# THEOS

## QUICKSTART

**THEOS 286-V Quickstart for IBM AT and Compatibles**

Sixth Edition

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## Welcome to THEOS

THEOS is a family of multi-user, multitasking operating systems for
the  Zilog  Z80, Intel  8088/8086,  Intel  80286 and Intel  80386
microprocessors.   Its  capabilities  bring   cost  efficiency  and
productivity to a microcomputer system.

THEOS allows users to share the same microcomputer and peripherals,
such as printers and hard disks.  There's no need to purchase a new
microcomputer each time  a new system user is added.  THEOS enables
new users to be added to a system via inexpensive terminals.

The  development of THEOS  was strictly controlled for maximum com-
patibility.   Standard interfaces  have been  imposed  across  each
microprocessor  version.   A  standard  user  interface  makes  new
hardware systems familiar to present users.  A standard application
interface enables  all  THEOS-based  applications  to  run  on  all
THEOS-based hardware.

## How To Use This Manual

This Quickstart booklet is designed to  assist you with the initial
phases of startup with THEOS -- whether  you are installing a THEOS
operating system for the first time or you are upgrading your THEOS
system.  By reading  the  manual's instructions  carefully, you can
successfully install your system.

A description of the THEOS product you have purchased  is contained
in this manual.  It is followed by a complete list of products cur-
rently supported by THEOS.

THEOS contains an on-line HELP facility listing all THEOS commands,
their syntax  and functions.  Once your THEOS  system is installed,
you  can  use this  facility simply by  typing  the HELP command as
shown:

>     >HELP <CR>
>     To display a list of all THEOS commands or
>
>     >HELP [Command Name such as "ERASE"] <CR>
>     To display command function, syntax (how to use) and options

## Table of Contents

## 286-V Fact Sheet

### General Information

The THEOS 286-V operating system was released in June, 1986, followed by the introduction of Version 2.2 in April, 1987. THEOS 286-V brings multi-user, multitasking capabilities to the IBM AT and compatible computers. Additionally, the operating system itself taps special features offered by the Intel 80286 microprocessor in Protected Virtual Address mode. The resulting power provides high performance, increased data access and software flexibility for many business users.

### 1.1   Supported Computers

THEOS 286-V supports a range of micros for business use. Not all AT compatibles, however, may execute the operating system. THEOS Software offers a test disk that determines whether your computer will run THEOS. For a complete list of supported hardware, contact your THEOS' representative.

### 1.2   Multi-user Capability

THEOS 286-V supports three concurrent users on the IBM AT -- two users at terminals, plus one at the main console. Additional users can be supported by the operating system with additional memory and add-on expansion boards by third party manufacturers.

### 1.3   Performance

THEOS 286-V for the IBM AT and compatibles performs four to eight times faster than the THEOS 86 operating system on the IBM PC/XT. Its high performance particularly supports sophisticated real-time applications, including manufacturing/process control, and a variety of vertical market applications ranging from accounting to health care.

### 1.4   Memory Support

THEOS 286-V breaks the one megabyte memory barrier by addressing up to 16 megabytes of real memory space. This large amount of RAM enables users to keep many large programs and data structures in memory at once for immediate access.

### 1.5   Memory Management and Protection

THEOS 286-V's unique memory management prevents users from crashing a system or writing over each other's files and data.

The 80286 chip's memory management unit, which handles the actual addressing of memory, allows the operating system to section off memory into segments. Passage from one segment to another is tightly controlled by assigning each segment one of four security levels, the highest reserved for the operating system. Without proper security clearance, a program is denied access.

Each memory segment can also be assigned to a particular task, thus, preventing users or programs with the same security level from entering a segment unless permission is given.

## 1.6 Software Flexibility

Most THEOS application programs developed in BASIC for THEOS 86 and THEOS 286 (Real mode) need only be recompiled to run under THEOS 286-V.

## 1.7 Code Compatibility

Compiled programs are **not** compatible between THEOS 286-V and the THEOS 86/286 operating systems. Source code for THEOS 286-V is compatible with THEOS 86/286. Source code compiled on THEOS 286-V must be re-compiled on THEOS 86/286 -- and vice versa.

## 1.8 Language Support

Languages available for THEOS 286-V include BASIC, C, RM/COBOL, EXEC Job Control, Debug and Link.

VDI (Virtual Device Interface) for full graphic capability is now included with each Basic product. Graphics drivers for standard IBM color graphics adapter and IBM graphics printer are also included with your system.

## 1.9 Hard Disk

A sizer program contained in the automatic installation EXEC program allows you to format many different disk drives from several disk drive manufacturers. Essentially, there is no size limitation because the maximum supported is 26 volumes 2 gigabytes per disk. Hardware design limitations may reduce this total.

