

A PERCOM BULLETIN

Adapter for disk controller eliminates read errors

Garland, Texas — November 29, 1979 — Harold Mauch, president of Percom Data Company, announced here today that the company is now manufacturing a simple plug-in adapter for the TRS-80* and SWTP MF-68 mini-disk controllers which corrects a design deficiency that causes data read errors.

Mauch said the Tandy and SWTP MF-68 controllers rely on an internal circuit of the principal controller IC chip to accomplish the data-clock separation function, a practice which the chip manufacturer warns is *not* recommended for high data recovery reliability.

As explained in the accompanying *Background*, the problem of inadequate data-clock separation is most severe on inner disk tracks where bit density is higher, and, therefore, where data separation during playback would be more critical.

The Percom adapter, called the SEPARATOR™, solves the problem with an explicit clock-data separation circuit that has been used in Percom mini-disk controllers since

1977, and that has been proven to be totally reliable.

The SEPARATOR™, which essentially substitutes its own separator circuit for the controller separator, is installed without modifying the host system. The user merely removes the FD1771 disk controller IC from the host controller, installs the IC in the DIP socket on the SEPARATOR™ card, and then plugs the card into the vacated FD1771 socket of the host controller. (Opening the TRS-80* Expansion Interface, as required to install the SEPARATOR™, may void the Tandy 90-day limited warranty.)

The SEPARATOR™ costs \$29.95, assembled and tested. Installation instructions included.

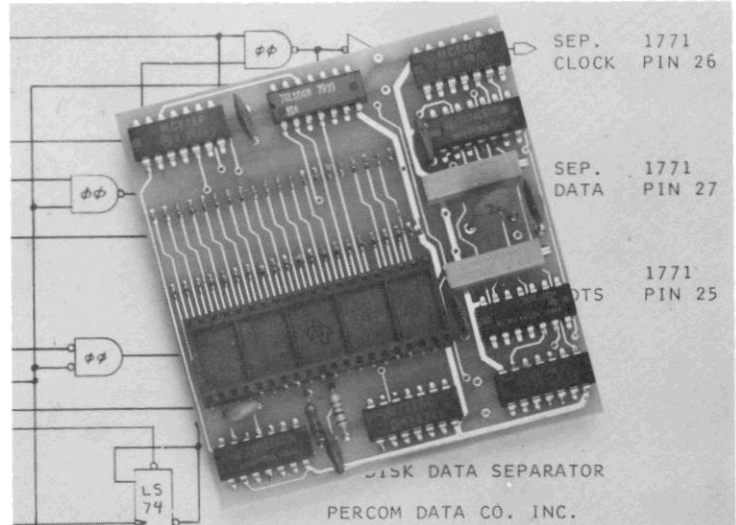
The SEPARATOR™ may be ordered by mail or by calling Percom toll-free at 1-800-527-1592. Payment may be made by certified check, cashier's check or money order, or charged to a VISA or Master Charge account. Texas residents must add 5% sales tax.

TRSDOS* 2.1 Also Source of Disk Problems.

If you're using TRSDOS* 2.1, the Percom SEPARATOR™ will not solve all of your disk storage problems. Although later versions of TRSDOS* have been corrected, TRSDOS* 2.1 has many software bugs which cause disk problems. The serious problems — that we are aware of — may be solved with a Percom program patch, called PATCHPAK™, which deglitches TRSDOS* 2.1. PATCHPAK™ also allows you to use the extra storage capacity of Percom 40- and 77-track drives with all versions of TRSDOS*.

Better yet, we recommend switching to Apparatus's new DOS+ or Percom MICRODOS™, both of which are immensely superior to TRSDOS*. A special feature of MICRODOS™ takes advantage of the faster access time and extra storage capacity available on the Percom disk drives.

PATCHPAK™, new DOS+ and MICRODOS™ are all available from Percom, and may be purchased by calling the Percom toll-free order number, 1-800-527-1592. Prices are as follows: PATCHPAK™ — \$10.00; new DOS+ — \$99.95; MICRODOS™ — \$29.95. These programs are supplied on minidiskette along with instruction manuals.



Percom PCB adapter fixes TRS-80*, SWTP MF-68 controller problem

BACKGROUND

CRC error! Track locked out!

by the Technical Staff
PERCOM DATA COMPANY

This project started while we were studying an annoying problem with the TRS-80* computer. All disk drives sold by Percom are realigned and tested before shipment. We noticed, however, a small percentage of disk drives would pass our inspection but just would not work reliably with the TRS-80* on the inner tracks. We then connected one of the troublesome drives to the SWTP mini-disk controller. Lo and behold! The very same problem as the TRS-80*. These drives were within the manufacturer's specifications, and would function perfectly on other disk systems Percom manufactures — "perfectly" meaning more than 50 million bytes read without error!

The disk read data separation arrangement in the TRS-80* Expansion Interface uses the internal data separator in the FD1771 IC disk Formatter/Controller which is a part of the Expansion Interface. The SWTP mini-disk controller also uses the FD1771 for clock-data separation. Use of the 1771 internal data separator is

not recommended by the 1771 manufacturer! The following note appears on page 17 of Western Digital's FD1771 data sheet:

Internal data separation may work for some applications. However, for applications requiring high data recovery reliability, WDC recommends external data separation be used.

