THE STRINGY FLOPPY - WHAT IS IT?

THE EXATRON STRINGY FLOPPY IS AN EXTREMELY FAST, ECONOMICAL AND RELIABLE REPLACEMENT FOR A FLOPPY DISK AT A THIRD ($\frac{1}{3}$) OF THE COST OF A FLOPPY DISK.

EXATRON STRINGY FLOPPY FEATURES

STORAGE CAPACITY SIMILIAR TO MINIFLOPPY

DATA TRANSFER RATES SIMILIAR TO MINIFLOPPY

COST SIMILIAR TO AN AUDIO CASSETTE

LOW POWER REQUIREMENT

THE EXATRON STRINGY FLOPPY IS ESPECIALLY SUITABLE FOR USE IN PORTABLE AND HAND HELD COMPUTERS

FRIENDLY OPERATION

OUTSTANDING MECHANICAL AND ELECTRICAL RELIABILITY

STRINGY FLOPPY vs AUDIO CASSETTE vs DISC

PERFORMANCE/COST ANALYSIS

	Stringy Floppy	Audio Cassette	Disc
K Bytes storage (max.)	100K	20K	170K
K Bytes storage available	5K to 100K (in increments)	10K to 20K	170K
Data transfer rate	2500 Bytes/sec.	62 Bytes/sec.	2500 Bytes/sec.
Typical K Bytes for programs-			
Accounting	16K Bytes on up	Need more info	Need more info
Games	2K-12K Bytes	Need more info	Need more info
Graphics	8K Bytes on up	Need more info	Need more info
Ex: Time to transfer 32K Bytes:	12.8 seconds	512 seconds	12 seconds
Size of storage media	$2\frac{11}{16}$" x $1\frac{9}{16}$" x $\frac{3}{6}$"	4" x $2\frac{1}{2}$" x $\frac{3}{8}$"	$5\frac{1}{4}$" x $5\frac{1}{4}$"
Cost to consumer	$100.00 est.	$80.00 est.	$300.00 est.
Media cost/unit of storage	$2.00	$2.00-$5.00	$4.00
Reliability-Expected read write failure rate	More than 10X reliable than audio cassettes, more mechanically reliable than floppy disc.		
Media cost/unit of storage	$2.00	$2.00-$5.00	$4.00

Introducing . . .

The Wafer Wheel™

- Protect your valuable collection of Stringy-Floppy Wafers.
- Holds 40 Wafers in ten compartments for easy organization.
- Rotates to eye level for easy access.
- Can be positioned on top of drive unit to conserve space.
- Made of high impact ABS plastic (like your telephone) in chocolate brown.

* DRIVE UNIT & WAFERS NOT INCLUDED.

(ALLOW 4 - 6 WEEKS DELIVERY)

INTRODUCTORY PRICE

$18.50 ea.

Reg. $24.95 Offer Expires May 30, 1982

Please send me ___ Wafer Wheels at the introductory price of $18.50 each. Add $2.00 for shipping & handling. (Calif. residents add applicable sales tax.) Enclosed is my: ☐ Check ☐ Master Charge ☐ Visa

ard # _____

Expiration date _____

ORDER YOURS TODAY

Satisfaction Guaranteed or Money Back

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City, State and Zip Code

DISK DRIVES

The future of peripheral data storage

RAYMOND C. FREEMAN JR., Freeman Associates

Other likely developments

The boundary between hard- and floppy-disk drives will become a war zone as diameters of rigid disks continue to shrink and capacities of floppy-disk drives continue to grow. Historically, there has been a capacity gap between the two classes of drives, with each filling a different market niche. That separation is now blurring as 6M-, 8M- and 10M-byte floppy-disk drives appear. Extensions of these technologies will lead to a significant overlap with low-end hard-disk drives. The likelihood of 3½-in. hard-disk drives in the form factor of the Sony 3½-in. floppy-disk drive will further accentuate capacity overlap between the two classes.

The decade ahead will witness widespread acceptance of narrow-width magnetic tape within the computer community. Both 0.25- and 0.15-in. tape cartridges will achieve significant inroads for backup and loading applications. As noted, though, it is difficult to foresee the role of ½-in. tape after the turn of the century; this uncertainty applies to the narrower widths as well.

There are those who suggest that new-technology products in the 2000s will blur the distinction between random- and sequential-access products. They contend that very compact, high-capacity, random-access, solid-state, storage devices will sell for so little that they will obviate the need for sequential-access products. This view is probably incorrect; storage should continue to be hierarchical. Economics will continue to pull lower performance, lower cost products into the market for secondary storage.

The year 2000

Exatron Mini-Business Plan

Currently Exatron is a company doing approximately two million dollars in sales, it is managed by Robert Howell Sr., Chairman of the Board. However, at this time Mr. Howell desires to restructure the company in conjunction with obtaining major capital investments. It is also Mr. Howell's desire to remain on the Board of Directors as Chairman and function within the company in the research and development area and support engineering.

The Integrated Circuit Handler and Tester parts of the Exatron business will be broken off as a separate entity as it is an entirely different kind of business. Robert Howell Jr. will leave Exatron to run the new tester/handler entity.

All done as of 4-10-82

Two weeks ago Mr. Natan Huffman was hired as Sales and Marketing Director. Mr. Huffman has an excellent background for this position as he has extensive experience in selling to the retail mass merchandisers and has comprehensive O.E.M. technical selling experience. Mr. Huffman is also an active computer hobbyist and amateur radio operator.

Action items at this time are as follows:

1) Identify new Chief Executive Officer.
2) Restructure the Board of Directors.
3) Obtain at least one million dollars in financing.

At this time a new C.E.O. has been identified and a final committment has been obtained from this gentleman. This candidate has extensive operations management experience and also has extensive experience in managing off-shore subcontracts and facilities. Currently this candidate is working as a Vice-President of Marketing for one of the major personal computer companies in the United States.

The new Board of Directors would be structured as follows:

Robert Howell Sr.....Chairman of the Board

ROBERT McDONALD.....The new Chief Executive Officer and President of Exatron

Anthony Danluck.....Stock Holder and President of Criterion Sales

Steve Johnson.....President of Boschert Inc.

Boschert is a leading switching power supply manufacturer owned by a three billion dollar corporation, VIZ. British Industrial Cable Corporation. Steve has a Masters in Mechanical Engineering and a Harvard M.B.A.. He has his own personal computer and an actual dual stringy floppy. Steve understands the personal computer marketplace very well and would be a tremendous asset in directing the future of Exatron.

Natan Huffman will be on board for one year, since the sales and marketing focus of the company is important to insure the growth desired.

Two additional positions on the Board of Directors will be made available to the investors of the monies. This investment capital will be used to purchase new tooling, set up additional production lines in Exatron, and hire additional people needed to grow from the projected level of two million dollars in 1982 to its projected seven million dollars in sales by 1983.

Commodore Realigns U.S. CPU Operations

By MARK HALPER

NORRISTOWN, Pa. — Commodore Business Machines has disbanded its Computer Systems division and reorganized the U.S. computer operation into two divisions — Consumer Products and Professional — each headed by a president, it was learned.

Additionally, the company placed the new divisions under the aegis of a new office of the president, which includes Jack Tramiel, vice-chairman of Commodore International, the firm's parent company, and two executives with new posts, Kit Spencer, vice-president of marketing and sales, and Gregg Pratt, vice-president of operations.

Mr. Spencer had been vice-president of the Computer Systems division, and Mr. Pratt was corporate controller as well as the division's operations vice-president. He relinquishes his corporate controller's post to Alan Friedman, who was controller of the Computer Systems division.

In forming the new office, Commodore excluded Jim Finke, president of Commodore International, from administrative duties for U.S. computer operations.

His absence from the new office raised questions last week about his corporate role.

Mr. Tramiel was said to be out of the country last week, and could not be reached to explain why Mr. Finke will not join CBM's office of the president.

"I'm not sure how active he (Jim Finke) is there now. The driving force is Jack Tramiel," noted Jody Frank, vice-president of Prescott, Ball & Turben, a New York City securities house.

In setting up the Consumer Products and professional divisions, Commodore elevates the status of two groups formed late last year as part of the now defunct Computer Systems division — the Home Computer Sales Group and the Professional Computer Sales Group (EN, Dec. 14, 1981).

The Consumer Products division is a consolidation of operations of the CBM Consumer Products Group, which included watches and calculators, with the old Home Computer Sales group, which was responsible for marketing the firm's low-end VIC 20 personal computer line as well as a recently introduced combination video game/home computer, the 2K $149 Ultimax (EN, Jan. 11).

Meanwhile, named as president of the Consumer Products division was Alan Fink, who joins the firm from Clairol, where he was marketing vice-president. Ken Hollandsworth, who was general manager of the Consumer Group, has resigned.

Mr. Fink reports to the new office of the president, according to Mr. Spencer. Bill Wade, who was named national sales manager of the Home Computer group, has retained that title under the new structure, and reports to Mr. Fink.

The company named Robert McDonald president of the Professional division. Mr. McDonald was vice-president of marketing and sales for MOS Technology, CBM's U.S.-based semiconductor manufacturing subsidiary.

Like Mr. Fink, he reports to the office of the president. No national sales manager has been named for the professional division.

His appointment is believed to reflect Commodore's plans to introduce later this year a small business system based on a 16-bit microprocessor said to be in development at MOS, which currently supplies its eight-bit 6502 microprocessor to other computer suppliers.

When introduced, the 16-bit machine would fall under the purview of the Professional division. The division also handles the Commodore CBM and PET computers and will market the Commodore 64 when it becomes available in late spring.

As part of the reorganization, Commodore also made these personnel changes:

- Dan Bliss as controller of the Professional division, from assistant controller of CSD. He reports to Mr. McDonald; and
- Dan Sparks as controller of the Consumer Products division reporting to Mr. Fink. He joins the firm from OIC International, a Philadelphia-based manpower training firm.

Commodore's U.S. computer operations last year accounted for $32 million in sales, including the PET, CBM and VIC lines.

Robert A. McDonald
630 Vermont Street
Moss Beach, California 94038
(415) 728-5720

Education: B.S. Mathematics, Brigham Young University, 1963
M.S. Physics, Arizona State University, 1967

Job Experience:

General Instrument Corporation

4/79 to 2/81 - Technology Transfer Assignment - Optoelectronics Palo Alto, California.

Duties: Currently responsible for transferring, from St. Louis, the entire former Monsanto Optoelectronic materials operation, and implementing same in Palo Alto, California. This activity entails building and equipping a facility, the transfer of some equipment, staffing of a new organization to handle long-term requirements. Ultimate organization size will be 200 persons (in 12 months), with 40-50 of these being professional.

Accomplishments: Assembled management team implementation plan, and building a facility for the transfer. Will see the project complete or for a smooth transition point.

11/75 to 4/79 - General Manager Memory and Microprocessor Products Microelectronics Division, Hicksville, New York.

Duties: Responsible for world-wide profit and loss of microprocessor, ROM and EAROM products (microprocessor products added in 1978), reporting to corporate Vice-President. Direct responsibility for marketing, applications, circuit design, product engineering, wafer fab, production control and customer service functions. Product line included N-channel silicon gate, N-channel metal gate and P-channel MNOS technologies; 15 different product families and over 200 people (including 75 professionals and excluding service organizations).

Accomplishments: Increased product line shipments from $250K/mo. to $3.0M/mo. in a 3 year period. Increase bookings from $300K/mo. to $3.5M/mo. over same period. Business expected to exceed $48M in 1979. Redesigned microprocessor and ROM products for improved cost and performance. Developed and implemented new market strategies for all products, and gained substantial market share in chosen segments. Accomplished high-volume EAROM and microprocessor shipment for the first time (>.5M/mo.). Established organization, processing, testing, EDP, etc. to support increased business levels.

3/75 to 11/75 - Fab Operations Manager - Microelectronics Division, Hicksville, New York.

Duties: Ran General Instrument's largest (at the time) Wafer Fab Operation. Had responsibility for all engineering, manufacturing, development, and production control functions. Responsibility for over 120 people (20 professionals). Technology was P-channel metal gate (implanted nitride).

Accomplishments: Increased output of 3 inch wafers 150% to 1200 per day. Improved yields of all products (throughput and probe), by implementation of process control system.

Established document control, and new EDP inventory systems, and throughly trained the organization to sustain the operation.

Stewart Warner Microcircuits
7/74 to 3/75 - Operations Manager, Sunnyvale, California.
Duties: Responsible for bipolar manufacturing operation consisting of wafer fab, test, product engineering, material (purchasing, production control, facility, etc.). Responsible for approximately 200 (40 professional) at peak.
Accomplishments: Improved wafer probe and throughput yield, restructured EDP, and test procedures, but operation closed due to poor market for products.

