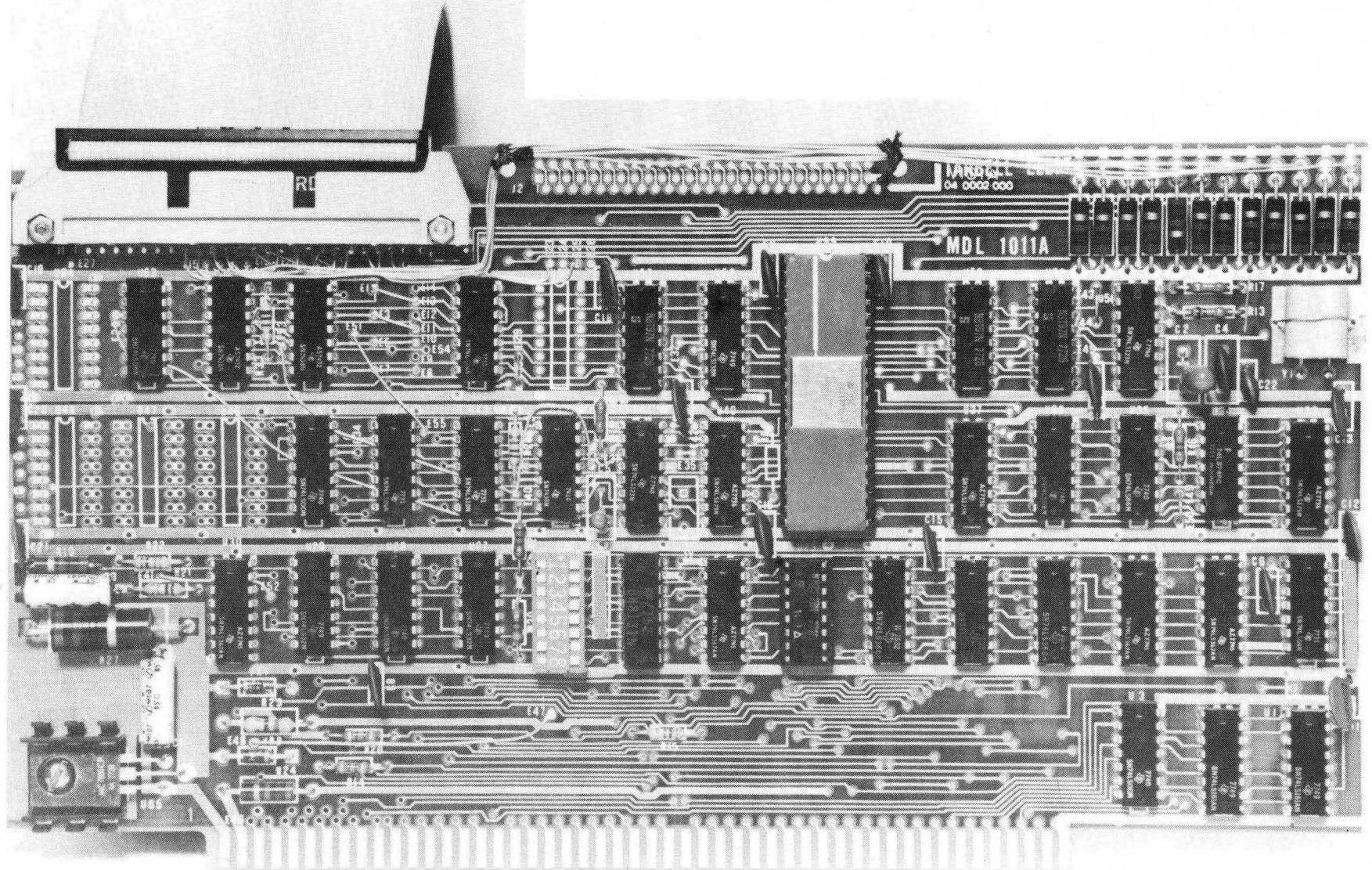




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## THE TARBELL FLOPPY DISK INTERFACE



The Tarbell Floppy Disk Interface is a programmed-data-transfer (not DMA) device. It plugs into your IMSAI or ALTAIR\* computer, and is designed to work with a variety of standard-size floppy disk drives. It includes a 32-byte ROM bootstrap program, which is automatically enabled when the computer RESET button is pushed, and which switches itself out after the bootstrap has run. In this way, no part of your memory needs to be dedicated to Read-Only-Memory (ROM). The interface runs at the standard speed of 250,000 bits per second, and the normal formatted capacity per diskette is 256 kilobytes. Places for two connectors are provided on the board. One 50-pin header connector and a cable with the mating connector are provided with the interface kit. The drive end of the cable has no connector, but a 50-pin edge connector may be added for \$10.00. There are four extra IC slots to allow you to do your own thing, and the connector pins come out to jumper pads, so you can adapt to different drives. The manual has the connections detailed for popular drives. An on-board dip-switch is used to select the device address, disable the bootstrap, and write-protect. Circuitry is included to run up to four drives, and eight can be accessed by using the spare IC slots.