We suspected the data separator because the problem was most severe on the inner tracks where the storage density is highest and where data separation is most critical.

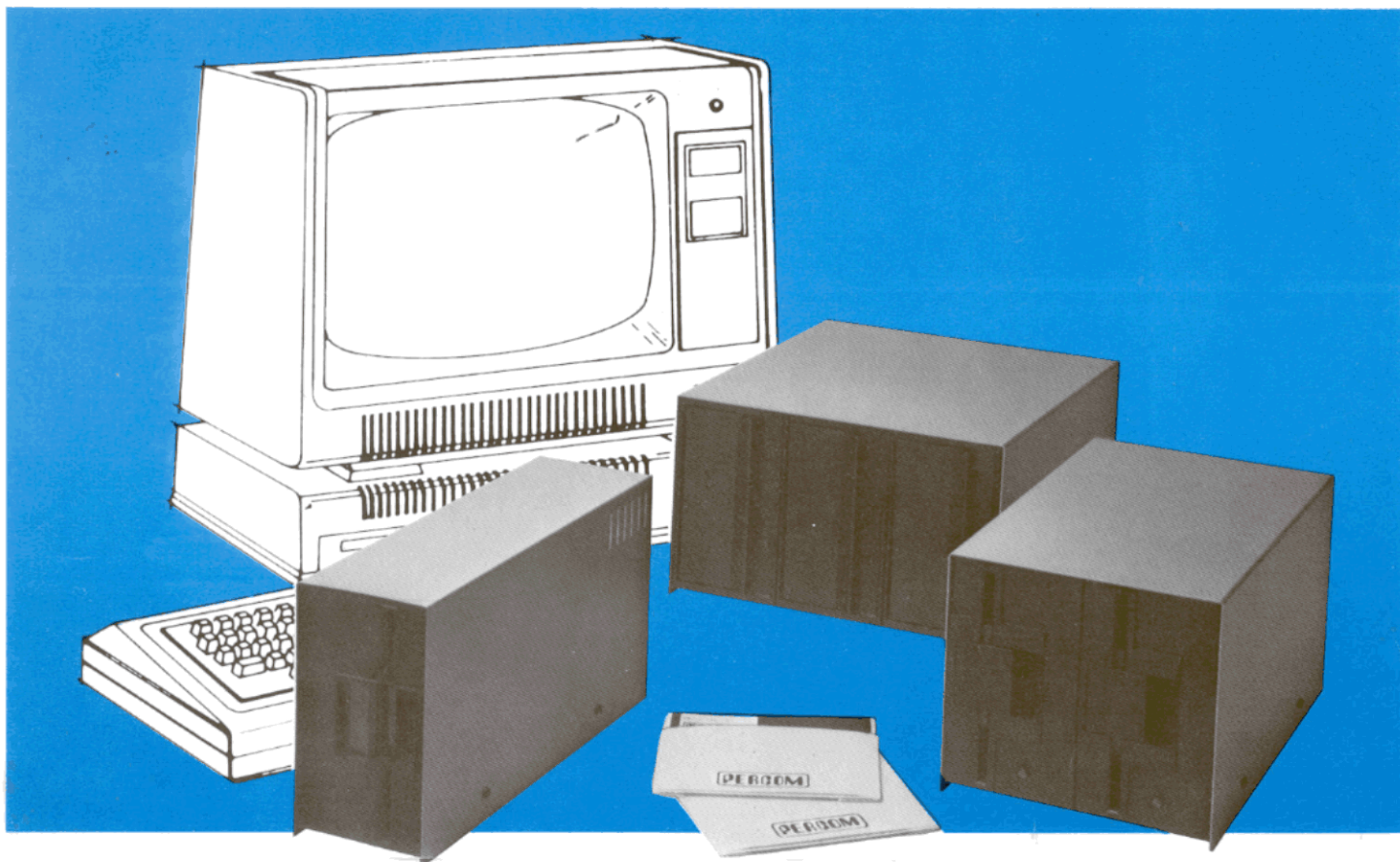
To prove the point, one of our technicians breadboarded a data separator circuit, which was configured to plug directly into the 1771 IC socket of the TRS-80* and SWTP controllers.

When connected to the TRS-80*, the troublesome drive functioned perfectly! We then connected the breadboard to the SWTP controller and again the drive worked perfectly. We ran a BACKUP utility many times and never got a track lockout. Before we added the external data separator circuit this same drive would always lock out tracks and would have difficulty reading data from the inner (high numbered) tracks.

Type of drive is unimportant

The Percom SEPARATOR™ corrects a design shortcoming of the TRS-80* and SWTP MF-68 mini-disk control-

lers. The type of drives being used is irrelevant; the SEPARATOR™ eliminates read errors resulting from the inability of these controllers to reliably separate clock and data signals when reading inner disk tracks.



Low Cost Add-On Storage for Your TRS-80*. In the Size You Want.

Six Mini-Disk Storage Systems — 102K Bytes to 591K Bytes of Additional On-Line Storage

- Choose either 40-track TFD-100™ drives or 77-track TFD-200™ drives.
- One-, two- and three-drive systems — off the shelf.
- PATCH PAK #1™ included (on disk) at no extra charge. PATCH PAK #1™ de-glitches and upgrades TRSDOS* for 40- and 77-track operation.
- Optional MICRODOS™ operating system works entirely with Level II BASIC commands — only \$29.95
- Access time is fastest possible with your TRS-80* Expansion Interface.
- TFD-100™ drives: Store 205K bytes per disk.
- Drive enclosure finish is silver enamel.

