between a cassette recorder and a disk drive, although it has more in common with recorders. In some cases, a Stringy Floppy is faster than a disk drive, although in other cases it can be as slow as a cassette. For media, Stringy Floppies use a small tape cartridge called a *wafer*. Wafers are extremely small and light – about two-thirds the size of a credit card and about three credit cards thick. Inside the wafer cartridge is digital-quality magnetic tape only 1/16-inch wide.



Inside View Of A Wafer

The tape in a wafer is wound differently than tape in a regular cassette. Cassette tape is wound end-to-end on spools, and the cassette must be flipped over or rewound for repeated use. But the tape in a wafer is one long continuous loop, very much like the tape in audio eight-track cartridges. A wafer is never flipped over or rewound. It winds in one direction only.

Because Stringy Floppies use tape, even though it is wound continuously, they share one important characteristic with conventional cassette recorders: they are *sequential access* devices. This point is important because it dictates how Stringy Floppies must operate. A sequential access device stores programs sequentially, one after the other. To get to a program somewhere in the middle of the tape, it must first wind past all the intervening tape. On the other hand, a disk drive is a *random access* device. The movable read/write head in a disk drive finds a program in the middle of a disk and moves to it directly.

A good analogy is to think

of stereo systems. To play a song in the middle of a cassette tape, you first must press Fast Forward and wind past all the preceding songs. But to play a song in the middle of a record, you need only lift the tone arm to the proper band; the preceding songs are bypassed. Disk drives work on the same principle.

Stringy Floppies, however, record programs and data sequentially, beginning at the start of the tape loop and continuing until the end. The Stringy Floppy drive is an "intelligent" peripheral device, and it knows where this tape loop begins and ends. This is accomplished with a shiny metal marker that splices the tape loop together. On top of the wafer is a small circular window, and a sensor within the Stringy Floppy drive peers through this window to detect the marker as the tape winds by.

Usually Far Faster Than Tape

Wafer tape winds very fast – eight inches per second (conventional cassette recorders wind tape at only 1⅞-inches per second). It transfers data quickly, too. That's why, under ideal conditions, a Stringy Floppy can outperform a VIC-1540/1541 disk drive (which admittedly is a bit slower than some other disk drives). However, because the Stringy Floppy is inherently a sequential access device, it can be as slow as a cassette recorder for some operations. In the vast majority of cases, though, it will prove much faster than cassettes.

The amount of data that can be stored on a wafer depends on the length of its tape loop. Wafers

The Exatron Stringy Floppy, with a wafer inserted in the front slot.

are available from Exatron in lengths of 5, 10, 20, 35, and 50 feet. The shortest wafer holds 4000 bytes (4K), which is enough to store the longest program possible in an unexpanded VIC-20 (which has 3583 bytes free for programming). The longest wafer holds 40K, which is enough to store the longest program possible in a 64 (which has 38911 bytes free for BASIC).

Speed Vs. Economy

The Exatron Stringy Floppy drive itself is a light, compact unit about a third the size of a VIC-1540/1541 disk drive. Hooking it up is simple – just plug in two cords. The first one, a coiled cord, plugs into the same input/output port on the back of a VIC or 64 that is used by the disk drive. (If your system already includes a disk drive, the Stringy Floppy plugs into the back of the drive, forming what is called a *daisy chain*.)

The second cord is for power – unlike the Datassette, the Stringy Floppy does not draw its power from the computer. The power cord has a transformer that plugs into the wall socket.

There are no switches, buttons, or controls of any kind on the Stringy Floppy. It comes on when it's plugged in, and one of the two red lights on the front panel lights up briefly to let you know. It blinks again when the computer is switched on. You'll hear a quiet whir as the Stringy Floppy initializes itself. The next step is to insert a wafer by sliding it, topside-up, into the front slot until it snaps into place.

The Stringy Floppy's commands are straightforward, and are similar to the standard VIC/64 commands for saving, loading, and verifying programs and data. The main difference is that the Stringy Floppy is addressed as device number 20, so a comma and 20 must be tacked onto each command. The 27-page manual explains all of this in a step-by-step, easily understood manner, with examples.

For instance, calling up a directory for a wafer is very much like the procedure on a disk drive. You type LOAD"$",20 and press RETURN. When the directory is loaded, you read it by typing LIST. This shows all the files stored on that wafer. Of course, since the directory itself is loaded as if it were a file, it erases any program currently in memory.

To load a file, you type LOAD"filename",20. The Stringy Floppy's second LED, a busy light, blinks on as the unit speeds through the wafer in search of that file. The drive searches sequentially through the tape, pausing briefly at the start of each file to check if it's the right one. When it finds its target, it loads the file in a matter of seconds (often faster than a disk drive).