Semiconductor Engineering Associates
8/73 to 3/75 - Principal in Consulting Firm, Santa Clara, California.
Duties: Founded the consulting organization. Established, and improved all types of semiconductor processing (N-channel, P-channel silicon gate MOS, bipolar, CCD, nitride processes, etc). Layout and implementation of wafer fab operations, and performed technical management consulting.
Accomplishments: Completed several successful jobs for the following - Hughes Aircraft, Newport Beach; American Micro-Systems, Pocatello and Santa Clara; Hewlett-Packard, Cupertino; ITT, London, Rockwell; Electronic Arrays, etc.

Nortec Electronics
2/72 to 8/73 - Wafer Fab Operation Director, Santa Clara, California.
Duties: Controlled all wafer fab production and engineering, as well as product engineering. Responsible for all interfaces between customer and factory for fab job-shop. Managed 110 people (20 professional).
Accomplishments: Successfully converted process (P-channel metal gate) for 3 inch wafers. Increased output form 500 to 2500 wafers out/week and probe yields over 100%. Established improved inventory control techniques, and directed labor incentive plan.

American Micro-Systems
2/70 to 2/72 - Wafer Fab Module Manager, Santa Clara, California.
Duties: Responsible for manufacturing and engineering of P-channel silicon gate area. Prior to that ran P-channel metal gate area. Also served periods as general foreman and engineering manager. Maximum organization was 100 people (15 professional).
Accomplishments: Implemented 2 inch wafer process into manufacturing. Improved wafer survival and probe yields. Increased output (as general foreman) to 1500 wafers per day. Implemented P-channel silicon gate into production.

Signetics
7/69 to 2/70 - Sustaining Engineer, Provo, Utah.
Duties: Sustaining Engineer for P-channel metal gate MOS process. Implementing and optimizing. Managed two technicians.
Accomplishments: Just began process implementation, when recession forced downtown business to close. Plant to temporarily close.

General Instrument Corporation
2/68 to 7/69 - MOS Process Manager, Salt Lake City, Utah.
Duties: Ran process development and pilot line organization. Responsible for all process engineering and manufacturing at this small facility. Processes were CMOS and P-channel nitride. Managed 40 people (15 professional).
Accomplishments: Established CMOS nitride process. Implemented P-channel process into production in New York facility. This process became General Instrument's main manufacturing process.

Motorola Semiconductor Products
6/63 to 2/68 - Process Engineering Supervisor and Process Engineer, Phoenix, Arizona.
Duties: Performed various duties in bipolar process development including basic work in phosphorous, boron and gold diffusion; epitaxial and polycrystalline silicon deposition; and precision lapping and polishing. Ran central processing group and later a pilot line for dielectrically isolated material. Managed a maximum of 20 people (6 professional).
Accomplishments: Developed phosphorous diffusion techniques that were implemented into production and published. These later became industry standards. Streamlined dielectrically isolated material techniques for productibility. Developed several new diffusion techniques for gold, boron and arsenic.

Update to resume

2/81 to Present - Commodore Ltd. - Santa Clara, Calif.

Duties: Began in a Special Projects role to set up semiconductor factories in Europe and Dallas, Texas. In Europe the factory was to be a complete business center. In March 1981, I assumed the role of Vice-President of Marketing and Sales for three Commodore Component Divisions:

1) M.O.S. Technology-Valley Forge, PA(memory and microprocesso products)
2) Optoelectronics-Dallas, TX(liquid crystal displays)
3) Frontier, Costa Mesa, CA(consumer CMOS products-watches/ clocks, etc.)

Sales force extends from Hong Kong through out the United States and Europe. In this role I have formulated business strategies, defined products and outlined general tactics necessary to gain market share. The Componets division expected fiscal year 1982 revenues of $70-90 million dollars, fiscal year 1981 revenues were 35 million (the general semi-conductor market has declined 5% during the last year). I have also organized the sales force establishing forecasting systems, etc.

4-79-2/81- General Instruments

Duties: This position evolved into Director of Materials Operations. I left after technology was transferred, production up and running and the facility completed. My purpose in leaving was to return to a more complete business management resposibility and at that time there was no opportunity available to me.

Resume-Director of Marketing March 1982

Natan Huffman

Natan Huffman is now the Director of Marketing at Exatron with responsibility for all sales and marketing of the complete Exatron product line.

Mr. Huffman was a Cum Laude graduate from Dickerson College in 1967 where Bachelor degrees in Clinical Psychology, Political Science, and Sociology were obtained. Additional credit hours from Pennsylvania State University within their Masters of Business Administration program have been accrued. Mr. Huffman has also attended various management workshops offered by the University of Connecticut.

In 1967 after graduation from Dickerson, Mr. Huffman began a career with the United States government working with the National Security Agency. An ultimate assignment in the middle east utalized his communication and hands on electronics skills. After a short period as a professional golfer where experience was gained in handling the associated stresses of survival on the professional golfers tour a career was begun with the Kirsch Company in Sturgis, Michigan.

After a short tenure as a trainee, Mr. Huffman was assigned the responsibility of managing a territory in Northeast Pennsylvania which was doing sales of $575,000 dollars. Within one year sales were increased to over $800,000 dollars. During this time various awards and recognitions were earned as validation for the sales performance. A transfer to a territory in Hartford, Connecticut followed in 1972. While here once again sales were increased dramatically and new experience was gained which led to a position that involved developing systems which were utalized by the mass merchandisers such as J.C. Penney, R.H. Macys, Federated, Allied, and other local as well as national retailing entities. Most of these programs are still in existence today which is a testimony to their worth.

A career change was made during 1978 which ended a seven year tenure with the Kirsch Company. A new challenge was engaged when a relationship as a manufactures representative was begun with Criterion Sales. This opportunity was a perfect marriage of the technical background and the sales/marketing abilites that were the basis of past career success. While at Criterion Sales substantial sales increases were made which far exceeded industry trends.

In 1981 Mr. Huffman left Criterion to begin his own company which was called "the Affinity Sales Group". This company was organized to represent high technology principals such as Plessey Semiconductor, Microtek, several switching power supply companies and other passive component companies. Mr. Hauffman's responsibilities included administration of the company as well as serving and developing a customer base.

In March of 1982 Mr. Huffman sold Affinity to accept the position he is now in with Exatron.

References are available upon request.

BOSCHERT INCORPORATED
384 Santa Trinita Avenue
Sunnyvale, CA 94086
Marlene White (408)732-2440

FOR IMMEDIATE RELEASE

JOHNSON BECOMES PRESIDENT OF BOSCHERT INCORPORATED

SUNNYVALE, CA--March 12, 1982--In a meeting of the board of directors in London last week, Stephen C. Johnson was appointed president and chief operating officer of Boschert Incorporated.

Mr. Johnson replaces Raymond J. Noorda, who was appointed chairman of the board at the same meeting. Mr. Noorda will retain the responsibilities of chief executive officer.

Mr. Johnson has been with the company for four years as vice president of marketing and was promoted last year to general manager of Boschert's Sunnyvale Division.

"Mr. Johnson will be responsible for running the day-to-day operations of the company," said Mr. Noorda. "This appointment is in recognition of the need for additional management growth consistent with Boschert's expected rapid business growth."

Mr. Johnson holds a B.S.E.E. from Princeton University, an M.S.E.E. from the University of New Mexico and an M.B.A from Harvard University.

Prior to joining Boschert, Mr. Johnson was marketing manager at Spectra-Physics in Mountain View, CA. and vice president of marketing at Canberra Industries in Meriden, Connecticut.

Incorporated in 1976, Boschert was acquired in March of last year by BICC Ltd., a London-based company with annual sales of $3B.

Boschert is a leading supplier of switching power supplies serving domestic and international markets for microcomputer-based systems. Its sales for 1982 are projected to gain in excess of 50% over 1981.

###

excellence in electronics

Dear TRS-80 Owner:

Thank you for your request for more detailed information about the Exatron Stringy Floppy (ES/F) for your computer. The enclosures will help answer many questions you may have.

Exatron sells directly from our factory and through Workshop Representatives located throughout the country. A list of our Representatives in your general area is enclosed. Please check it to see if one is near you. Each of them is an ES/F owner who has agreed to help other TRS-80 owners like you find out if the ES/F will meet your needs for improved storage.

A demonstration is your best way of reaching a decision about buying an ES/F. If you cannot arrange this locally, (or even if you do) I call your attention to our 30-day unconditional money-back guarantee. We want you as a satisfied and happy customer or we'll be happy to refund your money. One of the enclosures, incidentally, is a recent unsolicited testimonial from one of our thousands of satsified ES/F owners.

Each Representative is authorized to accept orders on our behalf. If you can, we prefer that you place your order through him. He will be your best long-term source of further help and information. Getting to know him and placing your order through him will best serve your own long-term interests. In each case, however, your payment should be made out to Exatron, unless the Representative is selling you an item he has in stock.

Our Workshop Representatives are called by this term because each of them will conduct, when feasible, meetings at which ES/F owners may exchange experiences and gain knowledge. Hundreds of workshops are in the process of being organized nationally. Your local representative can inform you of the plans he has for your area. A copy of the National ESFOA Charter is enclosed to give you an idea of what this owner's association expects to accomplish.

I am also enclosing a copy of our most recent software catalog. Quality software is of tremendous importance and is another reason for Exatron's support of ESFOA.

If you cannot obtain the information you need locally, call us direct on our toll-free hotline (800-538-8559). We look forward to adding you to our family of happy owners and sharing with you the excitement and opportunities of the fantastic computer revolution.

Sincerely,

Robert L. Howell, Sr.
Exatron Board Chairman

Enclosures

181 Commercial Street • Sunnyvale, California 94086 • 408/737-7111

WHAT'S IN THE STARTER KIT

The following items are included in the ESF Starter Kit for the TRS-80 Model I.

Qty.		Item
1		Exatron Stringy Floppy
1		2 for 1 Bus Extender
10		Assorted Blank wafers
1		Wafer Organizer
1	*	Current issue of 80-US Journal
1		Trial Subscription to @ LOAD
1		Programmed wafer with 8 files:

1. Data I/O
2. I/O Demo
3. I/O Demo
4. General Purpose Data Base Management
5. ESF-80 Monitor
6. What's On It
7. Display Ad
8. @ Freeze

* Your first issue of the 80-US Journal is included with your Starter Kit. You will receive future issues directly from 80-US Journal. If you are already a subscriber, then your subscription will be automatically extended for one year.

The following documentation is also included with your starter kit:

1) Exatron Stringy Floppy Owners Manual with reference card
2) ESF-80 Monitor Users Manual
3) Stringy-Floppy Data I/O Demonstration Listings
4) "Helpful Hints" Letter
5) General Purpose Data Base Management Program Documentation
6) @ Freeze Program Documentation
7) What's On It Program Documentation
8) ESF Workshops
9) Workshop Chairman/Workshop Representative List
10) Procedures for Program Submittal to the ESFOA Library
11) Procedures for Program Distribution Through ESFOA
12) ESFOA Member Activity and Interest Record

$NOW THAT I HAVE MY STRINGY FLOPPY, WHAT DO I DO NEXT????

13) Exatron Domestic Software Price List and Descriptions of Programs
14) Current Domestic Hardware Price list
15) Order Form

EXATRON DOMESTIC SOFTWARE PRICE LIST
AND DESCRIPTIONS OF PROGRAMS FOR THE TRS-80, MODEL I
AND THE EXATRON STRINGY FLOPPY

CONTENTS

Note: Unless otherwise indicated, all programs will run on a Level II, 16K system, with at least one ESF.

I. PRICE LIST GENERAL PROGRAMS

NAME OF PROGRAM	SUPPLIER/AUTHOR	PRICE	CAT #
BUSINESS			
Checkbook Genie	ESF/M.N. Kidder	29.95	146
Electric Pencil for ESF	Shrayer/Hassell	109.95	107
Patch for Electric Pencil	ESF/Hassell	9.95	108
Electric Spreadsheet 16K	ESF/Dan Haney	44.95	173
Electric Spreadsheet 48K	ESF/Dan Haney	69.95	160
File Management System	ESF/M.N. Kidder	19.95	125
FMS File Formatter	ESF/M.N. Kidder	7.95	138
Patchword for Scripsit	Discovery Bay/Phil Pilgrim	9.95	133
Scriplus	Rostek/Roger Junk	15.95	110
Small Bus Bookkeeping	DHU-GLAS/Roger Robitaille	24.95	147
Type Right Secretary	ESF/Duncan Pitman	24.95	174
LANGUAGES			
ESF Fourth	ESF/Vern Tallman	45.00	127
(two programmed wafers; manual; Z-80 assembler listing; each		15.00)	
Level III BASIC	Microsoft	49.50	112
SLIC, A Structured Language	RTG Data Systems	50.00	144
TUTORIALS			
Level III Demo Program	ESF/Bill Burnham	9.95	130
Morse Code Trainer	Discovery Bay Software	9.95	135
Typing Tutor	Microsoft	14.95	123

(continued on next page)

II. DESCRIPTION OF GENERAL PROGRAMS, BY CATALOG NUMBER

104 ESF-80 MONITOR 3.2 ESF/VERN TALLMAN 9.95

This MONITOR makes it possible to load SYSTEM TAPES from cassettes if the programs do not exceed roughly 14K. It identifies the STARTING and ENDING ADDRESSES as well as EXECUTION ADDRESS of standard format SYSTEM programs and makes it easy to SAVE them on wafer. It also allows SYSTEMS TAPES to be copied back to cassette. Its standard functions as a MONITOR include: to INSPECT and CHANGE MEMORY, to DISPLAY a MEMORY DUMP in HEX or ASCII CHARACTERS, to place a CONSTANT in MEMORY, to DISPLAY or ALTER REGISTERS, to SET and CLEAR a BREAKPOINT, and to EXECUTE a MACHINE LANGUAGE PROGRAM. It is relocatable in memory and requires slightly less than 2K of memory.