From a one-drive TFD-100™ to a three-drive TFD-200™, you get more data and program storage capacity for less money from Percom.

A TFD-100™, for example, can store 102.4K bytes of formatted data on each disk surface.

A TFD-200™ drive provides 197K bytes on line. With a three-drive system, you can access well over a half million bytes.

So choose the exact system you need. Confidently. Because it will carry the Percom name.

continued



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211 N. KIRBY GARLAND, TEXAS 75042

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PERCOM™ 'peripherals for personal computing'

PATCH PAK #1™

PATCH PAK 1™, which is supplied free (on disk) with the purchase of a drive, both extends TRSDOS* — to accommodate 40- and 77-track drives — and improves it. With the patch applied, the problem of interference with disk operations caused by the TRS-80* "Heartbeat" pulse is eliminated. And with PATCH PAK 1™, most of the so-called "silent deaths" — premature stopping of the drive motor during operation — are also eliminated. If silent death failures do occur, you can recover without hitting Reset, and therefore without destroying programs and data in memory.

PATCH PAK 1™ is applied to your system disk (containing TRSDOS* version 2.1) "on the fly" using two drives, one containing your system disk and the other containing the PATCH PAK 1™ disk. Application instructions are included.

SYSTEM REQUIREMENTS

The TFD-100™ and TFD-200™ drive systems are ready to use the minute they arrive. You'll need a disk operating system such as TRSDOS* or MICRODOS™, Level II BASIC, 16K of RAM and an interconnecting cable. An interconnecting cable may be purchased from Percom if you don't already have one. If you use TRSDOS* (version 2.1) it will need to be patched as discussed above.

TFD-100™, TFD-200™ DRIVE SPECIFICATIONS†

Diskette Size	5.25 in
Data Capacity (formatted):	
TFD-100™	102.4K bytes/side
TFD-200™	197.12K bytes
Media Life (each track)	3 x 10 ⁶ passes
Error Rate:	
Recoverable	1 per 10 ⁹
Non-recoverable	1 per 10 ¹²
Data Transfer Rate	250 kbits/s
Seek Time (track-to-track)	30 ms
Operating Temperature Range	10°C to 40°C
Relative Humidity Range	20% to 80% non-condensing

†Specifications are for Siemens model 82 drive and Micropolis model 1015 Mod II drive. The specifications of other makes of TFD-100/200 drives are equal or better.

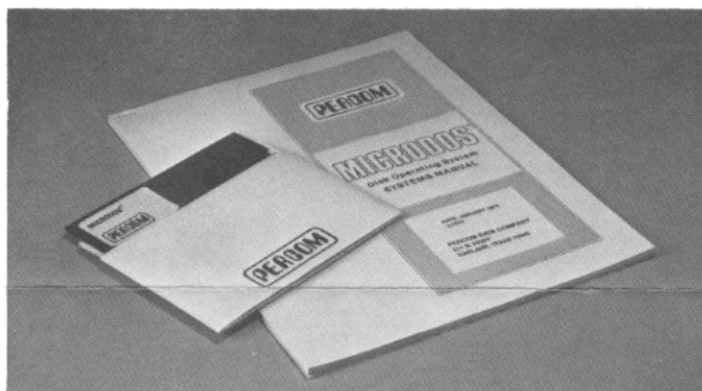
PRICES

TFD-100™ (40-track):	
Single-drive	\$399.00
Double-drive	\$795.00
Triple-drive	\$1195.00

TFD-200™ (77-track):	
Single-drive	\$675.00
Double-drive	\$1350.00
Triple-drive	\$2025.00

(The above prices include the drive system with power supply, the enclosure and PATCH PAK #1™ on diskette.)

Interconnecting Ribbon Cables:	
One drive	\$24.95
Two drives	\$29.95
Three drives	\$34.95
Four drives	\$39.95
MICRODOS™ operating system	\$29.95



MICRODOS™ — A BASIC Language DOS for Your TRS-80*

Developed especially for business and professional applications that use Percom's TFD mini-disk drive systems for storage, MICRODOS™ is both faster and more powerful than TRSDOS*, which it replaces, yet resides in less than 7K bytes of RAM.

MICRODOS™ is supplied on a system diskette that includes three self-teaching BASIC programs: (1) a file management program, (2) a program which illustrates how disk utilities may be written with only a few BASIC statements, and (3) a sample application program entitled "The Percom 5¼ Inch Notebook," a disk-based "notebook" of information about MICRODOS™ disk BASIC statements. The "notebook" may be easily accessed or changed by the user. A menu of system disk programs is activated by power-up or reset.

MICRODOS™ permits the use of hexadecimal constants in expressions, and the user may add up to 10 of his own special functions to existing functions. The MICRODOS™ system diskette sells for only \$29.95, and is included free with the purchase of a TFD-1000™ unit.

Prices are subject to change without notice.

For even greater storage capacity. . .