## 1.10 Disk Caching

For increased processing power, THEOS 286-V supports the DPT PM3011, a high performance, disk caching controller by Distributed Processing Technologies. The product is ideally suited for disk-intensive applications running under THEOS 286-V on IBM AT and compatibles. (See Chapter 3 for installation procedures for THEOS 286-V and the DPT controller.)

## 1.11 Tape Backup

THEOS Software Corp. supports streaming tape drivers for tape backup by Alloy Computer Products, Everex and Archive for THEOS 286-V on the IBM AT and compatibles. The Sperry streaming tape is also supported for the Unisys (Sperry) IT, as well as the ITT streaming tape for the ITT XTRA XL.

## 1.12 Multi-Port Expansion Boards

THEOS 286-V supports more users on a computer system through multi-port expansion boards by Alcatel, Arnet, Computone, Control Systems, DigiBoard, Kimtron, Star Gate Technologies and Wyse Technology.

## 1.13 Security Device

A hardware device may be supplied with your THEOS system. This is a security device that prevents unauthorized copying of your THEOS system. As a result, each copy of THEOS can only be run on one machine at a time.

To install your security device, place it on one of the computer's lowest parallel ports. The parallel ports are numbered in this order:

| THEOS Name | Address | Description |
|---|---|---|
| CENTLP1 | 0x378 | PIO 1 |
| CENTLP2 | 0x278 | PIO 2 |
| CENTLP3 | 0x3BC | Parallel Port on Monochrome Adaptor Card |

The security device is termed a "pass through" device, which means you can use the end of the device not connected to the parallel port as a parallel connection. In other words, the parallel port may still be used, for example, by a printer.

THEOS will check upon "boot up" and periodically during operation to see if this device is installed on your computer. THEOS will not operate if this device is not present so the device must be installed prior to installing THEOS. If you do use the port for a printer, make sure your printer is turned on when you boot up your system.

Warning: If you have a printer on the same port as the security plug, do not power your printer down while the computer is running because this may make the plug inoperable with THEOS. If you do turn off the printer, all programs currently running will remain running. However, you may not be able to start new commands. If your printer is turned off, turn the printer on again for THEOS to operate. THEOS Software recommends you leave your printer on during system operation.

## THEOS 286-V Version 2.2 Installation

### INTRODUCTION

The diskettes you have received for this THEOS 286-V Version 2.2 contain EXECs that automatically prompt you for action during the installation process. We hope this proves to be helpful.

Your machine may already have an MS-DOS partition on the hard disk. If so, this partition must be repositioned to the inner (i.e. higher numbered) cylinders of the disk. THEOS 286-V requires that cylinder zero not be assigned to any partition, and cylinders 1 through at least 100 be assigned for the THEOS 286-V partition. The MS-DOS partition must begin after the THEOS 286-V partition.

THEOS 286-V can run on a wide variety of hard disk sizes. However, the system must know the exact parameters of the disk you are using. The parameters for commonly used drives are listed in a table following this procedure. If the drive you have is not listed among those in the table, you will have to get the following parameters:

1.   The total number of cylinders on the disk.

2.   The number of heads on the disk.

3.   The write precompensation cylinder.

4.   The head parking cylinder (landing zone). If not specified, use the number of the last cylinder.

These parameters can be found in the hard disk technical manual. If you do not have this information, consult your dealer or hardware distributor. This information is vital to the installation procedure and must be secured for proper installation of the system.

### INSTALLATION PROCEDURE

1.   Insert the floppy disk labeled "AT1_286" and close the door.

2.   Reset the computer (either CTRL/ALT/DEL or power off/on).

3.   You will now be automatically logged onto an installation menu, which has several options. Choose the appropriate option, and your system will be automatically installed or upgraded.

4.   After you have selected the installation procedure on the menu, the hard disk sizer program will be executed. At this time you will need the hard disk information described in the introduction section. You will be prompted for the number of disk drives in your system and asked for size parameters for each of them. Refer to the Appendix for common disk sizes.

5.  The screen will display Fixed Disk Partitioning information
    and Partitioning of the disk will occur at this time.   If the
    disk does not have any partitions currently allocated, you
    will be asked: Okay to use entire fixed disk for THEOS 286-V
    partition?  The default answer is "Y."

    If you wish to share the disk with another operating system,
    you should answer with "N," this will bring up two more ques-
    tions dealing with the starting cylinder of the partition and
    the number of cylinders in the partition.   The second answer
    should be at least 100 to give sufficient working room for
    THEOS 286-V.