Commands to control the output to a parallel printer are included, as well as the ability to utilize an audio cassette, if desired.

106 PATCH TO RS EDITOR ASSEMBLER ESF/DAVID PURDUE 9.95

This patch, which comes on a wafer, is used to modify the RADIO SHACK EDITOR ASSEMBLER so that it may be used with the STRINGY FLOPPY. With it, SOURCE CODE can be saved on wafer and loaded from it. Object code is saved to cassette. The wafer contains patches for both versions 1.1 and 1.2.

107 ELECTRIC PENCIL FOR THE ESF SCHRAYER/HASSELL 109.95

The ELECTRIC PENCIL is probably the most widely known, high quality, program for WORDPROCESSING or TEXT EDITING that has been created for the TRS-80. It provides for full cursor movement and easy character insertion, deletion and correction by overwriting. It also provides for block movements and string searches. It is written in machine language and is therefore much faster than alternate programs written in BASIC.

PRINT formatting capabilites include setting line lengths, margins, page lengths, justification, and line spacing. Captions and page numbers may be placed on a multi-page document automatically.

The primary purpose of the ELECTRIC PENCIL is to create letters and various types of text documents. However, it is also useful for preparing invoices, mailing lists, accounting reports, and any other kind of document that may be retyped with relatively few changes. Its use can be learned rapidly and easily.

This program is the cassette version created for the TRS-80 by SMALL SYSTEM SOFTWARE and modified for the ESF by J.A. HASSELL. Files may, of course, be saved on wafer and reloaded later. It operates with or without a LOWER CASE MODIFICATION installed in the keyboard unit. However, all display and printing is done in UPPER CASE only unless the modification is installed.

108 PATCH FOR ELECTRIC PENCIL ESF/HASSELL 9.95

The ELECTRIC PENCIL may be obtained as the complete program for $109.95, as described above, or as a PATCH only for $9.95. To use the PATCH, one must already own the cassette version of ELECTRIC PENCIL. This program does not provide the capability of transfering to wafer, text files which were previously saved on cassettes.

110 SCRIPLUS ESF/ROGER JUNK 15.95

SCRIPLUS is an enhancement program for SCRIPSIT(c) which enables you to exercise any of the special functions, features, and print formats of your printer while your document is being printed. For example, you can change to expanded print, change the number of characters per inch, and even underline with most dot-matrix printers. Although designed especially for the dot-matrix printers, SCRIPLUS will work with any printer that is being used with the TRS-80 to print out BASIC programs, etc. If it has special control functions, SCRIPLUS can command them!

II. DESCRIPTION OF GENERAL PROGRAMS, BY CATALOG NUMBER

127 ESF FORTH — ESF/VERN TALLMAN — 45.00

This version of the FORTH language has been translated from the FORTH Interest Group 8080 FIG-FORTH and adapted for use in a 16K Level II machine with one or more ESF drives. The FORTH language contains a nucleus of commands and functions which may be combined to create new commands. The user may actually tailor the language to meet his own program needs. Editing and compilation facilities allow generation of fast, compact code. The manual contains examples of FORTH programs as well as the FORTH glossary. The program wafer, manual, and a Z-80 Assembly Listing each costs $15.00, if purchased alone.

129 THINK BIG + Bulletin Board — ESF/BILL BURNHAM — 9.95

This is a three-part chained program that gives the programmer a library of large letters, numbers, and symbols that he can use in his own programs. The normal BIG LETTER size covers 4x7 ordinary print rectangles. All coding has been done for the characters. The programmer simply chooses those characters he wants in his program and then deletes the rest. The program is completely self-documenting. It comes on a 50' wafer and requires a 16K machine.

130 LEVEL III DEMO PROGRAM — ESF/BILL BURNHAM — 9.95

This is a five-part chained program that explains and demonstrates some of the outstanding features of LEVEL III. It requires a minimum of 16K and comes on a 50' wafer.

133 PATCHWORD — DISCOVERY BAY/ PHIL PILGRIM — 9.95

This is a program for converting the cassette version of Radio Shack's SCRIPSIT for use with the ESF. It provides for certifying wafers and saving text on wafers. In loading text from wafer, it may replace prior text or may be appended to existing text if adequate memory is available to do this.
This program does not provide the capability of transfering to wafer, text files which were previously saved on cassettes.

135 MORSE CODE TRAINER — DISCOVERY BAY SOFTWARE — 9.95

MORSE is a practice and tutorial program for learning Morse code. Using the computer's cassette AUX output, the program sends code characters through any audio amplifier or speaker. MORSE gives the user a choice of six lessons, from a beginner's introduction to a 35 wpm speed drill. Its interactive nature pinpoints trouble spots enabling rapid mastery of the code.

136 R.S. U/L CONVERSION PATCH — ESF/M.N. KIDDER — 3.95

This is the software driver needed to activate you upper/lower case hardware modification. It will activate either the Radio Shack or Electric Pencil type of hardware modification. It is used when you wish to display both upper and lower case characters on the screen. It is not required when using a word processor such as Electric Pencil or Scriptsit, as these word processors have an upper/lower case driver as a part of their program code.

137 PATCH TO EDITOR ASSEMBLER PLUS — ESF/BOB ZINN — 9.95

This patch enables the MICROSOFT EDITOR ASSEMBLER PLUS to be used with the ESF. It applies to Versions 1.0, 1.1, and 1.2.

138 FMS FILE FORMATTER — ESF/M.N.KIDDER — 7.95

This program lists the DATA FILE STRUCTURE and VARIABLES used for any particular FMS FILE. This information is needed in order to prepare REPORTS based on the DATA contained within that FMS FILE. It extends the usefulness of the FMS PROGRAM.

This program is written in BASIC and will hold between 400 and 500 check and deposit records in a 16K Level II system. With a 32K or 48K system, it has much larger capacity.

An abbreviated screen display for Checkbook Genie is as follows:

```
------------------------------------------------------------
    1/03   500.00   500.00            $ STARTING BALANCE
501 1/03   430.00              70.00   R OFFICE RENT
502 1/05   393.10              36.90   T PACIFIC TEL
    1/10   628.60   235.50             1 COMM REC'D

CHECK NUMBER->                      <--BLANK FOR DEPOSITS
DATE -------->                        USE <CLEAR> TO EXIT
AMOUNT ------>
CLASS ------->
DESCRIPTION ->                   <--  SPACE= XXXX

A=ADD C=CLASS E=EDIT L=LIST M=MODIFY P=PRINT Q=QUIT S=START
------------------------------------------------------------
```

147 SMALL BUSINESS BOOKKEEPING DHU-GLAS/ROBITAILLE 24.95

This program is based on the DOME JOURNAL SYSTEM, as adapted for the TRS-80 by Roger Robitaille and for the ESF by Dustin Leer. Entries are primarily made from bank deposit detail and from checks written. A total of 58 accounts is provided for classification of income and expenses. Customization of accounts is possible if necessary. The system permits preparing statements based on entries made at each session of data input and for the period to date. Statements available are a List of Checks, a List of Expenses, by Category of Expense, and a Balance Sheet. All statements can be printed if desired. The number of entries that can be made depends on available memory and how often the books are closed. After closing, all accounts are summarized and statements prepared. The books are then reopened with new starting balances. Data are stored by using ESF Data Files I/O.

148 BASIC AUTO-RUN ESF/RAY CZAJKA 7.95

This program makes it possible to save a BASIC program and have it start running automatically when re-loaded later. It is not necessary to enter RUN. The program is in two parts and is self-documenting.

149 TELEPHONE DIALER BLECHMAN ENTERPRISES 10.00

AUTO DIALER II is a program to record frequently called PEOPLE and PHONE NUMBERS and enable them to be called with very brief instructions. It holds up to 500 NAMES in 16K. Instructions are included for building an inexpensive INTERFACE CIRCUIT which is needed for connection to the PHONE LINE. A TOLL CHARGE PROGRAM is included to keep track of charges; however, it is not connected to the telephone.

160 ELECTRIC SPREADSHEET 48K ESF/DAN HANEY 69.95

The 48K version of Electric Spreadsheet provides all of the capabilities of the 16K version (see Catalog No. 173) plus: an additional 20 operators (for a total of 70 operators versus 50 operators in the 16K version); the ability to revise the spreadsheet layout without retyping the entire problem (lines of columns con be added, deleted, exchanged, replicated, or moved to another location on the spreadsheet); histogram plots of two individual lines can be generated on the screen (the axes of the histogram are automatically labeled); Alphabetic information can be entered into data cells for special labels, headings or notes; lines or columns of data can be moved to remote storage in computer memory for later recall.

II. DESCRIPTION OF GENERAL PROGRAMS, BY CATALOG NUMBER

Printing controls include: setting page length; pagination; right margin justification; and capability to print in upper case even if text was prepared in both upper and lower case.

The Type Right Secretary Program provides the user with the capability to leave the program to return to basic, enter commands in the command mode, and return to the program with or without loss of text at the users option.

178 ACCEL2 ALLEN GELDER SOFTWARE/SO. SOFTWARE 88.95

ACCEL2 compiles selected subset to Z80 machine code in all four variable types, compact 1K run-time component controls interpreter to streamline all other statements and functions. This technique minimizes code expansion without impairing huge speedups for true double optimisation. There are six diagnostic messages. Local/Global options increase compatibility with subject programs. Professionals note: No royalities on the derived code.

180 BOWLING LEAGUE RECORDS ESF/REV R. BEEBE 14.95

This program is designed to enable you to maintain complete records for one or more bowling leagues. A league is defined as a group of teams playing each other in rotation over a period of many weeks.

The program does a number of things: (a) It computes the handicap for each player to use the following week; (b) It keeps a constant record of each player's average, total pinfall, number of strikes and spares, and his/her highest single game and three-game score; (c) It keeps a running record of each team's highest scores both with and without handicap, as well as each team's points won and lost; and (d) It ranks the teams in order based on the points won.

IV. DESCRIPTION OF GAMES, BY CATALOG NUMBER

132 AIR DEFENSE COMMAND W/SOUND ESF/BILL BURNHAM 9.95

This game tests your skill as an anti-aircraft gunner utilizing flak bursts. It has a humorous rating system that will grade your performance. It is programmed for sound effects and has the option of talking if you have the TRS-80 voice synthesizer. It contains good action graphics and interesting comments throughout.

134 GOMOKU DISCOVERY BAY SOFTWARE 9.95

GOMOKU is the ancient Japanese board game of five-in-a-row played on a 9x9 grid. The object is to get five contiguous markers in a straight horizontal, vertical, or diagonal line before the computer does. It is a game of skill in which you play against a wily opponent, the computer.

151 ANDROID NIM W/SOUND 80 US/CHRISTOPHERSON 14.95

This is the game of NIM which has been animated by Leo Christopherson. It is one of the pacesetters among both graphics games and sound games for the TRS-80. It is an augmentation of the original game which did not include sound.

152 BEEWARY W/SOUND 80 US/CHRISTOPHERSON 14.95

This game matches a PERSISTENT BEE with a CUNNING SPIDER in a DUEL TO THE DEATH. The BEE must try to sting the SPIDER before the SPIDER can jump up and swallow him. The game has brilliant graphics and FANTASTIC SOUND.

153 CONCENTRATION W/SOUND 80 US/RICHARD TAYLOR 9.95

This is the game of CONCENTRATION. Prizes and positions change with each game. It has excellent sound effects.

IV. DESCRIPTION OF GAMES, BY CATALOG NUMBER

161 'ROUND THE HORN — DHU-GLAS/GEORGE BLANK — 10.00

This game is a test of your ability to sail your ship from New York to San Francisco during the Gold Rush years. 'ROUND THE HORN challenges you to better the sailing records of the three fastest Clipper Ships the world has ever known.