The TFD-1000™ — 800K Bytes On-Line

- Use either one TFD-1000™ (two drives) or two TFD-1000™ units (four drives) with your TRS-80*. Two TFD-1000™ units provide 1.6M bytes on-line.
- Supplied complete with MICRODOS™ operating system, Peripheral Adapter Module PC card, interconnect cable and support documentation.
- MICRODOS™ is coherent with Level II BASIC, provides full random access capability, is faster than the Radio Shack operating system and requires less than 7K RAM.

• Low price: **\$2495.00**

Collateral Products

Diskettes:

40- & 77-track (two-sided): \$4.50 ea.
10 in organizer box: **\$44.95.**

Power line filter

(115/250 V, 50 — 400 Hz)**\$19.95**

TM trademark of Percom Data Company, Inc.
*trademark of Tandy Corporation and Radio Shack which has
no relationship to Percom Data Company.

Prices are subject to change without notice.

continued

Product Development Queue

Printer Interface Connect any serial RS-232-C printer to your TRS-80*. Available: August 1979 — **\$59.95.**

The Electric Crayon™ This color graphics system includes its own μ P and works with virtually any microcomputer that has a parallel I/O port. Display animation graphics, charts, tables, text, etc., on your color TV. Available: August 1979 — **\$184.95.**

To order products or request additional literature, call toll-free

1-800-527-1592,

or see your nearest Percom dealer. For detail technical information call (214) 272-3421.

Orders may be paid by check or money order, COD or charged to Visa or Master Charge accounts. Texas residents must add 5% sales tax. Prices are subject to change without notice.

PERCOM™ *'peripherals for personal computing'*



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211 N. KIRBY GARLAND, TEXAS 75042
(214) 272-3421

TERM80 - A Terminal Simulator for the TRS-80 (tm)

TERM80 is a special program designed to turn your TRS-80 into a full duplex ASCII terminal. It is written in LEVEL II BASIC and loads a machine-language program for terminal operation. Some of the important features of TERM80 are as follows:

- * All RS-232 options are set through the keyboard rather than the switches.
- * Terminal characteristics may be changed/checked at any time, even while on-line!
- * Terminal operation is true full duplex - keys may be struck while characters are being received with no character loss.
- * Terminal operation is both upper and lower case, with shift lock key. If the TRS-80 has been modified for lower case display, the CRT display driver is modified automatically.
- * All ASCII characters may be transmitted. Any key held down more than 1.5 seconds will automatically repeat. The BREAK key performs a true break function.
- * Received data may optionally be echoed to the printer. This option may be turned on and off at the keyboard while data is being received.
- * Provision is made for optional handshake to insure no character loss when operating above 1200 baud. This feature is unique to TERM80.

TERM80 is supplied on disk for only \$24.95. Turn your TRS-80 (tm) into a terminal today!

Disk Operating and File Management System for 6800 Microcomputers . . .

INDEX

only
\$99.95

An advanced, easy-to-use disk operating program for 6800 microcomputers, INDEX™ (INterrupt Driven EXecutive) features:

- **Fast execution** — I/O devices are serviced by interrupt request. Eliminates polling time.
- **System savings** — INDEX™ and user-added commands and routines are disk-resident. No need to add memory for program enhancement.
- **Adaptability** — I/O devices and peripherals are accessed the same as disk files. New devices may be added without changing the operating system.
- **Efficient** — INDEX™ lists or displays only those files at or above user-specified file activity level.
- **Versatility** — An unlimited number of DOS commands may be added. Over 60 system entry points for program linkage provided.

Versions of INDEX™ are available for the PERCOM LFD-400™, SWTP MF-68 and Smoke Signal Broadcasting Company's BFD-68 disk systems, and for Motorola's EXORciser™ development system.

INDEX™ handles both ASCII and binary files, and disk files are automatically created, allocated and de-allocated.

Files are referenced by names — of up to eight characters — and file name parameters are added for name extension (to further define the file), drive number, directory level and a file protection flag.

The INDEX™ operating system software also features a versatile BACKUP routine for copying files onto a diskette.

Console Interface Software

The console interface segment of INDEX™ software supports any standard serial ASCII terminal, and features:

- Program Interrupt (vs. Reset) for runaway programs.
- Operator Start, Stop and Skip display control.
- An interrupt-serviced, type-ahead character-queue buffer.
- A secondary line editing queue buffer.

continued



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INDEX™ Commands

Commands are given to INDEX™ a line at a time. Processing begins when the Return key is struck. The type-ahead character-queue buffer allows the operator to input a command while the previous command is being executed. A character may be deleted and corrected with the Backspace (Control H) key, and a line may be cancelled with the Rub-Out key.

COMMAND*	COMMENT
BACKUP	Used to make file back-up copies by copying files on diskettes. May copy only selected files or all files. Command also reorganizes fragmented files.
CONVERT	Converts files to binary code to save diskette space, decrease load time.
COPY	Used to transfer data from one file or I/O device to another file or device.
COUNT	A utility used to count the number of characters in a file (ASCII).
DATE	Used to change the current date on a file.

