User's Handbook to the TRS-80 MODEL II COMPUTER

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WSI WEBER SYSTEMS INCORPORATED

USER'S HANDBOOK TO THE TRS-80® MODEL II

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CHAPTER 1.
INTRODUCTION TO THE WORLD OF TRS-80

Introduction

Although TRS-80 computers are classified as small computers, they offer computing power that would have cost many thousands of dollars just a few years ago.

Large computers have been used for years for various scientific and business applications. Computers have been used to perform accounting functions, list maintenance, inventory control, production scheduling, and literally thousands of other applications.

A computer can be programmed to repeat the same task again and again. The computer can store and retrieve large amounts of data, it can communicate with humans, and most importantly, it can perform logical operations on and evaluate the information given to it.

History of the TRS-80
TRS-80 Model I

The TRS-80 Model I was introduced in 1977. The demand for the Model I was tremendous. Tandy Corporation had begun a revolution in the computer industry by building an affordable computer.

The TRS-80 Model I is built around the Z-80 microprocessor, which serves as the computer's central processing unit (CPU). Programs and other data are stored on internal memory chips.

The lowest priced Model I contains 4096 **bytes** or 4K of RAM (Random Access Memory). A byte is roughly the equivalent of one typewritten character. Random Access Memory (RAM) may be increased to 16K within the keyboard unit,

and may be further expanded to 48K by using the optional Expansion Interface.

The Model I is programmed in Level I BASIC which is a simplified version of the BASIC programming language. Level I includes most of the standard BASIC commands. It features a screen display of 16 lines of 64 characters each, upper case characters, video graphics, floating point arithmetic, 6-digit numeric counting, single dimension arrays, limited string variables, command abbreviations, and simplified error codes. Level I BASIC is stored in 4K of Read-Only Memory (ROM) which is activated when the Model I is turned on.

At this point, you may be confused as to the meaning of **ROM** and **RAM.** There are two types of components used for providing main memory. These are Read-Only Memory (ROM) and Random Access Memory (RAM). Both types of memories are present in TRS-80 computer systems.

RAM is a type of memory that can be both read and written. RAM memory is volatile, that is, the contents of RAM are erased when the system's power is turned off. Therefore, RAM is a temporary means of storing data.

ROM memory allows data to be stored permanently. In other words, ROM memory is not volatile. Once data has been inserted into ROM, it does not need to be changed. ROM generally is used to store programs such as run-time monitors, operating systems, or language interpreters.

Tandy offers several options and accessories that allow the Model I to be upgraded so that its capabilities are greatly expanded. First of all, the Model I can be adapted so that it includes lower case as well as upper case letters.

The Model I's language interpreter can be upgraded from Level I BASIC to Level II BASIC by inserting a new ROM chip.

An Expansion Interface can be added to the base of the Model I's video monitor which serves as a center of

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expansion for the Model I. The Expansion Interface allows you to add up to an additional 32K or RAM. It also allows the addition of a printer, two cassette recorders, and an RS-232C board that further allows the connection of modems, card readers, serial line printers, and other devices.

The Expansion Interface also allows the addition of up to four Model I Mini-Disk Drives. This allows for up to 307 bytes of disk storage. The first disk drive must contain a diskette containing TRSDOS and Disk BASIC.

TRS-80 Model II

Tandy expanded the TRS-80 line in 1979 when the Model II was introduced. The Model II is not an expanded version of the Model I. It is an entirely new computer. The Model II offers twice the speed of the Model I with greatly increased memory storage and more sophisticated programming languages and disk operating systems.

The Model II is contained in a compact desktop cabinet which contains a detachable typewriter style keyboard, a 12 inch video display screen, and a built-in 8 inch disk drive. The video screen will display 24 lines of 80 characters each.

The Model II is available with either 32K or 64K of Random Access Memory or RAM. The 32K Model II may be expanded to 64K at any time with the 32K RAM Add-On Option.

The Model II disk drive is **double density** and allows for storage of up to 416,000 characters per diskette on the built-in drive. Density refers to a diskette's recording format, which in turn affects its capacity.

If additional storage area is necessary, a Model II Disk Expansion Unit can be added. The Disk Expansion Unit is available with one, two, or three disk drives. Each drive can store an additional 486,000 characters. This brings the total capacity of a four-drive system to approximately two million characters.