This is a solo or a three player game. You and one or two friends can battle the winds and currents and each other as you race your ships, the CHALLENGE, the CUTTY SARK, and the SURPRISE to California. "Beware the Doldrums!" And don't run into land, either. Many a good mariner has been shipwrecked on land or on the Antartic Ice Shelf.

162 SCRAMBLE W/SOUND — 80 US/ RICHARD TAYLOR — 9.95

This game is similar to HANGMAN, but without the NOOSE. You must try to guess the SECRET WORD. Don't take too long, however, as there is a time limit. The game may be played by one or two players, using the vocabulary contained within the program or using words you put in yourself.

163 SNAKE EGGS W/SOUND — 80 US/CHRISTOPHERSON — 14.95

Based on BLACKJACK, this version has TALKING SNAKES who ARGUE with EACH OTHER. You are one SNAKE, trying to roll your EGG as far as you safely can. Your OPPONENT, (another SNAKE) is trying to beat you. If you roll your EGG too far, you will break it and lose automatically. Try to avoid "Scrambled Eggs". THEY LOSE! Great graphics, plus sound.

164 TAIPAN — DHU-GLAS/CANFIL — 10.00

In the 1860's, the South China Seas swarmed with pirates and adventurers ready to chance the dreaded "TAI-FUNG", or Holy Wind, and the uncharted reefs and shoals of those treacherous waters. They sought to reap the generous rewards to be had in the silk and opium trade of the times.

TAIPAN puts you in the midst of this unique period of history. You have indebted yourself to a Chinese moneylender for a small ship and some operating capital. This gives you the wherewithal to ply the coast as a trader and seek to reap this golden harvest.

Can you successfully sail the turbulent seas, meet the challenges of the times, and become a wealthy man? Or will you succumb, as have so many, to pirates, storms, or faulty judgments?

Excellent graphics support this venture into a bygone age.

165 THE GREAT RACE W/SOUND — 80 US/SCOTT CARPENTER — 9.95

This game is based on the "MILLE BOURNES" card game. You and up to two other players, plus, if you wish, the computer try to finish this 600 MILE RACE first. Your opponents may try to stop you with FLAT TIRES or WRECKS, but you can do the same things to them. The program has OUTSTANDING GRAPHICS with real LIFE-LIKE CAR SOUNDS!

166 TRS-80 OPERA W/SOUND — 80 US/RICHARD TAYLOR — 9.95

This program includes five pieces of music. The sound is super and in multiple voices. The pieces include the "Lone Ranger's Theme" and "The William Tell Overture" among others.

167 WORD CHALLENGER W/SOUND — 80 US/RICHARD TAYLOR — 9.95

This game is similar to Television's "WHEEL OF FORTUNE". You try to guess the SECRET PHRASE. Each CONSONANT guessed incorrectly costs you a point. Each VOWEL that is wrong, however, costs you TEN POINTS. For one or two players. You can use the phrases contained in the program, or put in your own. Your number of guesses is limited.

August 1981

V. ADDENDUM TO SOFTWARE CATALOG

181 STRINGY MAILING SYSTEM ESF/BOB SEXTON 99.95

Written specifically for the Exatron Stringy Floppy this program can be used as a conventional mailing list, but is designed for the small to medium sized business using direct mail as a prospecting and advertising method. The program features machine level data creation and editing, automatic computer created addresses, fast, single keystroke, data entry for general mailings and program control, and instructions for use with virtually any printer configuration. Memory conservation features are the use of program overlay, tokens for certain data entry and storage of a single address for multiple label printing in general mailings (as many as 1300 different labels have been printed with a list of less than 80 address entries - this was done in a 16K machine with one data load).

182 SUPER LABEL MAKER - 32/48K ESF/BILL BURNHAM 9.95

This program provides the capability of printing up to five lines of text on a standard 3 1/2" X 15/16" mailing label. You can print special "Title Labels" that can be affixed to wafers for indentifying program files, as well as printing mail and identifer labels for notebooks, file drawers, etc.

The number of characters printed per line is automatically set depending on which one of four different label print formats is selected.

All text data can be saved as data files and loaded at a later date for printing more titles or labels with the same text and format. These data files may be SAVE(d) or read in the standard Data I/O format or by a method that does not require the use of the Data I/O porgram. This method will also verify the SAVE(d) data file.

183 PATCH TO R.S. TINY PASCAL ESF/L.S. PRESTON 9.95

PASPCH is a patch to the 32K version of Radio Shack's Tiny Pascal. This program provides for ESF storage and retrieval of source and P-code files. Also available is a command to print source code on a line printer.

184 REAL ESTATE INVESTMENT "SCRATCH PAD" ESF/BOB SEXTON 24.95

This program provides a five year real estate progect operating, sales and return analysis for any property from single family to large apartments. It is unique in that any factor in the analysis can be changed at any time. Even loan strategy can be changed in analysis midstream. The "WHAT IF" game can be played with instant answers.

Provisions are made for entering local parameters where necessary and full or partial reports can be printed with the touch of a key.

This program is a must for anyone involved in any way with real estate investments.

185 EASY DOES IT - 32/48K ESF/BILL BURNHAM 14.95

The ultimate in a screen display formatter. Create mixed text and graphic displays, in either 32 or 64 character mode, with all or any portion of the screen automatically coded into packed strings for fast or animated reproduction in your own program. Choose your own packed string variable names and their resident line numbers. This program has screen editing functions similar to a word processor. Graphics can be generated utilizing the full graphics block (6 pixels at a time) or by utilizing just a single pixel.

Will automatically draw circles, rectangles, and diagonals of any size, anywhere on the screen. Just tell the program what you want and it will figure out how to do it for you - ## EASY DOES IT ##

1/18/82

EXATRON DOMESTIC SOFTWARE PRICE LIST
AND DESCRIPTIONS OF PROGRAMS FOR THE TRS-80, MODEL I
AND THE EXATRON STRINGY FLOPPY

NAME OF PROGRAM	SUPPLIER/AUTHOR	PRICE	CAT #
	UTILITIES		
@Freeze	ESF/Dr. L. Wang	9.95	141
Accel2	A. Gelder/Southern Software	88.95	178
Adv Programmer's Guide	ESF/Dr. L. Wang	9.95	113
BASIC Auto-Run	ESF/Ray Czajka	7.95	148
Bowling League Roecords	ESF/Rev. R.W. Beebe	14.95	180
Data I/O Autoload	ESF/M.N. Kidder	5.00	170
Disassembler 1.2	Misosys/Roy Soltoff	15.00	139
ESF-80 Monitor 3.2	ESF/Vern Tallman	9.95	104
ESOS 1.4	ESF/Tom Wheeler	25.00	169
Gen Purpose DB Mgmt Prog	ESF/M.N. Kidder	9.95	172
Hex-Dex	ESF/Bill Burnham	7.95	145
OMNI Key	Discovery Bay Software	19.95	114
Patch to ED ASSEM PLUS	ESF/Bob Zinn	9.95	137
Patch to RS ESTASM	ESF/ David Purdue	9.95	106
R.S. U/L Conversion Patch	ESF/M.N. Kidder	3.95	136
Telephone Dialer	Blechman Enterprises	10.00	149
Think Big + Bulletin Board	ESF/BILL BURNHAM	9.95	129
What's On It?	ESF/M.N. Kidder	9.95	142

II. PRICE LIST, GAMES, LISTED ALPHABETICALLY

Air Defense Command	ESF/Bill Burnham	9.95	132
Android Nim W/sound	80 US/Leo Christopherson	14.95	151
Beewary W/sound	80 US/Leo Christopherson	14.95	152
Concentration	80 US/Richard Taylor	9.95	153
Cribbage	ESF/Jim Howell	9.95	154
Galactic Empire	DHU-GLAS/Doug Carlston	15.00	155
Galactic Trader	DHU-GLAS/Doug Carlston	15.00	156
Galactic Revolution	DHU-GLAS/Doug Carlston	15.00	157
Galactic Trilogy	DHU-GLAS/Doug Carlston	41.00	158
GOMOKU	Discovery Bay Software	9.95	134
Lying Chimps	80 US/Roy Groth	9.95	159
'Round the Horn	DHU-GLAS/George Blank	10.00	161
Scramble	80 US/Richard Taylor	9.95	162
Snake Eggs W/sound	80 US/Leo Christopherson	14.95	163
Taipan	DHU-GLAS/Art Canfil	10.00	164
The Great Race	80 US/Scott Carpenter	9.95	165
TRS-80 Opera	80 US/Richard Taylor	9.95	166
Word Challenger	80 US/Richard Taylor	9.95	167

NOTE: Prices and availability subject to change without notice.

August 1981

In addition, programs in high memory are protected from intrusion by the text buffer, "END" returns to READY instead of reinitializing the system, and custom printer drivers are supported (not included).

112 LEVEL III BASIC MICROSOFT/BILL GATES 49.50

This program is a powerful enhancement to LEVEL II BASIC. It supplies to the programmer the functions of ADVANCED GRAPHICS, AUTOMATIC LINE RENUMBERING, SHIFT-KEY ENTRIES, LINE INPUT INSTRUCTION, 10 USER-DEFINED ROUTINES, HEX and OCTAL CONVERSIONS, and all other features of DISK BASIC that are not file management commands. As an example, for advanced graphics, a LINE statement permits drawing lines or boxes by specifying two points on the screen. GET@ and PUT@ statements make it possible to save graphics arrays from the screen and reload them later. Shift key entries make it possible to enter any command, statement, or other string of up to 15 characters by pressing the SHIFT key and a letter (A-Z) at the same time. LINE INPUT allows programs to accept commas and other punctuation as user responses. Many other useful functions are included.

113 ADVANCED PROGRAMMER'S GUIDE ESF/DR. L.WANG 9.95

If you have gone through the ESF USERS MANUAL carefully and wish to know more about how the ESF and its DATA FILES software can be used in machine language programs, then the 52-page Advanced Programmer's Guide is the next step. It shows how to use the ESF within a machine language program. The manual contains chapters on saving memory on wafer and loading memory from wafer. The memory saved or loaded may contin a BASIC program, a machine lanugage program, data files,a dump of the video screen, or any other type of memory contents.

Program overlays and chaining programs are covered. Source code listings are given for the Stringy Floppy firmware and for the ESF Data Files I/O 4.1A program.

114 OMNI-KEY ESF/DISCOVERY BAY 19.95

In it's standard configuration, OMNI-KEY provides the following functions: 1) Completion of the Level II control key feature, 2) keyboard debouncing, 3) autorepeat on all keys, 4) selectable upper/lower case shifting and lower case display driver, 5) single-keystroke input of BASIC keywords, 6) a one-key user-definable macro facility, and 7) a screen-oriented program editor. OMNI-KEY also includes the means for integrating separately recorded additions as they become available. Although written in machine language, OMNI-KEY loads and saves as a BASIC program and protects itself in upper memory, eliminating the need to set MEMORY SIZE.

123 TYPING TUTOR MICROSOFT 14.95

This program helps teach TOUCH TYPING from scratch. It also helps build speed. It uses TIME RESPONSE MONITORING so that the computer can judge SPEED, SKILL, ERRORS, AND WEAKEST KEYS. The program tells the typist how he or she is doing and then adjusts itself to help the typist improve most rapidly.

125 FILE MANAGEMENT SYSTEM (FMS) ESF/M.N.KIDDER 19.95

FMS is a DATA BASE SYSTEM which enables the user to enter and organize DATA according to his own needs. It requires a 16K or larger system and is written in BASIC. The user can define up to NINE FIELDS OF INFORMATION pertaining to each RECORD. Each FIELD may be ALPHABETIC, INTEGER NUMERIC, OR PRECISION NUMERIC. After the fields and their lengths have been established, the program allocates the amount of memory needed so as to make possible the maximum number of records. It then reports the number of records which can be entered.

COMMANDS in the system include ADD, CHANGE, DELETE, EXTEND, FIND, HIDE, JUSTIFY, LIST, MAP, NEW, PRINT, QUIT, RANGE, SORT, TOTAL, VALUE, and WRITE. Numeric columns can be totaled. DATA may be selected within specified RANGES. OUTPUT may be formatted for printing in a variety of ways. Fields may be placed in any order on a line and spaced as desired. Numeric fields may be lined up vertically, with or without a dollar sign or a decimal point. DATA may be saved on wafer and reloaded later. THIS IS AN EXCEPTIONALLY CAPABLE PROGRAM.