DELETE	Deletes a file. Fails if file is protected.
DIRectory	Lists the directory of a diskette on the console. Operator specifies level to which directories are listed.
DISKEDIT	Used to examine and modify files at the sector level.
DISKINIT	Used to initialize a diskette.
EXAMINE	Used to examine text file (ASCII) for control characters.
FILL	Sets the number of fill characters sent to the console after a Line Feed or Form Feed.
HELP	Displays instructions for using commands.
RENAME	Used to rename a file, change the protection flag or change the directory level.
SAVE	Saves a program in memory on disk. Saves as many blocks as desired.

SETSTART	Used to set the starting (transfer) address of an executable file.
SET-VERSION	Used to change the version number of a file.
SYSDISK	Used to set the disk drive number which is used as the default number for the DOS commands.
TYPE	Transfers data from a file or I/O to the console.
USERDISK	Sets the drive number which is used as the default number for file names other than commands.

*Any number of additional commands may be added by the user.

System Requirements

System requirements are as follows:

1. 8K RAM at address \$A000 — \$BFFF
2. Minimum of 8K RAM beginning at address \$0000
3. ACIA console interface (SWTP MP-C interface)
4. SWTBUG™ or equivalent monitor

How to Get Your INDEX™ Software

INDEX™ is supplied on two mini-diskettes together with a Users Manual for \$99.95, and may be ordered from PERCOM by dialing, toll-free, 1-800-527-1592. In addition to checks and money orders, Visa and Master Charge credit cards are honored. Texas residents add 5% for sales tax.

INDEX is a trademark of PERCOM Data Company.
LFD-400 is a trademark of PERCOM Data Company.
EXORciser is a trademark of the Motorola Corporation.
SWTBUG is a trademark of Southwest Technical Products.

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the
PERCOM
PILON-30™

***At Last . . . a Data Cassette for Home Computing with
Digital Cassette Features at an Audio Cassette Price***

Now, for only \$2.49 you can get orders-of-magnitude improvement in the data integrity of your home computing cassettes. By eliminating shortcomings inherent in the design and manufacture of mass-produced audio cassettes, and by selectively incorporating features normally found only in \$7 and \$8 digital cassettes, PerCom has developed a superior cassette for home computerists. One that doesn't cost you an arm and a leg. We call it the Pilon-30™.

a better pressure pad

Principal among the design innovations of the Pilon-30™ is an oversize pylon-coated pressure pad. What does this seemingly inconsequential improvement buy you? A lot.

With the oversize pad you get more uniform tape-to-head contact and better tape guidance than with smaller pads. You also get fewer "drop out" errors because the lint-producing felt pad of ordinary audio cassettes is replaced with a lint-free pylon-coated pressure pad. And, because the tape slides smoothly across the pylon coating, you get little or no high frequency flutter (which is deadly to data reliability) as is sometimes caused by the "release, stick, release again" kinetics of fiber pad cassettes.

a better pad spring

Another cause of high-frequency flutter in standard audio cassettes has been circumvented in the Pilon-30™ design. In most audio cassettes, the pressure pad is mounted on a leaf suspension spring that can be excited into flutter-producing oscillations if the tape drags across the pad. In the Pilon-30™ cassette, however, the leaf spring is replaced with an energy absorbing foam spring which quickly snuffs out flutter-causing vibrations.

quality tape

Flaws in the magnetic coating of cassette tapes are also a major source of drop out errors. The tape used in the Pilon-30™ was selected only after exhaustively studying tape formulations and contamination control procedures of manufacturers of high-performance polyester-based audio tapes. The Pilon-30™ tape is low noise, low drop out and splice free.

distortion-free assembly

The Pilon-30™ is assembled in a five-screw housing, which virtually precludes deformation during assembly. The deformation that sometimes occurs during the thermo-compression assembly of mass-produced audio cassettes is not tolerable in data applications.

another consideration

The Pilon-30™ cassette was developed by Harold Mauch, president of PerCom Data Company. A pioneer designer and manufacturer of products for the personal computing market, and one of two principals whose experimental work led to establishment of the recording technique known as the KC (Kansas City) or Byte Standard. There are probably few if any persons better qualified to develop a cassette that meets the special requirements of the home computerist.



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FEATURES: PILON-30[®] CASSETTE

- * Developed specifically to meet the needs of home computing users.
- * Incorporates selected features found only in high-priced digital cassettes.
- * Provides orders-of-magnitude improvement in data integrity over ordinary audio cassettes.
- * Oversize pilon-coated pressure pad replaces fiber pad of standard audio cassettes.
- * Lint-free pilon-coated pressure pad excludes source of fiber lint, a major cause of "drop out" error of audio cassettes.
- * Low friction between tape and pilon coating of pressure pad assures smooth motion of tape. Erratic tape motion sometimes causes high-frequency flutter.
- * Energy absorbing foam spring of Pilon-30[™] pad minimizes the possibility of flutter-causing oscillations as are sometimes induced by tape movement across the spring-mounted pads used in ordinary audio cassettes.
- * Five-screw case virtually precludes deformation of case during assembly.
- * Tape manufacturer selected only after exhaustively studying coating formulations and contamination control procedures of suppliers of quality audio tapes.
- * Developed by Harold Mauch, president of PerCom and pioneer designer and manufacturer of products for the personal computing market.

SPECIFICATIONS: PILON-30[®] CASSETTE

Pressure pad: lint-free, low friction, pilon-coated. Extra large.

Pressure pad spring: energy absorbing foam.