The Tarbell Floppy Disk Interface and other related items can be bought in pieces, so that it's not necessary to make a single large outlay of cash. Because of this policy, the 6-month warranty will be limited to only those items traceable to Tarbell Electronics. Notice that we are offering the CP/M floppy disk operating system, which is described on another page. An owner's manual for the interface is included with the kit or the bare board, and is also available separately.

|                                     |         |
|-------------------------------------|---------|
| Floppy Disk Interface Kit           | 190.00  |
| CP/M Operating System (on disk)     | 70.00   |
| CP/M System Manual Set (6)          | 25.00   |
| BASIC-E Compiler Manual             | 5.00    |
| GSI 110 Floppy Disk Drive           | 525.00  |
| Power Supply for 1 GSI 110          | 75.00   |
| Floppy Disk Interface Manual        | 5.00    |
| Bare Floppy Disk Interface Board    | 40.00   |
| Kit with all parts except 1771      | 150.00  |
| Western Digital 1771 FDC IC         | 60.00   |
| Assembled Floppy Disk Interface     | 265.00  |
| PerSci 270 Dual Floppy Disk Drive   | 1295.00 |
| Power Supply for PerSci 270         | 125.00  |
| Blank Formatted Diskette            | 10.00   |
| BASIC-E Source Listing (PL/M)       | 15.00   |
| Additional Charge for Special Cable | 10.00   |
| Package of IC Sockets (35)          | 10.00   |
| CBASIC on disk                      | 85.00   |
| CBASIC manual                       | 15.00   |

*NOTE: These prices are subject to change without notice. There are no discounts for complete systems; just add the prices together to find the total for your purchase.*

Since Tarbell Electronics does not wish to get into the business of selling complete systems, we encourage you to buy your system, including the floppy disk drive, from your local dealer. If you add up the prices of the first six items, however, you can see that a complete floppy disk system including software and hardware can be had for less than a thousand dollars. Note that the Tarbell Floppy Disk Interface is not designed to work with double-density or mini-floppys, although it will work with multiple and double-sided drives. The drives that it has worked with so far include the Shugart 800/801, the Innovex 410, the Innovex 220 (modified by a jumper change), the GSI 110, the CDC 803, and the PerSci 270, the PerSci 70, the Wangco/Orbis 76, the Pertec 400, and the Calcomp 140. The on-board bootstrap may not work reliably with some Z-80 CPU's and some dynamic memories. Ask your local dealer about possible conflicts, as it may be necessary to use ROM on another board.

The first deliveries were made July 2, 1977. Delivery from the factory is 3-4 weeks after receiving your order, and individuals must send cash in advance. For faster delivery, check with your local dealer.

\* ALTAIR is a trademark/tradename of MITS, Inc.

## CP/M™ BY DIGITAL RESEARCH – A COMPLETE FLOPPY DISK OPERATING SYSTEM FOR THE TARBELL FLOPPY DISK INTERFACE.

The CP/M Disk operating system has been in existence for over two years in various manufacturer's products, and thus has had extensive field testing. It is now being made available to the hobby community. It is licensed software, and copying for other individuals is prohibited. We feel this is justified, as the cost, \$100, is low for such a good system.