II. DESCRIPTION OF GENERAL PROGRAMS, BY CATALOG NUMBER

139 DISASSEMBLER 1.2 — MISOSYS/ROY SOLTOFF — 15.00

This program, written in machine language, will disassemble MACHINE CODE into ZILOG Z-80 MNEMONICS with SYMBOLIC LABELS. References preceding the START ADDRESS are output as EQUATES. All 16-bit references are generated as LABELS. OUTPUT can be directed to CRT, PRINTER, WAFER or AUDIO CASSETTE. A SOURCE TAPE is produced that is suitable for loading into the RS EDITOR ASSEMBLER for reassembly. Three versions are supplied on one wafer. They load at 4400H, 5400H, or 6400H. The program is fully compatible with the ESF PATCH to the RS EDITOR ASSEMBLER. The ESF version has been improved and expanded by the author over the cassette version.

141 @FREEZE — ESF/DR L.WANG — 9.95

@Freeze is a powerful new utility program written by Dr. LiChen Wang. This remarkable program allows you to freeze the contents of your TRS-80 RAM memory, including the screen display, and save your program and data on the Exatron Stringy Floppy. You can later reload and continue from the exact place you "froze" your program. For example, if you are in the process of playing a game, you can save the machine state at any time and return to finish the game at a later date. It is also a very simple and powerful substitute for the data I/O program in many business applications.

142 WHAT'S ON IT — ESF/M.N.KIDDER — 9.95

This is another powerful new utility program which will allow you to produce a catalog of the program and data which you have saved on a wafer. Every serious programmer should have a copy of this program which comes with extensive explanations.

144 SLIC, A STRUCTURED LANGUAGE — RTG DATA SYSTEMS — 50.00

SLIC is a simple but powerful language which uses a small number of quickly-learned statements. Its name is an acronym for "structured language for interactive computation". It is a general purpose language, as is BASIC, and includes the same math functions as BASIC but with greater precision. SLIC encourages top-down design and structured programming, as does PASCAL, however, it is an interpreter rather than a compiler. This makes it easier to debug and modify a program and immediately re-run it. SLIC helps write easier-to-read, more reliable programs than does BASIC and is easier to learn than PASCAL. A self-teaching user's manual, "Structured Programming in SLIC" is included with each order or may be purchased separately for $10.00. If bought separately, the full purchase price of the manual is applicable to a later purchase of the SLIC program on wafer.

145 HEX DEX — ESF/BILL BURNHAM — 7.95

HEX-DEX is a program which converts HEXADECIMAL NUMBERS to DECIMAL and vice-versa. It gives a single READ OUT or will display a group of conversions from 0 TO 65535 (DECIMAL), OR 0000 TO FFFF (HEX). It displays on the screen or prints on a PRINTER in a formatted output. It comes on a 10' WAFER and requires a 16K machine.

146 CHECKBOOK GENIE — ESF/M.N. KIDDER — 29.95

This program is designed to maintain, balance, and analyze checkbook records. It keeps a running bank balance. It has a one-character alpha or numeric code which allows 20 or more classifications of income or expense. Using one or more of these codes, checks can be selectively displayed or listed, starting with any desired check number. This saves time if the number of checks is large. The classification of check records can be changed with a single key stroke. By changing the classification code to zero for all checks that have not cleared the bank, deducting deposits not credited at the bank, and listing the non-zero records, the balance should agree with the bank statement.

The program provides an easy method for entering check records. It automatically increments check number and duplicates the date, if these entries are correct. Each record has 5 fields: Check number, Date, Amount, Classification, and Description. These records are converted by the program into DATA statements. This allows the records to be saved and retrieved along with the program itself. Check records can be changed, inserted, or deleted using the BASIC editor.

II. DESCRIPTION OF GENERAL PROGRAMS, BY CATALOG NUMBER

169 ESOS 1.4 ESF/WHEELER 25.00

Formerly called EXTENDED BASIC, this program has been renamed ESOS, for Exatron Stringy Floppy Operating System. This program is an operating system for the Stringy Floppy with some of the features of a disk based system. It uses full file names for saving BASIC programs and uses passwords for controlling access to them. It does not save machine language programs unless they are incorporated in a BASIC program.

The DIRECTORY command makes it possible to list each program on a wafer and its length. If a program may be lengthened in the future, provision can be made for this. Total wafer length used is given so that it is possible to calculate whether additional programs can be saved on a particular wafer. Comprehensive data I/O functions are built in. A 22 page manual is included for easy operation.

170 DATA I/O 4.1A WITH AUTOLOAD ESF/KIDDER 5.00

This program modifies DATA FILES I/O 4.1A so that, when saved as file 1 on a wafer, it will automatically call up a BASIC program that is file 2. The purpose is to assure loading of the data I/O file along with any program which requires it. It simplifies the process by loading both files with one command.

172 GENERAL PURPOSE DATA BASE MANAGEMENT TUTORIAL 9.95
ESF/M.N.KIDDER

This program contains examples of good programming practice and allows you to "easily" modify the program for your own special purpose use. If you have any interest in learning to write "Business or Data Base Programs", you should use this program as a starting point.

173 ELECTRIC SPREADSHEET-16K ESF/DAN HANEY 44.95

Electric Spreadsheet is Exatrons answer to VisiCalc. Electric Sqreadsheet is a program that allows the TRS/80 Model 1, and the ESF, to be used as an assistant to perform complex calculatons for which you would normally use a large spreadsheet, or worksheet. The program permits you to use the screen and keyboard the way you would use a paper and pencil. You have the equivalent of six pages with 20 columns and 28 lines, with up to 10 columns and 14 lines in view at any one time.

With Electric Spreadsheet it is possible to input data anywhere on the spreadsheet/screen simply by moving the cursor. When the cursor is in position, input the data. Then to add, subtract, multiply, divide, or accomplish any other operation, designate the operation at the appropriate location on the screen.

You don't have to be a programmer to use Electric Spreadsheet to its full capability. This program provides you with the ability to analyse and/or project almost anything which can be represented numerically.

174 TYPE RIGHT SECRETARY ESF/DUNCAN PITMAN 24.95

Type Right Secretary is the first Word Processing Progrcm expressly written for use with the ESF. It is designed for use with those TRS-80 keyboards that do not have an upper/lower case hardware modifiaction. The program will convert the keyboard action to that of a typewriter(i.e. press the <SHIFT> key for upper case letters), however, all text whether upper or lower case will still be displayed as upper case on the screen. A method is provided to ascertain from the screen display which characters truly are upper case.

If you have an upper/lower case printer, the program will cause text printouts to be reproduced in upper/lower case as it was typed into the program. Type Right Secretary will work with a TRS-80 that has the upper/lower case hardware modification installed, but it will not work correctly if you attempt to activate the mod. with a software driver.

The Type Right Secretary Program has extensive text-editing capability (e.g. full cursor movement including roll and scroll; letter and line insertion, correction, and deletion; block and string movement and searches; and upper case text review).

154 CRIBBAGE — ESF/JIM HOWELL — 9.95

This program plays the standard six-card, two-player game of CRIBBAGE. The computer plays one of the two hands. The cribbage board is displayed at the top of the screen, so as to denote its holes and pegs. The scores are shown at the right of the board. Cards are represented as a rank followed by a suit. Thus, AS is the Ace of Spades, 4H is the four of Hearts, etc. Throughout the game the computer refers to its human opponent as "you" and to itself as "I" or "me".

155 GALACTIC EMPIRE — DHU-GLAS/CARLSTON — 15.00

This is the first of three games which comprise the GALACTIC SERIES. Together they cover the life of one man as he endeavors to bring his galactic system under one unifying government of justice and protection.

In this first game you are commander of the Imperial Fleet, with the task of bringing the 19 planets of the galactic system under one government. Your home planet, Galactica, is neither the largest nor strongest of the competing powers. You must therefore plan your campaign with meticulous care. Attention must be paid to funding as well as the logistics of building and manning the massive space fleet that you will ultimately need to assure your success.

GALACTIC EMPIRE will run in 16K but will not permit use of ESF DATA FILES I/O. The SAVE GAME feature requires use of cassette for files. DATA FILES I/O is completely supported in 32K or 48K. Please state system size when ordering.

156 GALACTIC TRADER — DHU-GLAS/CARLSTON — 15.00

This is the second in the GALACTIC SERIES. Your successful conquest of the galactic system has placed the Emperor, your former employer, in a quandary. Your fame, as past commander of the Star Fleet, worries him. Some of the views you expressed have caused him to remove you from power and force you into retirement, ostensibly with great honor. In reality, however, you have been given a small stipend and a ship in which you are consigned to life as an interplanetary trader. You know further, however, that if you can amass sufficient capital by your trading and avoid assassination by the Emperor's hirelings, you can obtain the resources needed to replace him by causing a revolution.

157 GALACTIC REVOLUTION — DHU-GLAS/CARLSTON — 15.00

In the third and final GALACTIC episode, you may play against the computer or with two other persons as you try to cause a revolution that will depose the Emperor. You can create socio-economic changes on the planets within your sphere of influence. You can also seek economic sanctions or make war on those planets controlled by other forces. In this way, ultimately, you hope to cause a revolution. However, changes in the political structure of one planet have a far reaching effect on other planets, so beware.

Can you successfully use your resources and political abilities to lead a GALACTIC REVOLUTION? Only the computer knows.

158 GALACTIC TRILOGY — DHU-GLAS — 41.00

The three games just described, GALACTIC EMPIRE, GALACTIC TRADER, and GALACTIC REVOLUTION can be obtained on one wafer, both for convenience and to save money.

159 LYING CHIMPS W/SOUND — 80 US/ROY GROTH — 9.95

This is a version of the old game of "I DOUBT IT" or "LIAR". You play with four CHIMPS who may lie or cheat. You must try to find the LIAR by observing the discards made by each. The CHIMPS must be truthful about the number of cards played, but not about the cards' RANK. GOOD LUCK! It has excellent animated graphics with sound.

V. ADDENDUM TO SOFTWARE CATALOG

We are constantly adding new programs to our software catalog. The addendum section is the place where we announce new or revised programs before they are incorporated into the appropriate section of the software catalog.

Programs which are revised or enhanced versions of exsisting programs, will be so noted. If you have an earlier version of such a program and wish to purchase the revised or enhanced version, you may do so by:

1) Paying the difference between the selling price of the "old" and "new" versions, plus

2) $ 3.95 for the programmed wafer and $ 3.00 shipping and handling, and

3) Providing proof of purchase of the "old" program. This proof of purchase may be the original wafer with the program label affixed, or a photo copy of the invoice you received when you purchased the program.

Following are the lastest "new" or "revised" programs in our Software Catalog.

106 PATCH TO R.S. EDITOR ASSEMBLER ESF/DAVID PURDUE 11.95

This patch is an enhanced version of an exsisting patch by David Perdue. This program is used to modify the RADIO SHACK EDITOR ASSEMBLER (EDTASM) so that it may be SAVE(d) on and used with the ESF. In this version of the patch both the SOURCE and OBJECT CODES may be SAVE(d) to and LOAD(ed) from wafer. This wafer contains patches for both versions 1.1 and 1.2 as well as Series 1, version 1.0 of EDTASM.

109 ZAP & DUMP ESF/KIDDER 9.95

These two machine language utility programs may be used to display and modify memory in a 16K to 48K, TRS-80 Model I.

The display is in hexadecimal and ASCII notation. The arrow keys are used to direct the program to display any area in memory and to position the cursor over the displayed memory of any byte which may then be modified. New data is entered in memory simply by typing over the old data on the display.

These are excellent programs for the person who understands hexadecimal representation of memory and wants an easy and efficient way to view and/or modify data in memory.

169 ESOS 2.4 EXATRON STRINGY OPER. SYS. ESF/TOM WHEELER 35.00

ESOS 2.4 is an ENHANCED version of the original ESOS (1.4). It resides in less than 5K of memory and contains every feature of the original, plus many new statement types. See page 8 of this catalog for a description of ESOS 1.4.

In the area of file handling improvements, ESOS 2.4 now verifies all SAVE(s), with three different modes of verify; AUTO-ON, AUTO-OFF, and maunual, via LOAD? . Data I/O is still unbuffered, but is smoother than in the original ESOS. Reliability has been improved through several changes in file-handling routines. Wafers written by ESOS 1.4 are still compatible with ESOS 2.4. Program files may now be merged by using the MERGE command. Overall file handling is much quicker.

The Extended BASIC part of ESOS 2.4 contains many useful new functions: Program Renumber, Hex to Decimal (and its inverse) conversion, Flexible User-Defined functions, screen (or directory) dump to any line printer, and many others, to speed programming.

A complete upper-lower case "intelligent" driver is also included (supports Radio Shack U/L case mod). BASIC programs can control this driver.

All of these features are in addition to the original ESOS features of Wafer Directory by Name, User passwords, etc.

A 40 page manual takes you step-by-step through all the features of the operating system, so that you can become confident in your use of ESOS 2.4.

ESOS 2.4 is designed to operate in as little as 16K; however, 32K or 48K is even better.