Tape: High performance, low noise, low drop out and splice-free. Polyester base resists stretching and breakage.

Case: Five-screw format, plastic, white.

Mechanical construction: Nickle-alloy hum pickup shield, stainless steel pins, double-flanged idler rollers, graphite coated slip sheets.

Data Capacity: C-30 (150-foot length) stores over 50,000 bytes of 30-byte per second data or over 200,000 bytes of 120-byte per second data.

Phone: (214) 272-3421



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From Percom . . .

Low Cost Mini-Disk Data Storage for EXORciser Bus Computers

- Compatible with EXORciser* and other 6800/6809 computers based on EXORciser* bus concept.
- 40- or 77-track drives in one-, two- and three-drive configurations add 102K bytes to 591K bytes of random access data on-line.
- 40-track LFD-400EX™ drives store data on both surfaces of mini-diskettes — almost 205K bytes per disk.
- EXORciser* bus compatible controller includes 1K of RAM, provision for 3K of PROM. Mature design features explicit clock-data separator, drive motor inactivity time-out function, and more.
- Support software includes disk operating systems, a file manager, text editor, assembly language program development/debugging aids, an extended BASIC interpreter, an SPL/M compiler and business programs. Numerous programs available from other suppliers may be used with LFD-400/800EX mini-disk systems with little or no modification. Watch for FORTRAN & Pascal announcements.

Low cost Percom LFD-400/800EX mini-disk data storage systems are a fast, dependable alternative to tape storage for 6800/6809 EXORciser* bus computers. A single 40-track LFD-400EX™ drive adds 102K bytes of formatted on-line storage; a single 77-track LFD-800EX™ drive adds almost 200K bytes. And data may be stored and read from either surface of LFD-400EX™ minidiskettes.

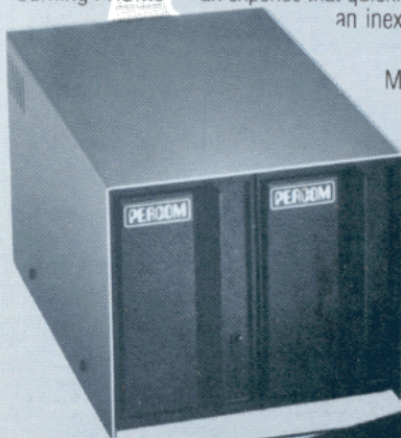
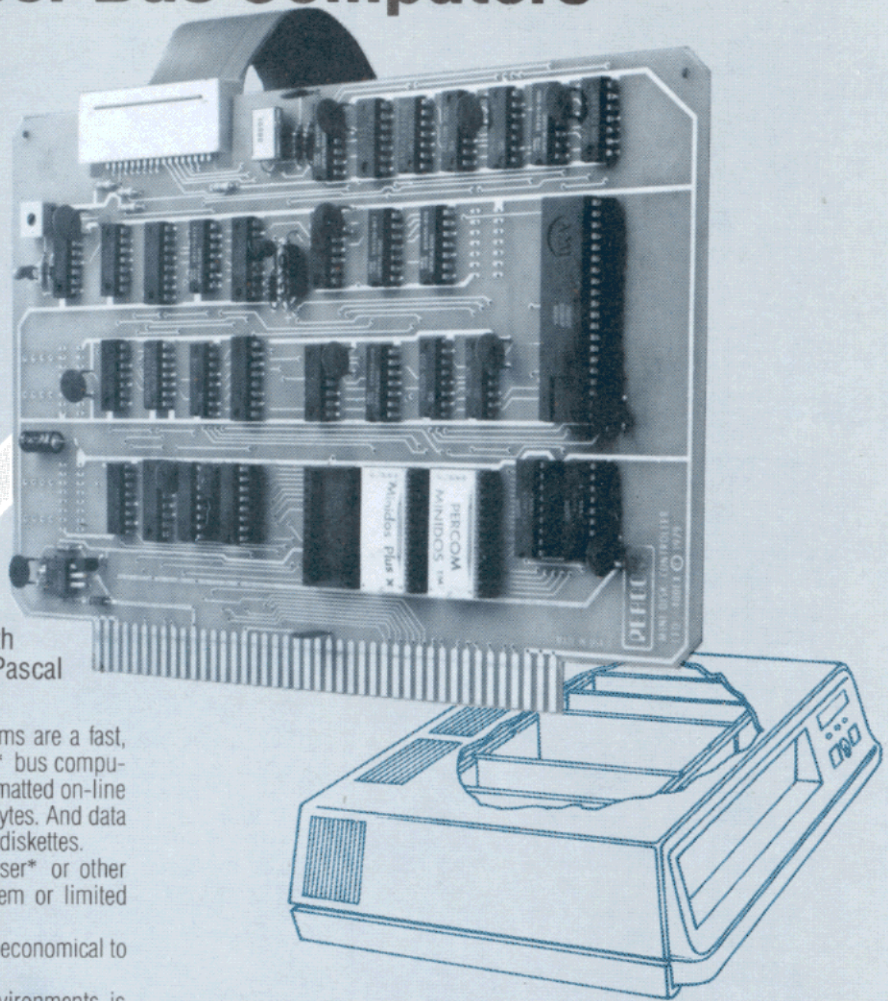
Fast mini-disk data storage makes your Motorola EXORciser* or other EXORciser* bus computer more than just a development system or limited evaluation system.