But the key factor here is the search time. Remember, the Stringy Floppy cannot rewind its tape – it must always search forward through the tape loop. Although the unit loads files very quickly once they are found, the search time depends on where the tape happens to be positioned. Under ideal conditions, when the tape is positioned just before the file you want, the whole loading procedure takes only a few seconds. The extreme case is when the tape is positioned just *after* the file you want. Then the Stringy Floppy must search the entire length of the tape loop. This happens every time you VERIFY a previous SAVE, and every time you call up a directory. Since the Stringy does not store its directory in one place, as a disk drive does, it must search the entire wafer for the filename headers which precede each file.

The time consumed by these

searches depends, of course, on the length of the wafer. On a medium-length wafer (20 feet, or 16K), one complete cycle through the tape loop takes 55 to 65 seconds (the exact time depends on the number of files stored, since the Stringy pauses briefly to read each file header). So when you SAVE a short program on a long wafer, the VERIFY procedure could take as long as rewinding a conventional cassette and then VERIFYing.

Thus, it seems shorter wafers would be the answer. But there's a trade-off involved – there's not much difference in price between the shortest and longest wafers. The lowest price for a five-foot, 4K wafer is $2.50, while a 50-foot, 40K wafer is $3.50. Since wafers always store data in 1K blocks, no matter how short the actual program is, a 4K wafer is pretty much limited to one or two short files. This makes short wafers significantly more expensive than disks or cassettes. Long wafers are a much better bargain, but also require much longer search times.

So, the trade-off is between the convenience and speed of short wafers versus the economy of long wafers.

Keeping Track Of Files

Another factor to consider when weighing the merits of a Stringy Floppy is the convenience of storing multiple files on a single wafer. Disk drives, of course, automatically keep track of where files are stored. With cassettes, you have to manually keep track of what files are on which tapes, usually by jotting

down the tape counter numbers. With a Stringy, you'll probably have to keep a similar log. Here's why:

There are two SAVE commands for the Stringy. The first is SAVE"filename",20 (filenames up to eight characters are allowed). This automatically stores the file as *the first file on the tape loop following the splice marker.* The Stringy does not check to see if a file is already there, so one or more files can be overwritten if you use this command carelessly. (However, the Stringy *does* check to see if the end of the tape loop has been reached – if so, it will stop recording, and your subsequent VERIFY will tell you that the SAVE was interrupted.)

The second command is SAVE"#filenam",20 (only seven-character filenames are allowed because of the # sign). The # sign, which is stripped off the filename by the Stringy, tells the Stringy to store the file *wherever the tape is currently positioned.* Important: It's up to you to insure the tape is positioned after the end of the last file on the wafer. Otherwise, existing files may be overwritten.

Unfortunately, there is no special command to position the tape past the last file. The best way is to VERIFY the last file. Since the last file will be different than the file you want to save, a ?VERIFY ERROR will result. This is just what you want; the tape is now properly positioned for a SAVE with the # sign. Then you VERIFY with the proper filename to double-check the SAVE. This is the procedure recommended by Exatron, although it is not mentioned in the manual.

This whole procedure also depends on your knowing the filename of the last file; otherwise, you can't get the ?VERIFY ERROR you want. That's why you'll have to keep a careful log of the files on each wafer. You can't discover the filename by calling the directory, because loading the directory will erase the file in memory that you want to save (as it does on the disk drive).

Does all this sound confusing? Exatron advises new users of Stringy Floppies to store only one file per wafer until they get the hang of it.

Other Considerations

As a general-purpose mass storage device, the Stringy Floppy supports the same commands as the Datassette and disk drive, including OPEN, PRINT#, INPUT#, GET#, CLOSE, CMD, and STATUS. This means you can store data files on wafers in addition to programs, perform input/output during program execution, and so on. The Exatron manual explains these operations.

Exatron warrants the Stringy Floppy for one year, parts and labor, and offers a 30-day money-back guarantee of satisfaction. Unlike a disk drive, the Stringy does not have a movable read/write head, and the only moving parts are the tape transport mechanisms, so it should be a reliable device. The only maintenance it requires is an occasional head and capstan cleaning.

Besides convenience and cost, another major factor to consider is commercial software availability. Software is widely available on cassettes and disks, but this is not yet the case with wafers. That might well change soon, however, if Stringy Floppies become a popular alternative for VIC and 64 users. In the TRS-80 community, some software has been made available on wafers. Also, Exatron is trying to collect public domain software for VICs and 64s to distribute free with sales of blank wafers.

New Momentum

There's evidence that Stringy Floppies are picking up momentum among other computer users, too. A new line of peripherals introduced by Texas Instruments for its new $99 TI-99/2 computer includes a Wafertape drive, which is an Exatron Stringy Floppy licensed to TI. The Wafertape drive also works on TI's new Compact Computer 40 and – with an adapter – on the TI-99/4A. A recently announced portable business computer also has a Stringy Floppy for mass storage. The Stringy's small size, speed, and ruggedness make it ideal for portables.

Whether you go with a cassette, disk drive, or Stringy Floppy, remember that the mass storage device is probably the most important peripheral you'll buy. All have advantages and disadvantages; which one is "best" depends mostly on your needs. Exatron's Stringy Floppy is clearly a viable alternative.

Exatron Stringy Floppy
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