179 SMALL HOME-BUS PROGRAMS ESF/FRED BLECHMAN 25.00

These programs are designed for the small entrepreneur with no employees, operating a home-based business such as AMWAY, AVON, FULLER BRUSH, SHAKLEE, TUPPERWARE, Mail Order, Speciality Salesman, Insurance or Real Estate. The programs are designed for the TRS-80, Model I, Level II, 16K BASIC. No disk is required, but an 80-column printer is needed for three of the programs. These programs include: 1) Speed-letter, a word processor; 2) 12-Column Ledger, an accounting program; 3) 3-Across Mailing Labels, a mailing list program; 4) Telephone Auto-Dialer/Timer; 5) Toll-Charge, a program to display the cost of a phone call in real time.

1982 Domestic Price List

Effective January 1,1982 to April 30,1982

Part #	Product	Price
TR-103	TRS-80 MODEL I STARTER KIT	$ 349.50
TR-100	TRS-80 MODEL I Drive 0	249.50
TR-101	TRS-80 MODEL I Drive 1	199.50
CL-105	TRS-80 COLOR COMPUTER THING (16K memory)	347.90
CL-101	Interface (16K memory standard)	199.00
CL-108	Interface (32K memory)	219.00
CL-102	Disk Controller	99.00
CL-103	CCDOS plus Manual	29.95
CL-104	ROM Back-up Adaptor	19.95
TR-301	TRS-80 MODEL III STARTER KIT (Dr. 0 only)	349.50
TR-302	TRS-80 MODEL III STARTER KIT (Dr. 0 & 1)	449.50
TR-303	ESF III Drive 0	299.50
TR-304	ESF III Drive 1	125.50
AA-101	APPLE II STARTER KIT	349.50
AA-102	Apple Drive 2	189.50
RS-234	RS-232 MICRO-Sponge STARTER KIT	449.50
RS-232	RS-232 MICRO-Sponge	399.50
EP-101	EPSON MX-80 PRINTER(with standard cable)	545.50
EP-102	EPSON MX-80 PRINTER(with smart cable)	599.50
EP-106	EXATRON SMART CABLE	69.50
EP-107	EXATRON STANDARD CABLE	19.95
EP-103	GOSUB INTERNATIONAL FRICTION FEED KIT	49.50
MM-204	Upper/Lower Case for TRS-80	19.95
MM-206	Installation of U/L Kit	35.00
	40 Pin Bus Extenders for TRS-80 Model I	
TR-115	2 for 1	20.00
TR-116	3 for 1	25.00
TR-117	4 for 1	30.00
TR-186	5 for 1	40.00
TR-118	Custom Bus Extenders are available as follows: The base price is $20.00 PLUS $5.00 per connector (male and/or female) PLUS $5.00 per foot of cable (or portion thereof) used. Custom Bus Extenders are not returnable.	
TR-128	Wafer Organizers (2)	7.00

WAFERS	Regular		Certified	
Length	Part #	Price *	Part #	Price *
5'	SF-105	$2.00	SF-205	$3.00
10'	SF-110	2.00	SF-210	3.00
20'	SF-120	3.00	SF-220	4.00
35'	SF-135	3.00	SF-235	4.00
50'	SF-150	3.50	SF-250	4.50

* MINIMUM ORDER 10 WAFERS

Price and availablilty subject to change without notice.

EXATRON 181 Commercial,Sunnyvale,CA 94086 ■ (408) 737-7111 ■ Toll Free 800-538-8559 ■ Telex:172-090

2/16/82

Wafer Warranty

For a period of one year from the date of purchase, certified wafers will be replaced for only the shipping and handling charge. For a period of 30 days from the date of purchase, regular wafers will be replaced for only the shipping and handling. Wafers returned subsequent to these dates will be replaced for a charge of $1.00 plus shipping and handling. Only one shipping and handling fee of $3.00 will be charged per wafer order and/or wafer replacement, regardless of the number of wafers involved.

RECOMMENDED PROCEDURES FOR HANDLING AND STORING PROGRAMMED WAFERS.

The first step after obtaining a copy of a programmed wafer from Exatron or any other source, should be to make an archive copy on a long wafer. This copy should be stored in a seperate location from your working wafers.

The second step should be to make a working copy of the program on the shortest suitable wafer.

The original wafer should then be stored in a safe place for use in the unlikely event that both the archive and working copies are lost or accidently destroyed.

All programmed wafers will be replaced for a charge of $3.95 per wafer and a standard $3.00 shipping and handling charge. The original programmed wafer must accompany all requests for replacement.

@FREEZE (for TRS-80 Model I only)

@Freeze is a utility program which can be used instead of the Data I/O program in most data file applications. Both your program and data can be saved and loaded as a single file with the same wafer.

Speed of operation, storage capacity of the wafer and ease of use will all be improved. Use of this utility is highly recommended for consideration in all applications which involve data files.

STANDARD WARRANTY

All Exatron ESF products on the reverse side (other than Wafers, see above) are warranted for one year. Additionally, all ESF products may be returned postage paid within 30 days for refund of purchase price. Customer agrees to follow recommended maintenance procedures as outlined in the Owner's Manual. If you experience equipment failure, contact Exatron for determination of need for repair or refund, and Returned Materials Authorization (RMA) number. The customer must return the equipment postage paid to Exatron. After repair, the equipment will be shipped back at Exatron's expense via surface freight (UPS). Air freight (UPS Blue) is avaialble at customer's expense.

EXCEPTIONS TO WARRANTY

Operator misuse
Customer repairs or modifications not authorized by Exatron.
Shipment damage due to improper packing.

NON-WARRANTY SERVICE

Minimum charge $18.00
Labor rate - Exatron manufactured products $35.00/hour ; Non-Exatron products $45.00/hour
Parts cost - extra
Exatron will make every effort to complete repairs in 7 working days or less
90-day warranty on complete unit after repair

EXATRON CORPORATION ORDER FORM

QTY	ITEM	UNIT PRICE	PRICE

Shipping and Handling:

Software Starter Kits and Drives	USA	$ 3.00 [redacted] 6.50 *
	Canada	10.00
	C.O.D.	[redacted] 1.50

SUBTOTAL _____

Sales Tax (CA residents only) _____

Handling & Shipping Charge _____

*** Shipping and Handling in USA now includes insurance**

C.O.D. Charge _____

TOTAL _____

WORKSHOP CHAIRMAN/REPRESENTATIVE NAME _____ CHAPTER NO. (if applicable) _____

PAYMENT BY:

Visa Cd No. _____ Expires _____

MstrChge Cd No. _____ Expires _____

Name _____

Address _____

City _____ State _____ Zip _____

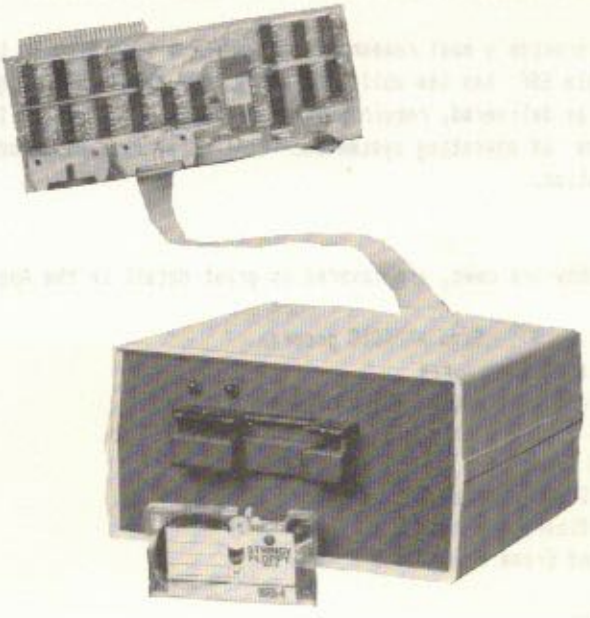
Phone: Business ( ) _____ Home ( ) _____

NOTES:
1. Allow at least four weeks for shipping and handling.
2. Normal shipment is by UPS.
3. Allow two weeks for clearance of personal checks.
4. Prices and availability subject to change without notice.

HOT LINE
Outside California Only
800-538-8559

EXATRON CORPORATION 181 Commercial Street • Sunnyvale, California 94086 (408) 737-7111

EXATRON'S STRINGY FLOPPY for the APPLE II®



Mini-disk speed, versatilty and reliability

- Command Set emulates Apple DOS
- Data transfer rate 16000 Baud
- Powerful operating system uses less than 6K Bytes RAM
- Controller Card supports two drives
- Starter Kit includes everything needed to use Apple ESF

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The Exatron Stringy Floppy Data-Storage System

Keith Carlson
43 McDill Rd
Bedford MA 01730

More powerful than an 8-inch Winchester? Not likely. Faster than a speeding floppy? Sometimes. Able to read huge data bases in fleeting seconds? Impossible!

Exatron's Stringy Floppy data-storage system may not compare with Superman, but from the minute I plugged my new Stringy Floppy drive into my Radio Shack TRS-80 Model I Level II computer, I was convinced it was super. It appears to be a convenient and economical way to equip a TRS-80 Model I with most of the speed and convenience of a disk drive at less than half the price. There are some problems with it, but they are minor compared to problems of audio-cassette storage.

Why Digital Cassette?

Exatron was the first company to apply the concept of a completely digital cassette-tape data-storage system to microcomputers in a practical way. Audio cassettes are simply not designed for digital recording. They are made to accommodate a limited analog frequency range: those frequencies audible to the human ear (sometimes less, depending on the quality of the tape). Also, the tape moves comparatively slowly past the write/read (record/playback) head. Finally, you have to rewind the tape to read what has been written or to write something else.

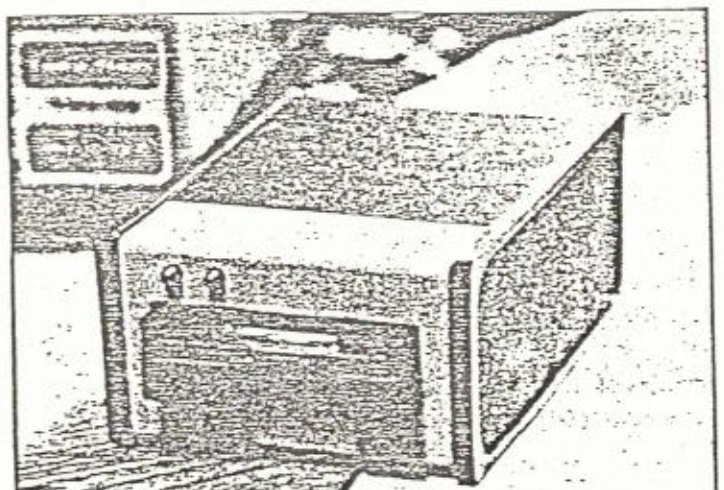


Photo 1: *The Exatron Stringy Floppy digital cassette-tape drive.*

In contrast, the Exatron digital cassettes, or *wafers*, are designed for digital recording. The tape is about ¼ inch wide, and it is a closed loop moving in a single direction. It works in a manner similar to that of an eight-track audio tape cartridge. The tape is pulled out of the middle of the single reel and is wound up around the outside. No rewinding is necessary because the tape forms one big loop. The tape runs past the read/write head fast enough to transfer data at 7200 bps (bits per second). The wafers are about the height and width of a business card and about ⅜ inch thick.

Stringy Floppy Characteristics

The basic control software for the Exatron Stringy Floppy system is stored in ROM (read-only memory) located inside the drive, making the system easy to use. The addressing of the ROM fits cleverly into an otherwise-unused gap in the TRS-80's memory-address space. The control software uses 4 bytes of read/write user memory. All you have to do to activate the control software is type "SYSTEM" to the Level II BASIC interpreter and then type "/12345". There are three ROM-based commands available: @LOAD, @SAVE, and @NEW.

To load a BASIC program from the wafer, you simply type "@LOAD*n*" (where *n* is a file number from 1 to 99) and within a few seconds the program will have been loaded into user memory. To store a BASIC program on the wafer, you type "@SAVE*n*". The system verifies that the program has been stored correctly, so this takes a little longer. To load and store machine-language programs, you use the same commands, adding arguments (in decimal radix) to specify the load-starting address, the length of the program, and the program's entry point.

variables.

The @NEW command certifies a wafer for use. When you type "@NEW", the system writes a test pattern on the wafer, verifies it, and then displays the amount of storage space available on the wafer.

Storing data is just a little more complicated. A data-I/O (input/output) program that must be loaded into user memory is provided on a wafer. It takes up about 1 K bytes of memory. When loaded, it provides five more commands: @OPEN, @INPUT, @PRINT, @CLOSE, and @CLEAR. The uses of the first four are similar to corresponding commands in disk-based systems, and detailed explanations are included in the manual. The command @CLEAR is used for aborting open files and setting up I/O buffer space when you have more than one drive.