    If another operating system has a partition allocated, the
    screen will show this menu:

            Create THEOS 286-V Partition
            Delete THEOS 286-V Partition
            Change active partition
            Delete all partitions
            Format THEOS 286-V Partition
            Exit to THEOS 286-V

    To select an option simply use the up and down arrow keys to
    position the cursor next to the selection desired, and type a
    carriage return.

    Use the "Delete all partitions" option if the other operating
    system partition is present on the disk. (THEOS 286-V should
    be Partition 1 on the hard disk.) This will bring up the ques-
    tion about wanting the entire disk for THEOS 286-V.

    If you wish to boot from the THEOS 286-V partition, you must
    make sure that it is active. If it is not you must use the
    change active partition option.

    The last option to select is to format the THEOS 286-V parti-
    tion.   This procedure is necessary to initialize the THEOS
    286-V partition. This option will destroy all information on
    the disk. If another operating system is resident on the
    disk, be sure to save all information on the other partition.
    The other operating system's partition must be rebuilt after
    formatting the THEOS 286-V partition.

6.  The next question is if automatic sector sparing is to be per-
    formed. We highly recommend that this procedure be specified,
    even though it will take approximately one hour per 10
    megabytes of hard disk capacity, it will find most of the sec-
    tors that might fail or be troublesome in the future. The
    default answer for this question is "Y."

7.  The next step is the installation of the system files on the
    hard disk. This is done in two parts. The first uses the
    "RESTORE" utility to copy the files from the archive diskette,
    labeled "AT2_286," to the hard disk. The second step involves
    copying some of the files from the boot disk to the hard disk.

8.  Next control of the operating system will be transferred to
    the hard disk.

9.  If you are using Computone boards, you may need to use the
    SYSGEN command to re-enter the users running on the Computone
    boards.

10. If you have any language packages, they may be installed at
    this time by inserting the first disk of the set and typing
    the following command at the ">" prompt:

            >INSTALL

    This procedure must be done once for each package.

11. Refer to the appropriate chapters in this manual for installing
    expansion boards and streaming tape drives.

Chapter 3

## THEOS 286-V and DPT Disk Caching Controller

### System and Controller Installation Procedures

### Introduction

Performance is critical in a multi-user environment where many users run different programs and access data at once. Disk caching is one way THEOS 286-V brings high multi-user performance to AT compatible computers.

THEOS 286-V supports the PM3011 disk caching controller (MFM Version) by Distributed Processing Technologies. The DPT disk caching controller dramatically increases the speed of THEOS applications on computers. Features of the DPT controller make it ideally suited for disk-intensive applications in a multi-user environment.

### 3.1 Hardware Compatibility

The DPT disk cache controller can be used with THEOS 286-V on a variety of popular AT compatible computers. Not all compatibles, however, can use the controller. For example, micros with the AMI BIOS Version 102386 are incompatible. Contact your THEOS representative for a complete list of supported hardware.

The DPT disk cache controller supports hard disk drivers with up to 15 heads and 1024 cylinders. If your hardware was supplied with another controller already installed, it must be removed and replaced with the DPT controller.

### 3.2 Space Requirements

The DPT controller occupies a single slot inside your AT compatible. The DPT floppy disk daughterboard occupies an additional 1/2 slot. This means that in systems that have memory expansion cards adjacent to the hard disk drive, the controller will occupy 2 slots. Examples of such systems would be those manufactured by Acer and Wyse Technologies.

If your system utilizes the floppy disk controller on the motherboard, you will need to remove the floppy disk controller daughterboard from the DPT controller.

### 3.3 Power Requirements

The standard DPT controller requires 25 watts of power. DPT's 2MB cache memory expansion board takes 4 watts, while the 4MB cache memory expansion uses 8 watts.

If your system is loaded with several multi-port expansion boards and the DPT controller, be sure that your system has at least a 220-watt power supply.

## 3.4  Cache Memory Requirements

The DPT cache controller utilizes memory that is separate from system memory.  Cache memory is expandable up to 16 MB, which, if purchased on a single board, occupies a single 8-bit slot.  THEOS Software recommends installing and using the controller with the standard 512K.  Additional cache memory is required to maintain high performance if the system is accessing large files and is supporting more than 8 users.

## 3.5  Controller Board Settings

It should not be necessary to change the factory-adjusted switch and jumper settings on the controller board.

## 3.6  DPT/THEOS Installation

This section describes how to install THEOS 286-V in conjunction with the DPT disk caching controller (MFM version).  By following these steps, you can successfully install the DPT PM3011 with THEOS.

Note:  If you already have THEOS installed on your computer, you will need to backup your system and reinstall THEOS with the controller.