For example, at the low LFD-400/800EX prices it becomes economical to use your development system as the final working system.

Data capture/retrieval in research, test and production environments is another application where versatile, random-access LFD-400/800EX storage can provide efficient operation.

Equipment control is yet another area where the speed and facility of mini-disk storage greatly expands application possibilities. Even if you use a mini-disk only to load and control programs you'll save simply by taking a lot less time than with slow, inconvenient tape storage. Moreover, by storing programs on fast-loading, low cost minidiskettes you eliminate the overhead of burning PROMs — an expense that quickly adds up to far more than the price of an inexpensive Percom mini-disk system.

The bottom line? An EXORciser* or Micromodule*, with percom LFD-400/800EX mini-disk data storage, is a remarkably adaptable microcomputer — a system that meets the quality and dependability demands of industry yet is competitively priced with personal computing systems.



PRICES

Model	1-drive system	2-drive system	3-drive system
LFD-400EX™	\$649.95	\$1049.95	\$1449.95
LFD-800EX™	\$945.95	\$1599.95	\$2245.95

MPX Disk Operating System (2-chip ROM set)

Standard versions for most popular monitors \$69.95

LFD-400/800EX Users Instruction Manual:

Includes driver utility listings, controller schematic \$15.00

The system prices are single-quantity prices. A system includes (1) the drives, power supplies and enclosure, (2) the EXORciser* bus compatible controller PC card with 1K RAM and provision for three 2708 EPROMs, (3) an interconnecting cable, (4) an 80-page users instruction manual, and (5) a system minidiskette. The Percom Software Services Group will customize the MPX DOS for a nominal charge if one of the standard versions is not suitable for your monitor. LFD-400EX™ systems use 40-track drives; store 102K bytes of formatted data per minidiskette side. LFD-800EX™ systems use 77-track drives; store almost 200K bytes on one side of minidiskette.

Orders may be placed by dialing 1-800-527-1592 (outside of Texas) or (214) 272-3421 (in Texas). For additional technical information dial (214) 272-3421.

PERCOM DATA COMPANY, INC.
211 N. KIRBY GARLAND, TEXAS 75042
(214) 272-3421

PERCOM

Percom LFD-400/800EX Mini-Disk Data Storage Systems

The LFD-400EX™ and LFD-800EX™ are low-cost mini-disk data storage systems for 6800/6809 EXORciser* bus computers. The LFD-400/800EX systems are also compatible with other 6800/6809 computers based on the EXORciser* bus concept such as Motorola Micromodule* systems and D1, D2 and MicroChroma* evaluation systems. LFD-400/800EX systems may also be used with 6800/6809 EXORciser* bus modules manufactured by Percom, Creative Micro Systems, Synertek, Rockwell and others.

The LFD-400EX™ uses 40-track drives; the LFD-800EX™ uses 77-track drives. Systems of either drive type are available in 1-, 2- and 3-drive configurations. Usable on-line storage capacity ranges from 102K bytes to 306K bytes for LFD-400EX™ systems and 197K bytes to 591K bytes for LFD-800EX™ systems. Both sides of LFD-400EX™ minidiskettes may be used for data storage.

The Percom LFD-400™ mini-disk data storage systems have been in manufacture since the Fall of 1977 and have a proven reliability record based on thousands of applications. The LFD-400/800EX systems are the extended OEM versions of the popular LFD-400/800 systems.

the Controller

The LFD-400/800EX controller PC card plugs into the 86-pin EXORciser* bus. The same controller is used for both the LFD-400EX™ and the LFD-800EX™. This single-density mini-disk controller accommodates up to four single- or dual-headed drives. Although designed for hard-sectored disks, the controller is equally capable of reading soft-sectored disks.

Features of the controller include:

- Provision for three 2708 EPROMs on board
- 1K of RAM on board
- Explicit clock-data separator circuitry to eliminate a type of read error that plagues controllers using the internal data separator of the primary controller chip.
- An inactivity time-out circuit to prolong drive motor life
- Buffered outputs and other similar reliability design considerations
- Industrial quality construction: FR4-G10 epoxy-glass substrate with two ounce copper printed wiring and re-flowed tin-lead plating

the Drives

Either Pertec or Siemens drives are used for LFD-400EX™ systems, and Micropolis drives are used for LFD-800EX™ systems. The models used are dependable field-proved designs. Furthermore, every drive is tested and double checked for alignment before leaving Percom.

The 40-track Pertec and Siemens drives allow data to be stored on both sides of a disk. Only one side of a disk may be used for storage on the 77-track LFD-800EX™ minidiskettes although nearly twice the capacity (197K bytes) of one side of a 40-track disk (102K bytes) is available.

The drive enclosures, which are configured to accommodate either one-, two- or three drives along with individual drive power supplies, are finished in color-fast polyurethane enamel. Standard colors are silver and blue. Other colors are optionally available.