The system is not without some minor problems. First, no matter how well a tape-based system works, it is still a sequential-access system. That is, it may have to read all the files preceding the file you wish to access. (Since the Exatron drives are comparatively fast, this is less irritating than it sounds.)

Furthermore, the method of storage allocation leads to some interesting problems. If you read a program from a wafer, modify the code so it is longer, and then rewrite it onto the same wafer, the longer program will destroy the header of the file behind it. I have made it a policy (after losing several hours' worth of work) always to use a "scratch" wafer until I am absolutely satisfied there are no more changes to be made to a program. Another way to avoid this problem is to write the modified program as the last file on a wafer.

A second problem (one familiar to users of audio cassettes) is that there is no directory on a wafer of the files it contains. I use 3 by 5 file cards cut down to the size card with the wafer.

The last problem involves those 4 little bytes of user memory that the operating system uses. You won't be able to use every byte of memory in a 16 K-byte system. I was dismayed, at first, to find that I couldn't load some large programs from the Stringy Floppy. (Fortunately for devotees of games like the Scott Adams Adventures, a special loading routine has been developed for use with Adventure International products.) Of course, the 4 bytes are missed less by owners of 32 or 48 K-byte systems.

The 4 bytes will be relocated just below any area at the top of memory reserved for machine-language programs. If you don't reserve memory for machine-language programs, the 4 bytes will reside at the top of memory. If you have a machine-language program that attempts to load over these 4 addresses, either it won't load at all or it won't run correctly.

One way of increasing the data-transfer rate of the TRS-80 version of the Exatron Stringy Floppy system is by speeding up the Z80 microprocessor within the TRS-80. Exatron sells a speed-up kit that roughly doubles the processor's clock rate and the Stringy Floppy's data-transfer rate. Unfortunately, wafers recorded at the higher rate can be read only by a TRS-80 that has been speeded up.

Manufacturer's Support

I am impressed by the documentation and support provided for the Exatron Stringy Floppy. First, enough information about the operating system is provided in the user's manual to make assembly-language programming of wafer-I/O operations simple. Entry points to ROM routines for the various primitive functions (read block, write block, write file header, verify block, etc) and an

Name
Exatron Stringy Floppy

Use
High-speed mass storage on digital cassette

Manufacturer
Exatron Corporation
181 Commercial St
Sunnyvale CA 94086
(800) 538-8559
(408) 737-7111 (in California)

Price
First drive for TRS-80 Model I, $249.50
First drive with starter kit, $349.50; Second drive, $224.50
First drive for Apple II, $349.50; Second drive, $189.50

Dimensions
TRS-80 Model I, 6 by 4¼ by 2¾ inches (15.25 by 10.5 by 6 cm)
Apple II, 6¼ by 5¾ by 3¾ inches; (15.8 by 14.9 by 8.5 cm)

Features
TRS-80 Model I: on-board ROM-based operating system, 7200 bps data-transfer rate, LED indicators, automatic keyboard debounce; Apple II: LED indicators, built-in catalog function, 16,000 bps data-transfer rate

Additional hardware needed
TRS-80 Model I Level II computer and 40-pin ribbon connector; Apple II or Apple II Plus computer and interface card (card supplied with first drive)

Hardware options
TRS-80 Model I Speed-Up Kit (doubles processor clock rate and Stringy Floppy data-transfer rate), $19.95

I/O-demonstration programs, a machine-language monitor called ESF-80, which resembles Radio Shack's T-Bug, and a mini-data-base program. The starter kit also contains documentation, ten blank wafers, and a two-for-one ribbon cable for connecting the Stringy Floppy drive to the expansion port on the TRS-80 keyboard/processor module.

Third, for support after the sale, Exatron Corp has established the Exatron Stringy Floppy Owners' Association, through which a variety of software is available on wafer, including games and utility programs. Membership is automatic when you purchase a Stringy Floppy drive. The association also distributes instructions for modifying popular commercially sold programs to work with the Stringy Floppy drive. Such patches are available for the Electric Pencil word-processing program from Michael Shrayer Software and for the Editor/Assembler Plus from Microsoft Consumer Products. Members of the association are encouraged to contribute to the software collection and to a collection of hardware interface designs, sometimes in exchange for royalties.

Fourth, Exatron maintains a toll-free telephone number you can call if you need more help than you can get locally. The number is (800) 538-8559. California residents can call (408) 737-7111.

Other Planned Products

In addition to the version for use with the TRS-80 Model I, Exatron has recently announced a Stringy Floppy drive for use with the Apple II computer. The new system differs from the TRS-80 version in several ways. The operating system for the Apple will not be resident in ROM; it will be loaded into 6 K bytes of the Apple's user memory by a bootstrap routine when the Stringy Floppy system is activated, in much the same manner as popular disk operating systems. The Apple version will provide a catalog on each wafer, residing in the first file, and the standard data-transfer rate will be higher, about 16,000 bps. As the owner of a TRS-80, I envy these features.

Because Exatron is designing Stringy Floppy drives for some Commodore Business Machines computers and for the Radio Shack TRS-80 Color Computer, owners of these machines may look forward to having the Stringy Floppy added to the selection of peripheral devices.

Conclusions

- The Exatron Stringy Floppy system is an excellent low-priced alternative to slow audio-cassette data storage. The system appears to work well despite some minor bugs. Exatron apparently has worked hard to make both the hardware and its operation simple and efficient.
- Both documentation and support appear to be good, and toll-free telephone assistance is a reassuring asset.
- Thanks to the efforts of Exatron and the owners' association, an adequate supply of software converted to run on the system is available. ■

exatron

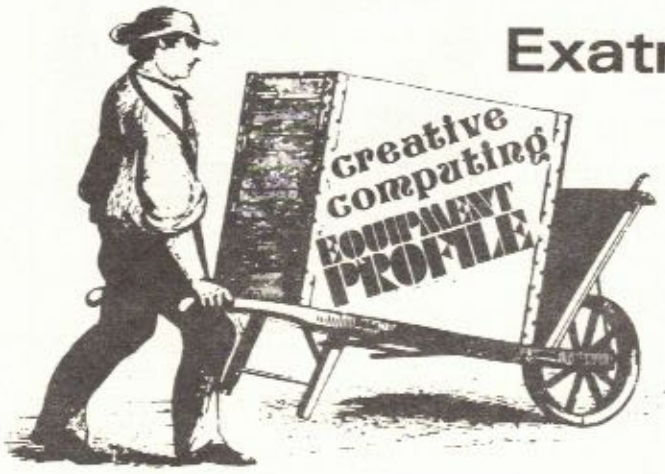
Note:

Since publication of this article in Creative Computing, September, 1980, some of the information has changed. Price information should be checked. We now offer more Wafer lengths and additional computer interfaces. That update can be found in the other materials enclosed.

Thank you,

Bob Howell
Chairman of the Board
Exatron, Inc.

exatron, inc.
181 Commercial Street
Sunnyvale, CA 94086
(408) 737-7111



Exatron's "Stringy Floppy" for the TRS-80

Fred Blechman

Even though I saw it advertised several times and read about it in two articles, I had no interest in the Stringy Floppy until I got my hands on one. Now I'm a believer! I'm not sure if the ads were too general, or the articles too technical, or that there's nothing like having the real thing and using it to really know what it can do.

Cassette Systems

Let's talk for a moment about the difference between cassette systems and disk systems. Cassettes are relatively slow. The TRS-80 Level II operates at about 500 baud — that's approximately 62 characters per second when loading a program onto a cassette from the computer, or loading a program from the cassette into computer memory. Cassette tapes are tricky to load, with head alignment problems, speed variations, tape variations, dropout, tape wrinkles, oxide flaking and such. You really have to CSAVE and verify at least twice for reliability. External DATA handling is too slow for most practical purposes. Changing programs requires making new copies, rewinding and then verifying with CLOAD? — just too time-consuming. However, cassette recorders are inexpensive. The tape cassettes are cheap (about 75¢) and are really great for "archival storage" — information you're going to keep for a long time and you're not going to use every day.

Exatron's Stringy Floppy is a "poor man's disk."

Disk Systems

Now look at a disk system. They're fast and wonderful — great for DATA handling, and extremely fast for loading and saving. But they're expensive! An Expansion Interface, with an additional 16K memory (which you almost have to get, since the disk operating system uses 12K all by itself — and with a 16K machine, that would only leave you with 4K) costs $448 from Radio Shack. The disk drive is another $449 — for a total of $937 (perhaps less if you have another source or use non-Radio Shack devices). The blank disks are about $5 each. And the disk system is also complicated, creating new problems for those who are not willing to spend the time and effort to learn it.

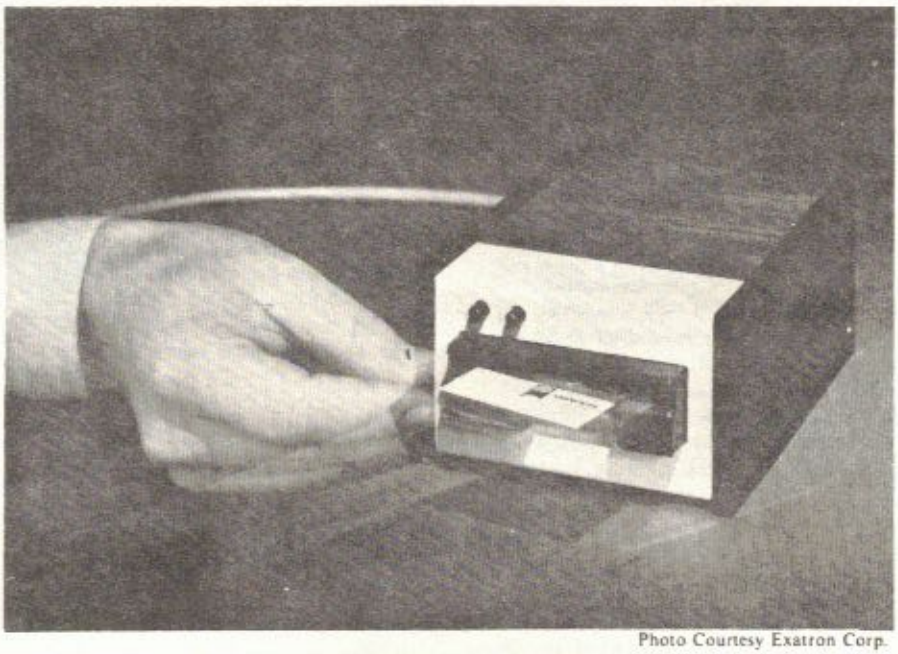


Photo Courtesy Exatron Corp.

The Stringy Floppy

Now there's another alternative, Exatron's Stringy Floppy for $250 — a "poor man's disk."

Let me tell you some of the advantages. It's fast. (I mean fast for me. Maybe not fast for you people from disk-land.) It runs at 7200 baud, which is 14 times faster than the Level II cassette. Actually, it's 14.4 times faster. That's about 900 characters per second as compared to around 62 characters for Level II cassettes.

You don't need an Expansion Interface. The Stringy Floppy plugs right into the wall socket for AC power (no power stolen from TRS-80). It plugs right into the keyboard expansion slot, and has an extra connector to share the expansion port if you've got something already plugged into it.

You can put up to seven Stringy Floppies in daisy-chain fashion on one system, address them individually, and have them talk to each other — as compared to the normal maximum of four disk drives.

Fred Blechman, K6UGT, 7217 Bernadine Ave., Canoga Park, CA 91307.

Floppy, cont'd...

Automatic Keyboard Debounce

None of Exatron's literature or advertisements even mention what I'm about to tell you. When I discovered this I called up Bob Howell, Sr., the President of Exatron, long-distance to confirm it. He said, "Oh, yes, the Stringy Floppy automatically debounces the keyboard. I guess we should mention that . . . "

The Stringy Floppy requires *no RAM memory* from the TRS-80! It has its own EPROM — erasable programmable read-only memory. While it utilizes space in some operating system areas, it does not interfere with normally accessible memory.

"Oh, yes, the Stringy Floppy automatically debounces the keyboard. I guess we should mention that..."

It's self-verifying on loading and saving. When you tell the Stringy to save a program, it puts the program on tape, then goes back and checks every single byte. So you don't have to make two copies of everything, then rewind and CLOAD? verify.

Wafers

The Stringy Floppy uses little "wafers," $2 each, and smaller than a business card. In fact, I store my wafers in the jackets of plastic business card holders. Each can hold over 48 thousand bytes. Not bad for something this small. It's only 3/16 of an inch thick, and looking down from the top it's 2¾ inches by 1½ inches.

Inside, the wafer is a *continuous loop* of 1/16 inch wide tape — so narrow it looks like a string, hence the name "Stringy Floppy."