The following commands are built in to the operating system:

|      |  |
|------|--|
| DIR  | List all or selected portions of the directory (file list) |
| TYPE | Type the contents of an ASCII file on the console          |
| REN  | Rename a file to a different name                          |
| ERA  | Erase a file or files from the disk                        |
| SAVE | Save memory on disk for later load                         |

The following programs are included on the disk, and are invoked just like commands by typing the name:

|         |   |
|---------|---|
| PIP     | Peripheral Interchange Program moves files around                               |
| SUBMIT  | Batch processing program for predefined list of commands                        |
| ED      | A really nice, string-oriented text editor                                      |
| ASM     | Assembler to convert assembly language to machine code                          |
| DDT     | Dynamic Debugging Tool for memory dumps, loads, traces                          |
| LOAD    | Convert hex file to memory image file   |
| DUMP    | Dump file in hex onto console   |
| SYSGEN  | Generates new CP/M systems for backup   |
| BASIC   | BASIC-E compiler has both sequential and random file access                     |
| RUN     | Run-time interpreter for BASIC-E programs                                       |
| STAT    | Prints the amount of disk storage still available and amount used for each file |
| CPM     | Generates different sized CP/M systems  |
| COPY    | Copies from one disk onto another, track by track                               |
| TAPELIB | Provides extensive disk-to-cassette facilities.                                 |

The following source files are included on the disk:

|        |   |
|--------|---|
| CASDSK | Transfers the named file from Tarbell cassette to disk    |
| DSKCAS | Transfers the named file from disk to Tarbell cassette    |
| SBOOT  | Cold-Start loader which is loaded by bootstrap program    |
| CBIOS  | Customer's Basic Input/Output System includes all drivers |
| FORMAT | Reformats crashed diskettes                               |
| COPY   | Assembly language source for program above                |

Tarbell Electronics provides the system modified to work with the Tarbell floppy disk interface and a simple console interface, such as a teletype. The console is addressed with port 0 for status and port 1 for data. Bit 0 of status low means keyboard ready, and bit 7 of status low means printer ready. It is set up to work in 24 kbytes. The documentation includes a listing of the BIOS, and instructions which will enable you to patch the CBIOS for your own system.

As of March 1, 1978 the CP/M User's Group had 24 diskettes full of software. It costs \$4 to get on the mailing list, and the diskettes are \$8 each.

### DOCUMENTATION:

- CP/M FEATURES AND FACILITIES MANUAL
- CP/M EDITOR, ASSEMBLER, AND DEBUGGER MANUALS
- CP/M INTERFACE GUIDE
- CP/M SYSTEM ALTERATION GUIDE
- TARBELL CP/M USER'S GUIDE

## BASIC-E Compiler Description

This compiler is a public-domain piece of software written by Gordon E. Eubanks, Jr. As provided by Tarbell Electronics, it is meant to work with the CP/M™ Disk Operating System. With the CP/M, it requires about 20K bytes of main memory. Since it is a compiler, as opposed to an interpreter, it has some advantages: 1) the program will probably run faster than with an interpreter, 2) the program will probably use less memory than with an interpreter. There are also some disadvantages: 1) it is not as easy to develop a program, because editing must be done separately, 2) it cannot be easily used with a cassette, because there are several steps that are not easily and quickly performed by a cassette unit, 3) In this version there is no PEEK or POKE, no PRINT USING, no CALL to machine code programs, and no LPRINT. These are all available in CBASIC, which costs \$100.00.

The following statements are valid in BASIC-E:

FOR, NEXT, FILE, CLOSE, GOSUB, GOTO, INPUT, LET, ON, PRINT, READ, RESTORE, RETURN, RANDOMIZE, OUT, STOP, DATA, DEF, DIM, END, IF, REM, ELSE, THEN.

The following built-in functions are valid in BASIC-E:

ABS, ASC, ATN, CHR\$, COS, COSH, FRE, INP, INT, LEFT\$, LEN, LOG, MID\$, POS, RIGHT\$, RND, SGN, SIN, SINH, STR\$, SQR, TAB, TAN, VAL, EXP.

The following logical connectives are available: AND, EQ, GE, GT, LE, LT, NE, NOT, OR, <, >, =.

There are 26 compiler error messages, and 23 run-time error messages, all of two characters each.

Disk files may be read, written or updated by the BASIC-E program using both sequential and random access. There are blocked and unblocked files. The program can select any disk available to CP/M.

Using the BASIC-E compiler consists of three main steps:

- 1) The source program is created on disk using the Editor.
- 2) The source is compiled by the compiler, which produces an intermediate file.
- 3) The intermediate file is then run by the run-time monitor.

Line numbers need only be used on statements to which control is passed, and do not have to be in ascending order. Using identifiers longer than two characters and indenting statements to enhance readability does not affect the size of the object file created by the compiler. The first 31 characters of identifiers are used by the compiler.

The 40-page manual is available for \$5.00.

The compiler and run-time monitor are included on our CP/M diskette, and are also available separately on a diskette for \$10.00.

The complete listing, which is written mostly in PL/M, is available for \$15.00.