### Installation Procedure

1.  If you have information on the hard disk, be sure to archive the information to floppies or tape.

2.  Physically install the DPT board in the computer.

3.  Run the DOS setup utility to configure the system for the correct drive type.  To establish a drive type, you must know the drive's number of heads and cylinders.  The drive type must exactly match the number of heads.  The number of cylinders in the table must be less than or equal to the number of physical cylinders the drive has.  For example, if you have a hard drive that has 819 cylinders and 5 heads, you must find a drive type that has 5 heads and 819 or less cylinders.

4.  Locate the hard disk flaw map.  The flaw map is usually supplied as a separate sheet of documentation with the drive, or is taped directly to the drive.  Note:  Entering the disk flaw map is an optional, time-consuming step.  However, it ensures that THEOS will not use areas of the disk that the manufacturer has found may be unreliable for holding information.

5.  Insert the floppy disk labeled "DPT1" in the floppy drive and press <CTRL> <ALT> <DEL>.

    After selecting option one from the THEOS installation menu, the DPT menu is displayed.

6.  If your disk drive does not contain another operating system, enter F<CR> to display the DPT drive type table.

    Note:  If partitions are already defined, select "M" to modify the disk partition table.  If you choose to modify, THEOS displays the DPT 3011 Formatter Menu.  Select the "Delete all partitions option" and press <CR> to return to the DPT main menu.  You can now select "F" to display the drive type table.

7.  When the list of drive types is displayed, find the drive parameters that match those of the installed drive.  If your drive is on the displayed list, enter the corresponding code and press <CR>.  If your drive is not on the list, enter O<CR>.  The screen will display:

    > DPT3011 DISK Parameters
    > Number of cylinders......................
    > Number of Heads..........................
    > Reduced Write Current/Precomp...........
    > Landing Zone.............................
    > Step Pulse Period (microsecs)...........

    Input the parameters for your drive by pressing <CR> after each entry.  If you know the Reduced Write Current/Precomp, enter this value.  Otherwise, enter a number equal to 1/2 the number of the drive's cylinders.  Since 5 is the correct setting for most hard drives, the Step Pulse Period defaults to 5 when you press <CR>.

    The following values are automatically calculated for you by the system so press <CR> for each entry.

    > Sector interleave...................... 2
    > Formatted Capacity...................... xx,xxx,xxx

    The system will automatically default to a sector interleave of 2 and calculate the Formatted Capacity.

8.  Enter the number of defects from the list supplied in the documentation, or use the flaw map on the hard disk.

    > Number of defects: x

    You will be prompted to enter the head, cylinder and bytes for each defect.

9.  Next, the system prompts you to enter the defect type:

    > MFM or RLL defects: M or R

    If your disk is certified for RLL controllers, the defect map may be RLL defects.  If you know your drive is RLL certified, enter "R." Otherwise, enter "M."

10. You will now be asked to specify the CACHE RAM Parameters.  These values are the percentage of the amount of RAM to allo-

cate between drives.   If you have only one drive,  100 percent
should be allocated to drive 1.  The screen will display:

```
        DPT3011 RAM Parameters
DPT 3011 Version......................PRM 3011B/50
Cache % Drive 1........................ [100]
Cache % Drive 2........................ 0
```

When the values are correct, the system prompts:

    Are these Parameters OK? [Y]

The system defaults  to  "Y." Press <CR> if  this  is  correct.
Otherwise,  enter "N" to enter new values.  When the values are
correct and you press Y<CR>, the system will display:

    Perform Auto Surface Analysis?  [Y]

Auto Surface Analysis is similar in function to THEOS automatic
sector sparing.  During this procedure, the disk is scanned and
bad sector numbers are  placed in  a table  so they will not be
used by THEOS.  To avoid problems with disk access, this proce-
dure is recommended.   This analysis requires  approximately 10
minutes per 15 megabytes of hard disk capacity.

11. Upon completion of surface analysis the system will display:

    Proceed with format?  [Y]

Entering Y<CR> displays the message:

    Format will complete in nn.n minutes

12. THEOS now returns to the  standard THEOS formatting  procedures
    and a hard disk  partition  must now be  sized for THEOS.  The
    screen will  display Fixed  Disk Partitioning information.   If
    the disk does not have any  partitions currently allocated, you
    will be asked:  Okay to use entire fixed disk for  THEOS 286-V
    partition?  The default answer is "Y."

    If  you wish to  share the disk with another  operating system,
    you should answer with "N," this will  bring  up two more ques-
    tions dealing with the starting cylinder of the  partition  and
    the  number  of cylinders in the  partition.  The second answer
    should be  at least  100  to give sufficient  working room  for
    THEOS 286-V.