Illustration 1-1. TRS-80 Model II

If still more disk storage is needed, the optional Model II Hard Disk System may be added to your Model II. The Model II Hard Disk System allows for storage of 84 million characters. Up to four Model II Hard Disk Systems may be used on-line with the Model II allowing for total capacity of over 33 million characters.

Not only does the Model II Hard Disk System allow for greatly increased storage area, the disk access time is much faster with the Model II Hard Disk System than with the floppy disks.

The Model II Hard Disk System is Composed of two 8 inch platters, each of which is permanently sealed in an environment that is completely free from dust. Both surfaces of each of these platters are accessed by an individual read/write head. This forms a cylinder of 4 tracks under the head at any one moment.

The Model II Hard Disk System uses all current TRSDOS commands as well as two additional utilities; SAVE and RESTORE. The SAVE utility is used to save data from the hard disk to one or more of the floppy diskettes for back-up.

The RESTORE statement reads data on the floppy diskette and writes it onto the hard disk.

Model II TRSDOS

Model II TRSDOS controls the disk operations of the TRS-80 Model II. TRSDOS is contained on the system diskette on the built-in drive. Part of TRSDOS is automatically loaded into memory for use when the Model II is powered on. The Supervisor program, input/output drives, and some other essential parts of TRSDOS are always held in memory. Only a small part of TRSDOS is loaded into memory at any one time. The remainder is loaded as needed into an overlay area.

Model II TRSDOS includes a complete set of library commands, utility programs, and other useful system routines.

Some of the library commands contained in TRSDOS include:

- ATTRIB--which is used to change a file's password.
- CREATE--which is used to preallocate disk file space for faster execution.
- COPY and MOVE--which is used to transfer files.
- DEBUG--which is used to isolate errors in machine language programs.
- DO--which is used for automatic execution of a sequence of commands.
- FORMS--which is used to set the printer's page length, line width, top of forms, and to help toggle parallel or serial printer drives.
- HELP--which is used to explain TRSDOS commands.
- PATCH--which is used to modify the code in the system software so that new updates may be implemented.
- SPOOL--which is used to save the output to the printer in a disk file for use in later printings. This command can also be used to allow printing while other operations are being entered.

Some of the utility programs available with TRSDOS include the following:

- BACKUP--which is used to copy a diskette.
- FORMAT--which is used to format a diskette.
- MEMTEST--which is used to check RAM.

A set of communications commands are also included with TRSDOS including:

- ECHO--which is used to begin the echoing of keyboard input to the display.
- HOST--which is used to allow keyboad input from and video output to a remote terminal.
- RECEIVE--which is used to input data into RAM from the serial interface.
- SETCOM--which is used to set RS-232 port parameters.
- TERMINAL--which is a menu driven ASCII communications program.

Model II TRSDOS displays replies to commands as they are entered. For example, if the following command were entered,

KILL ACCOUNT/DAT

TRSDOS would respond with:

ACCOUNT/DAT KILLED

if ACCOUNT.DAT existed. The following response would occur,

ACCOUNT/DAT NOT FOUND

if ACCOUNT/DAT did not exist.

Model II TRSDOS includes a password system that can be used as a security device to help protect your data and program files.

Model II BASIC

Model II BASIC is an expanded version of Level II BASIC. Model II BASIC is a 17K disk-based interpreter. Some of its

features are outlined below.

- Error flagging
- Advanced string handling
- Multidimensional arrays
- Full editing capability
- Program line renumbering
- Hex and octal conversion
- Direct and sequential disk access
- Ability to call machine language subroutines

Model II BASIC has been made as compatible as possible with Level I BASIC and Model III BASIC so that Model I and Model III owners who upgrade to the Model II will experience only a minimal adjustment.

Compiled vs. Interpreted Language

Computer languages are often distinguished as being either **compiled** or **interpreted** languages.

A compiled language program consists of the **source code** and the **compiled code.** The source code consists of the program statements in their original form. For example, the following is a line of source code from a program written in the CBASIC compiled language.

```
100 INPUT "ENTER TODAY'S DATE:"; DATE.1
```

The source code is processed by a program known as a **compiler** into the compiled code. The compiled code is very similar to the machine language used by the microprocessor. The compiled code is the code actually used when a compiled program is run. A program known as a **run-time monitor** is used to run the compiled program.

An interpreted language consists of only the source code. The source code is translated line-by-line directly into machine language instructions. The Microsoft BASIC language that is standard on the Model II is an interpreted language.

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