The wafers come in four different lengths: 5 feet, 10 feet, 20 feet and 50 feet. Just remember the numbers 4-5-6 and it's easy. A 4K wafer — that is, it will hold 4000 bytes — is 5 feet long and runs around its whole length in 6 seconds; 4K, 5 feet, 6 seconds. Now if you extrapolate that, 8K uses a 10 foot wafer and runs 12 seconds; 16K uses a 20 foot wafer that runs 24 seconds; and 40K fits on a 50 foot wafer that runs 60 seconds. Actually, I've found the 50 foot wafers really hold over 48K, so either the tapes are longer than marked, or the byte density is somewhat higher than 4K on 5 feet. (The $2 price is the same for all lengths.) Somewhere on it there's a little metal foil about ½ inch long, to indicate the end-of-tape/beginning-of-tape location to a pickup in the tape drive.

On top of each new wafer is a small ½ inch diameter silver paper reflective disk. If this is removed, or covered over with black paper, the Stringy Floppy will not record. In other words, if you want to protect a program on the wafer from being recorded over, remove or cover the silver disk. This wafer would then be called "write-protected." This is like removing the break-away tabs at the back of a cassette.

@NEW(n) — Verifies Ability of Tape to Hold Bits Along Entire Unused Portion. (n) Optional.
@SAVE(n) — Writes Numbered Program and Verifies Each Byte. (n) Required.
@LOAD(n) — Loads Next (If No (n)) or Specified Program Into Memory With Parity & Checksum Verified.
(Note: @ May Be Shifted or Unshifted)

Table I. Stringy Floppy Commands

PROGRAM	BYTES	SECONDS TO LOAD	
		LEVEL II CASSETTE (500 BAUD)	STRINGY FLOPPY (7200BAUD)
TRS232 Printer Driver	1734	32	2½
Telephone Toll-Charge	2853	48	3½
Simplified Bookkeeping	3163	54	3½
Telephone Dialer/Timer	5139	86	6
Distributor Records - Amway	7687	127	10
Order Verification - Amway	10417	171	14

Table II. Loading Time Comparisons

Other Things

The Stringy Floppy is fast enough to make DATA handling practical. An internal buffer spits out 256 bytes of DATA about every second, just like that, into your computer memory — or from the computer to a DATA tape.

You can also load and save machine language programs, and a monitor program is available for machine language geniuses. (As for me, I've got my hands full with just Basic.) Incidentally, the Stringy Floppy does not interfere in any way with your regular cassette operation — you can CSAVE and CLOAD just exactly as you did before.

Installation

The actual unit is four inches wide, six inches deep and only two and a half inches high, and weighs about two pounds. The black and gray metal and plastic cabinet is a perfect match for the TRS-80. That's all there is to the installation. The wafer just pushes into the slot on the front of the unit. There are no controls on it; just two light-emitting diodes, one to show that the drive motor is operating, the other to tell you when it's writing on tape.

Using The Stringy

Use of the unit is simplicity itself. When it's connected and the computer is turned on, the display will show MEMORY SIZE? If you need to reserve memory for some other use — printer driver or whatever — type in the number you need in the normal fashion. When you press ENTER you'll be in Basic with a READY on the screen. Type in SYSTEM and press ENTER, then type in /12345 and press ENTER. The screen will now come up with:

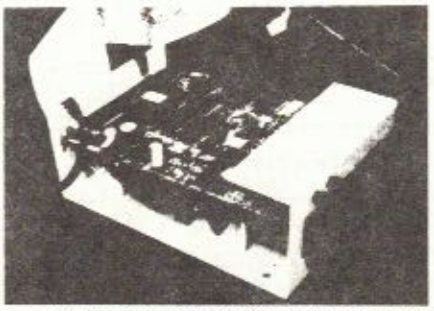
EXATRON STRINGY FLOPPY
VERSION 3.2

and READY. You're in Basic and your keyboard is debounced! Check your memory with ?MEM and you'll get the same number you would without the Stringy Floppy on line (15572 for 16K unit with no memory reserved).

New Commands

You have three new commands when you've done this (see Table I). @NEW (and you can use an upper or lower case @!), @SAVE and @LOAD. These commands can be entered from the keyboard or can actually be placed in Basic programs.

The @NEW command initializes and verifies the wafer by turning on the drive motor (right LED goes on) and searching the tape for the beginning-of-tape foil. When a sensor spots the silver foil on the tape, the left LED goes on and the Stringy writes on the wafer tape with a special code. The tape is a continuous loop — it pulls out of the center, goes past the recording/playback head, and then winds around the outside of the tape pancake, like the common 8-track music tapes you have in your car or home. You don't ever have to rewind — in fact, you can't. As soon as the beginning-of-tape foil is located, the left LED goes out, the unit



A single PC board in the Exatron Stringy Floppy drive unit contains the ROM and all the necessary electronics. Photo Courtesy Exatron Corp.

continues running, reading and verifying every non-byte on the entire tape! This assures you that the tape has no dropouts, snags, wrinkles or other nasty things.

Meanwhile, the screen says "ERASING . . . " (Shouldn't it say "VERIFYING"?) When the tape has been completely verified, the number of available bytes on the tape appears on the screen, followed by "DONE."

Saving A Program

The @SAVE command is similar to the cassette CSAVE command, and must be followed with a number from 1 to 99. 99? Yes, you can save up to 99 numbered programs on a single wafer. (You can do the same sort of thing on a cassette — in Level II, anyway — but who bothers? It takes so long for the tape, running at normal speed, to find the numbered program that everyone I know uses the tape counter and fast-forward manually.)

You must give the program a number, starting with "1" for the first program. The drive moves the tape forward until it finds the next available space. If you already have, say, two programs on that wafer, you would command @SAVE3. Once the tape has moved to the next available space, the record head writes the program, then the tape continues around and verifies with the computer every byte of the newly-written program before stopping.

In one operation you have accomplished what you usually do with a CSAVE, rewinding and a CLOAD? using a cassette.

Loading a Program

The @LOAD command is like the cassette CLOAD. If you don't follow with a number, it will load in the next program on the wafer. Give it a number, like @LOAD3, and it will seek and load that specific program only. Give it a number not existing on the tape and it will seek endlessly. (This wastes time but it is not otherwise harmful.)

The BREAK key stops the Stringy Floppy at any time.

You verify the loading two ways. The screen says "READING . . . " during loading and follows with "DONE" when completed. If there's an error, a "CHECKSUM ERROR" or "PARITY ERROR" will appear on the screen — rare, in my experience, and not likely to occur if you try again. The second verification of a good load is to LIST the program. I've never had a bad load when the screen said "DONE." What a pleasure compared to cassette loading in Level II.)

Timing Comparisons

Getting down to the nitty-gritty, I have a chart that shows the timing comparisons in loading several programs I use frequently (see Table II). The Amway Products Distributor Records program contains over 270 DATA statements (one for each of my distributors) and it needs to be updated every month. This used to be a real bother with cassettes, since every change required making a new cassette copy of the program, CSAVEd and verified twice. Each CSAVE or CLOAD? took over 4 minutes plus rewinding time. With the Stringy Floppy it takes under 45 seconds to @SAVE and verify —and I only have to do it once. That's over 16 minutes for cassette, versus under 45 seconds with the Stringy Floppy.

The Telephone Dialer Program is another example of how speed can be important. It offers the convenience of dialing numbers stored in memory — but can take several minutes to load if you have a lot of names in memory. With 67 names in memory it takes 86 seconds to load from a cassette, but only 6 seconds with the Stringy Floppy. Obviously, it gets used more often now than before I had a Stringy.

Data Handling

Some programs require data be stored outside of the regular program itself. Inventory, mailing lists, accounts receivable and many other data bases are usually handled this way. With cassettes it's a bummer. Loading external data into a program from a cassette, can take 30 minutes or more, since it's usually done line-by-line.

However, a special data I/O program is supplied for the Stringy Floppy. It lets you operate on 256 bytes at a time, with no serious loss of speed. The program occupies less than 1K and loads quickly from a wafer (taking about one second to load).

The data I/O wafer gives you four new Basic commands (see Table III). These are similar to cassette or disk file commands, and can be directed to any of up to seven Stringy Floppies on line. The special I/O commands are normally imbedded in Basic programs.

Table III. Data I/O Commands

@OPEN(n) — Open Specified Data File
@PRINT — Records Data on Wafer Tape
@INPUT — Reads Data Into Memory
@CLOSE — Closes Data File
(Note: @ May Be Shifted or Unshifted)

For example, I have an order checking program I use almost daily in my Amway business. It holds 260 DATA statements which are loaded into a two-dimensional, 6-column by 260-row array with READ statements in the program. Because the resident DATA statements take up about 6500 bytes of my 16K memory, I'm limited to 260 stock numbers and prices. Once the data items are loaded into the array by the program, the data is just occupying memory for no purpose. I found I could use a data cassette, but it took almost 30 minutes to load the data into the program. However, using the Stringy Floppy data I/O program, reading the data into the array from a wafer takes only 45 seconds and frees 6500 bytes of memory — which allows me to put almost 500 stock numbers and prices in an array instead of 260! Now that's what I call an improvement.

Tape cassettes are cheap and are really great for "archival storage"

Machine Language

You can also @SAVE machine language programs if you know the starting address and byte length. An autostart address is optional. A monitor wafer is available for machine language debugging; it includes a memory relocator and separate manual. Level III Basic is also available on a wafer.

Manual

Although I've had no experience with disks or exotic peripherals, I followed the user's manual easily. It's so very explicit, with examples and explanation of error messages. It even has a selection on Assembly Language Operations for those of you who understand that stuff. And for the hardware types, a parts layout and complete schematic are also included.

Guarantee

Exatron sells the units with a 30-day unconditional moneyback guarantee. Besides the TRS-80, Stringy Floppies are available for the SS-50 and S-100 busses as well. The cost for the TRS-80 version is $250, with the other units comparable.

Exatron doesn't have any dealers, so you'll have to contact them directly. Their address is 181 Commercial Street, Sunnyvale, CA 94086 , and they have a hot-line toll-free number: (800) 538-8559, except in California, where the number is (408) 737-7111. □

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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.

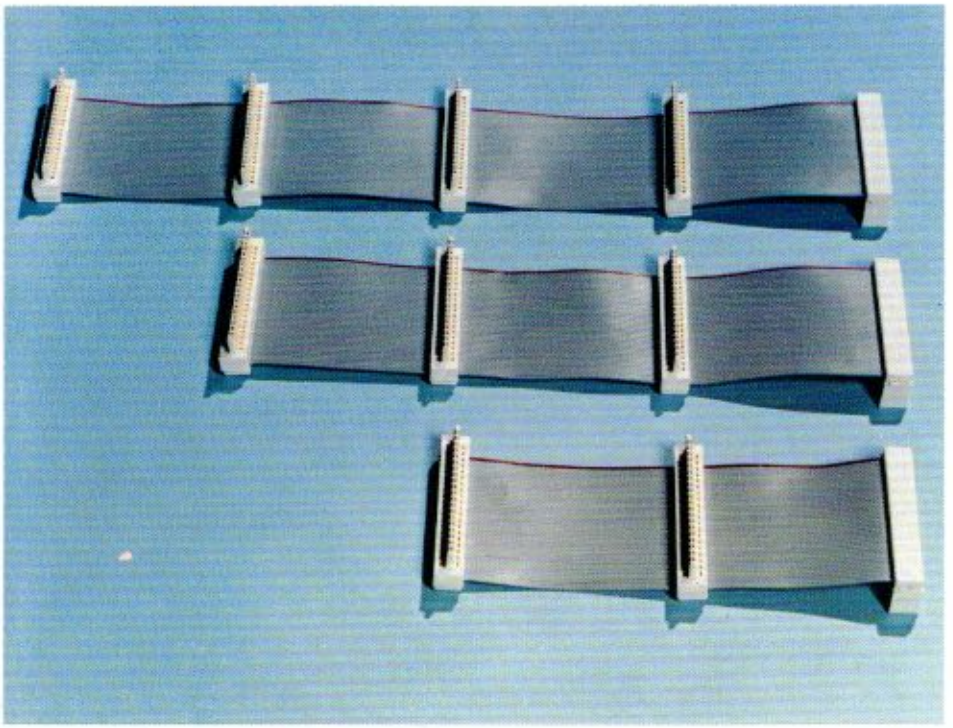
The software in every ESF adds a parity bit to every byte saved on tape, and a checksum to the end of every file. These are checked both after recording data and upon replay, any detected error is indicated by a message on the video display. This system of automatic error checking gives confidence in 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 @SAVEn, where n 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 @LOADn, as with @SAVE 1 through 99 can be specified for n. As might be guessed the @LOADn 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: @#3LOADn).

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

- 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

WHAT'S THE CATCH?

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.

800-538-8559

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