    If  another operating  system  has  a partition allocated,  the
    screen will show this menu:

    Create THEOS 286-V Partition
    Delete THEOS 286-V Partition
    Change active partition
    Delete all partitions
    Format THEOS 286-V Partition
    Exit to THEOS 286-V

To  select an option simply use the  up and down  arrow keys to
position the  cursor next to the selection desired, and  type a
carriage return.

Use  the "Delete  all  partitions" option if  another operating
system partition is present on the disk.   (THEOS  286-V should
be Partition 1 on the hard disk.) This will bring up the  ques-
tion about wanting the entire disk for THEOS 286-V.

If  you wish to  boot from the THEOS 286-V partition, you  must
make sure that it  is active.   The THEOS/DPT installation will
automatically make the THEOS partition active.

The last  option to select is to  format the THEOS 286-V parti-
tion.   This procedure is  necessary  to  initialize  the THEOS
286-V partition.  Note:  This option will destroy all informat-
ion on the disk.  If another operating system  is  resident  on
the disk,  be sure to save  all information on the other parti-
tion.  The  other  operating system's partition must be rebuilt
after formatting the THEOS 286-V partition.

13. The next step  is  the installation of the system files on  the
    hard  disk.   This is done  in  two parts.   The first uses the
    "RESTORE"  utility to copy the files from the archive diskette,
    labeled "AT2_286," to the hard disk.  The second step  involves
    copying some of the files from the boot disk to the hard disk.

14. Next control of the operating system will be transferred to the
    hard disk.

15. If  you are using  Computone boards,  you may  need  to use the
    SYSGEN command to  re-enter the  users running on the Computone
    boards.

16. If  you have any language packages, they  may be  installed  at
    this time by inserting the first disk of the set and typing the
    following command at the ">" prompt:

    >INSTALL

    This procedure must be done once for each package.

17. If you have an archive set of disks or  tapes  that you wish to
    install on the system, use the RESTORE (NEWFILE utility.

18. Refer to the appropriate chapters in this manual for installing
    expansion boards and streaming tape drives.

Multi-port Expansion Boards for THEOS 286-V

## Introduction

THEOS 286-V will  support  several popular multi-port serial inter-
faces.  Instructions  on how  to install and use  them are outlined
here.  The interfaces include the following:

Alcatel:            The  ITT  MTS  serial  interface  with  eight
                    ports.  Up  to  four boards can be used for a
                    total of 32 ports.

Arnet:              The  Arnet   Twinport,  4-port,  8-port   and
                    Smartport serial  interfaces  feature support
                    for  the clock/calendar chip.   Use  of addi-
                    tional eight-port boards increases the serial
                    interface to 32 ports.

Computone:          The  Advantage serial  interface  with  eight
                    ports.  Up  to  four boards may  be used for a
                    total of 32 ports.

Control Systems: Hostess 4-port and 8-port serial interfaces.

DigiBoard:          DigiCom  4-port/8-port and  DigiCom/i  8-port
                    serial interfaces.  Use of  a second,  eight-
                    port board increases the  serial interface to
                    16 ports.  Use of a third board increases the
                    serial interface to 24 ports, while  use of a
                    fourth  board  increases the serial interface
                    to 32 ports.

Kimtron:            Quartet 4-port serial interface.

Star Gate:          ACL (Avanced Communications Link) eight-port,
                    intelligent serial expansion board.  Use of a
                    second board  increases  the serial interface
                    to 16 ports.

Wyse:               The  Wyse  Flasher serial interface with eight
                    ports.   Up  to four boards may be used for a
                    total of 32 ports.

## 4.1  How to Use Your Multi-port Expansion Board

### Attaching the Expansion Board
New  device  names have  been created  for use with the  multi-port
expansion  boards.  Each device  name is used for a particular port
on the board.  For example, to attach Port 1 on a Hostess board  to
your communication line, use the command:

    >ATTACH COM HOST1 (B9600 W8 PN E0

**Board Device Names**
The new device names for the multi-port expansion boards are listed
below:

Alcatel ITT MUTS:

| | |
|---|---|
| MUTS1 | Port 1 on MUTS Board 1 |
| MUTS2 | Port 2 on MUTS Board 1 |
| MUTS3 | Port 3 on MUTS Board 1 |
| MUTS4 | Port 4 on MUTS Board 1 |
| MUTS5 | Port 5 on MUTS Board 1 |
| MUTS6 | Port 6 on MUTS Board 1 |
| MUTS7 | Port 7 on MUTS Board 1 |
| MUTS8 | Port 8 on MUTS Board 1 |
| | |
| MUTS9 | Port 1 on MUTS Board 2 |
| MUTS10 | Port 2 on MUTS Board 2 |
| MUTS11 | Port 3 on MUTS Board 2 |
| MUTS12 | Port 4 on MUTS Board 2 |
| MUTS13 | Port 5 on MUTS Board 2 |
| MUTS14 | Port 6 on MUTS Board 2 |
| MUTS15 | Port 7 on MUTS Board 2 |
| MUTS16 | Port 8 on MUTS Board 2 |
| | |
| MUTS17 | Port 1 on MUTS Board 3 |
| MUTS18 | Port 2 on MUTS Board 3 |
| MUTS19 | Port 3 on MUTS Board 3 |
| MUTS20 | Port 4 on MUTS Board 3 |
| MUTS21 | Port 5 on MUTS Board 3 |
| MUTS22 | Port 6 on MUTS Board 3 |
| MUTS23 | Port 7 on MUTS Board 3 |
| MUTS24 | Port 8 on MUTS Board 3 |
| | |
| MUTS25 | Port 1 on MUTS Board 4 |
| MUTS26 | Port 2 on MUTS Board 4 |
| MUTS27 | Port 3 on MUTS Board 4 |
| MUTS28 | Port 4 on MUTS Board 4 |
| MUTS29 | Port 5 on MUTS Board 4 |
| MUTS30 | Port 6 on MUTS Board 4 |
| MUTS31 | Port 7 on MUTS Board 4 |
| MUTS32 | Port 8 on MUTS Board 4 |

Arnet 8-port:

| | |
|---|---|
| ARNET1 | Port 1 on Arnet Board 1 |
| ARNET2 | Port 2 on Arnet Board 1 |
| ARNET3 | Port 3 on Arnet Board 1 |
| ARNET4 | Port 4 on Arnet Board 1 |
| ARNET5 | Port 5 on Arnet Board 1 |
| ARNET6 | Port 6 on Arnet Board 1 |
| ARNET7 | Port 7 on Arnet Board 1 |
| ARNET8 | Port 8 on Arnet Board 1 |

| | |
|---|---|
| ARNET9 | Port 1 on Arnet Board 2 |
| ARNET10 | Port 2 on Arnet Board 2 |
| ARNET11 | Port 3 on Arnet Board 2 |
| ARNET12 | Port 4 on Arnet Board 2 |
| ARNET13 | Port 5 on Arnet Board 2 |
| ARNET14 | Port 6 on Arnet Board 2 |
| ARNET15 | Port 7 on Arnet Board 2 |
| ARNET16 | Port 8 on Arnet Board 2 |

Arnet Smartport:

| | |
|---|---|
| SARNET1 | Port 1 on Arnet Smartport Board 1 |
| SARNET2 | Port 2 on Arnet Smartport Board 1 |
| SARNET3 | Port 3 on Arnet Smartport Board 1 |
| SARNET4 | Port 4 on Arnet Smartport Board 1 |
| SARNET5 | Port 5 on Arnet Smartport Board 1 |
| SARNET6 | Port 6 on Arnet Smartport Board 1 |
| SARNET7 | Port 7 on Arnet Smartport Board 1 |
| SARNET8 | Port 8 on Arnet Smartport Board 1 |
| | |
| SARNET9 | Port 1 on Arnet Smartport Board 2 |
| SARNET10 | Port 2 on Arnet Smartport Board 2 |
| SARNET11 | Port 3 on Arnet Smartport Board 2 |
| SARNET12 | Port 4 on Arnet Smartport Board 2 |
| SARNET13 | Port 5 on Arnet Smartport Board 2 |
| SARNET14 | Port 6 on Arnet Smartport Board 2 |
| SARNET15 | Port 7 on Arnet Smartport Board 2 |
| SARNET16 | Port 8 on Arnet Smartport Board 2 |
| | |
| SARNET17 | Port 1 on Arnet Smartport Board 3 |
| SARNET18 | Port 2 on Arnet Smartport Board 3 |
| SARNET19 | Port 3 on Arnet Smartport Board 3 |
| SARNET20 | Port 4 on Arnet Smartport Board 3 |
| SARNET21 | Port 5 on Arnet Smartport Board 3 |
| SARNET22 | Port 6 on Arnet Smartport Board 3 |
| SARNET23 | Port 7 on Arnet Smartport Board 3 |
| SARNET24 | Port 8 on Arnet Smartport Board 3 |
| | |
| SARNET25 | Port 1 on Arnet Smartport Board 4 |
| SARNET26 | Port 2 on Arnet Smartport Board 4 |
| SARNET27 | Port 3 on Arnet Smartport Board 4 |
| SARNET28 | Port 4 on Arnet Smartport Board 4 |
| SARNET29 | Port 5 on Arnet Smartport Board 4 |
| SARNET30 | Port 6 on Arnet Smartport Board 4 |
| SARNET31 | Port 7 on Arnet Smartport Board 4 |
| SARNET32 | Port 8 on Arnet Smartport Board 4 |