The drive power supplies are cool-running open-frame design of more than ample capacity. Input power is 105-125 vac, 50-60 Hz, 0.5 ampere, maximum. Options: 210-250 vac, 50-60 Hz, 0.25 ampere input units available.

the Software

Software support for LFD-400/800EX mini-disk storage systems is both extensive and varied. In addition to Percom's own library of professionally written 6800/6809 disk programs, the programs of other 6800/6809 software suppliers may be used with little or no change. Programs presently available from Percom are listed below. In addition, FORTRAN and Pascal compilers are being readied.

Operating Systems/File Manager

MPX — Two-chip ROM set installs in controller EPROM sockets. MPX features named-file manipulation, unlimited extensibility via disk-resident (transient) commands, callable subroutines and more. Assembly source listing provided. Versions available for popular ROM monitors.† \$69.95

DFM — A supplemental Disk File Manager for MPX. Permits programs to be easily linked to MPX operating system. DFM ROM plugs into controller 2708 EPROM socket. Assembly source listing provided. — \$39.95.

INDEX™ — Highly sophisticated DOS is interrupt driven, I/O device independent, dynamically allocated. Very fast because console and other I/O devices are serviced by interrupts instead of polling. Supports unlimited number of DOS commands. Over 60 system entry points. Requires 16K bytes of RAM — 8K dedicated exclusively to INDEX™. On minidiskettes with user manuals. — \$149.95.

System Software

Super BASIC — 12K-byte extended disk BASIC. Supports 44 commands, 31 functions. Accommodates user reconfiguration of many initialization parameters. Reports 40 types of programming errors. Features 9-digit BCD arithmetic for business programs — direct random access to disk file data — PRINT USING command for report formatting — LINPUT command for entry of text line into a single string variable — named disk file processing using MPX operating system. Super BASIC minidiskette and users manual — \$79.95.

SPL/M — Small Programming Language for Microprocessors based on Intel PL/M language. Requires only 20K of RAM. Features arbitrary length identifiers, structured programming constructs. SPL/M is a true compiler requiring no run-time interpreter, and extensive intrastatement optimization generates code that is almost as efficient as the equivalent assembly language. Compile-time options include a printout containing interlisted object code. SPL/M minidiskette and users manual — \$99.95.

Text Editor — Used to create and edit programs, data files and other alphanumeric text. Commands include String Search and Change, Insert, Delete, Move, Copy, List and more. Text Editor minidiskette and users manual — \$49.95.

Program Development/Debugging Aids

6800 Symbolic Assembler — Specify assembly options at time of assembly. Source listing included on program minidiskette. Price includes disk and manual — \$49.95.

The following 6300 mini-disk programs — developed by Smith Software Works Company and available from Percom — work with LFD-400/800 EX systems without modifications.

Disassembler/Source Generator — Produces source code for re-editing and assembly with the user's assembler. On minidiskette — \$30.95.

Relocating Assembler & Linking Loader — Produces relocatable object code. Features alphabetized cross reference listing, global and local labels, and more. In relocatable formatted code on minidiskette. — \$55.95.

Relocating Disassembler/Segmented Source Text Generator — Produces compacted code for re-editing and assembly using the Relocating Assembler & Linking Loader. Output may be listed, printed or stored. In relocatable formatted code on minidiskette. Assembly listing included. — \$40.95.

Disassembler/Trace — Debugging program used to examine — or examine and execute — any area of memory with full operator control. Trace displays CPU status before and after execution of each instruction. CPU or memory may be changed at any time. On minidiskette. — \$25.95.

Relocator — Relocates a program from any contiguous area of memory — RAM, ROM, EPROM, etc. — to anywhere in RAM. Moves programs without any adjustments. Can relocate itself. On minidiskette. — \$25.95.

Business Programs

General Ledger — Updates account balances immediately (in real time); prints financial statements immediately after journal entries. User assigns account numbers, tailors financial statements as needed. Provides audit trail. Ample prompts during data entry allows use with little or no bookkeeping experience. Runs under Super BASIC. Requires 24K bytes of RAM. General Ledger minidiskette and users manual — \$249.95.

Finder™ — General purpose data base manager written in Super BASIC. Allows user to define and access records using his terminology. File structures may be customized to specific needs. Commands: New, Change, Delete, Find and Pack. Add up to three user-defined commands. Requires 24K bytes of RAM. FINDER™ minidiskette and users manual — \$149.95.

List Processor — Powerful Create, Update, Search and Sort commands plus ability to store up to 700 addresses per minidiskette make this program easy to use, efficient. Runs under Percom Super BASIC. Requires 24K bytes of RAM. List Processor minidiskette and users manual — \$149.95.

† In addition to standard versions for most common monitors, Percom's Software Service Group will customize programs to user's requirements. Call for information.

SYSTEM REQUIREMENTS

The LFD-400/800EX controller occupies a 4K block of the computer's memory extending from C000 through CFFF (hex values). Additional RAM for the INDEX™ DOS, for INDEX™ and MPX transient commands and for disk parameters must also be available. For proper operation of the LFD-400/800 EX mini-disk system, the processor clock frequency must be between 890 kHz and 1.1 MHz. The correct version of the MPX operating system must be specified when ordering. (MPX communicates with the data terminal ROM monitor — EXbug,* MiKbug,* etc. — by calling I/O subroutines, and these differ from monitor to monitor.) When ordering software, be sure to indicate programs are for the LFD-400/800EX systems.

* trademark of Percom Data Company, Inc.

* trademark of Motorola Corporation