Star Gate ACL:

ACL1            Port 1 on Star Gate ACL Board 1
ACL2            Port 2 on Star Gate ACL Board 1
ACL3            Port 3 on Star Gate ACL Board 1
ACL4            Port 4 on Star Gate ACL Board 1
ACL5            Port 5 on Star Gate ACL Board 1
ACL6            Port 6 on Star Gate ACL Board 1
ACL7            Port 7 on Star Gate ACL Board 1
ACL8            Port 8 on Star Gate ACL Board 1

ACL9            Port 1 on Star Gate ACL Board 2
ACL10           Port 2 on Star Gate ACL Board 2
ACL11           Port 3 on Star Gate ACL Board 2
ACL12           Port 4 on Star Gate ACL Board 2
ACL13           Port 5 on Star Gate ACL Board 2
ACL14           Port 6 on Star Gate ACL Board 2
ACL15           Port 7 on Star Gate ACL Board 2
ACL16           Port 8 on Star Gate ACL Board 2

Computone Advantage:

ATVANT1         Port 1 on Computone Advantage Board 1
ATVANT2         Port 2 on Computone Advantage Board 1
ATVANT3         Port 3 on Computone Advantage Board 1
ATVANT4         Port 4 on Computone Advantage Board 1
ATVANT5         Port 5 on Computone Advantage Board 1
ATVANT6         Port 6 on Computone Advantage Board 1
ATVANT7         Port 7 on Computone Advantage Board 1
ATVANT8         Port 8 on Computone Advantage Board 1

ATVANT9         Port 1 on Computone Advantage Board 2
ATVANT10        Port 2 on Computone Advantage Board 2
ATVANT11        Port 3 on Computone Advantage Board 2
ATVANT12        Port 4 on Computone Advantage Board 2
ATVANT13        Port 5 on Computone Advantage Board 2
ATVANT14        Port 6 on Computone Advantage Board 2
ATVANT15        Port 7 on Computone Advantage Board 2
ATVANT16        Port 8 on Computone Advantage Board 2

ATVANT17        Port 1 on Computone Advantage Board 3
ATVANT18        Port 2 on Computone Advantage Board 3
ATVANT19        Port 3 on Computone Advantage Board 3
ATVANT20        Port 4 on Computone Advantage Board 3
ATVANT21        Port 5 on Computone Advantage Board 3
ATVANT22        Port 6 on Computone Advantage Board 3
ATVANT23        Port 7 on Computone Advantage Board 3
ATVANT24        Port 8 on Computone Advantage Board 3

ATVANT25        Port 1 on Computone Advantage Board 4
ATVANT26        Port 2 on Computone Advantage Board 4
ATVANT27        Port 3 on Computone Advantage Board 4
ATVANT28        Port 4 on Computone Advantage Board 4
ATVANT29        Port 5 on Computone Advantage Board 4
ATVANT30        Port 6 on Computone Advantage Board 4
ATVANT31        Port 7 on Computone Advantage Board 4
ATVANT32        Port 8 on Computone Advantage Board 4

Control Systems Hostess:

HOST1           Port 1 on Hostess Board
HOST2           Port 2 on Hostess Board
HOST3           Port 3 on Hostess Board
HOST4           Port 4 on Hostess Board
HOST5           Port 5 on Hostess Board
HOST6           Port 6 on Hostess Board
HOST7           Port 7 on Hostess Board
HOST8           Port 8 on Hostess Board

Kimtron Quartet:

KT1             Port 1 on Kimtron Board
KT2             Port 2 on Kimtron Board
KT3             Port 3 on Kimtron Board
KT4             Port 4 on Kimtron Board

DigiBoard COM/8:

DIGI1           Port 1 on DigiBoard Board 1
DIGI2           Port 2 on DigiBoard Board 1
DIGI3           Port 3 on DigiBoard Board 1
DIGI4           Port 4 on DigiBoard Board 1
DIGI5           Port 5 on DigiBoard Board 1
DIGI6           Port 6 on DigiBoard Board 1
DIGI7           Port 7 on DigiBoard Board 1
DIGI8           Port 8 on DigiBoard Board 1

DIGI9           Port 1 on DigiBoard Board 2
DIGI10          Port 2 on DigiBoard Board 2
DIGI11          Port 3 on DigiBoard Board 2
DIGI12          Port 4 on DigiBoard Board 2
DIGI13          Port 5 on DigiBoard Board 2
DIGI14          Port 6 on DigiBoard Board 2
DIGI15          Port 7 on DigiBoard Board 2
DIGI16          Port 8 on DigiBoard Board 2

DIGI17          Port 1 on DigiBoard Board 3
DIGI18          Port 2 on DigiBoard Board 3
DIGI19          Port 3 on DigiBoard Board 3
DIGI20          Port 4 on DigiBoard Board 3
DIGI21          Port 5 on DigiBoard Board 3
DIGI22          Port 6 on DigiBoard Board 3
DIGI23          Port 7 on DigiBoard Board 3
DIGI24          Port 8 on DigiBoard Board 3

| | |
|---|---|
| DIGI25 | Port 1 on DigiBoard Board 4 |
| DIGI26 | Port 2 on DigiBoard Board 4 |
| DIGI27 | Port 3 on DigiBoard Board 4 |
| DIGI28 | Port 4 on DigiBoard Board 4 |
| DIGI29 | Port 5 on DigiBoard Board 4 |
| DIGI30 | Port 6 on DigiBoard Board 4 |
| DIGI31 | Port 7 on DigiBoard Board 4 |
| DIGI32 | Port 8 on DigiBoard Board 4 |

DigiBoard Com/8i:

| | |
|---|---|
| SDIGI1 | Port 1 on DigiBoard COM/i Board 1 |
| SDIGI2 | Port 2 on DigiBoard COM/i Board 1 |
| SDIGI3 | Port 3 on DigiBoard COM/i Board 1 |
| SDIGI4 | Port 4 on DigiBoard COM/i Board 1 |
| SDIGI5 | Port 5 on DigiBoard COM/i Board 1 |
| SDIGI6 | Port 6 on DigiBoard COM/i Board 1 |
| SDIGI7 | Port 7 on DigiBoard COM/i Board 1 |
| SDIGI8 | Port 8 on DigiBoard COM/i Board 1 |
| | |
| SDIGI9 | Port 1 on DigiBoard COM/i Board 2 |
| SDIGI10 | Port 2 on DigiBoard COM/i Board 2 |
| SDIGI11 | Port 3 on DigiBoard COM/i Board 2 |
| SDIGI12 | Port 4 on DigiBoard COM/i Board 2 |
| SDIGI13 | Port 5 on DigiBoard COM/i Board 2 |
| SDIGI14 | Port 6 on DigiBoard COM/i Board 2 |
| SDIGI15 | Port 7 on DigiBoard COM/i Board 2 |
| SDIGI16 | Port 8 on DigiBoard COM/i Board 2 |
| | |
| SDIGI17 | Port 1 on DigiBoard COM/i Board 3 |
| SDIGI18 | Port 2 on DigiBoard COM/i Board 3 |
| SDIGI19 | Port 3 on DigiBoard COM/i Board 3 |
| SDIGI20 | Port 4 on DigiBoard COM/i Board 3 |
| SDIGI21 | Port 5 on DigiBoard COM/i Board 3 |
| SDIGI22 | Port 6 on DigiBoard COM/i Board 3 |
| SDIGI23 | Port 7 on DigiBoard COM/i Board 3 |
| SDIGI24 | Port 8 on DigiBoard COM/i Board 3 |
| | |
| SDIGI25 | Port 1 on DigiBoard COM/i Board 4 |
| SDIGI26 | Port 2 on DigiBoard COM/i Board 4 |
| SDIGI27 | Port 3 on DigiBoard COM/i Board 4 |
| SDIGI28 | Port 4 on DigiBoard COM/i Board 4 |
| SDIGI29 | Port 5 on DigiBoard COM/i Board 4 |
| SDIGI30 | Port 6 on DigiBoard COM/i Board 4 |
| SDIGI31 | Port 7 on DigiBoard COM/i Board 4 |
| SDIGI32 | Port 8 on DigiBoard COM/i Board 4 |

Wyse Flasher:

| | |
|---|---|
| FLASH1 | Port 1 on Wyse Flasher Board 1 |
| FLASH2 | Port 2 on Wyse Flasher Board 1 |
| FLASH3 | Port 3 on Wyse Flasher Board 1 |
| FLASH4 | Port 4 on Wyse Flasher Board 1 |
| FLASH5 | Port 5 on Wyse Flasher Board 1 |
| FLASH6 | Port 6 on Wyse Flasher Board 1 |
| FLASH7 | Port 7 on Wyse Flasher Board 1 |
| FLASH8 | Port 8 on Wyse Flasher Board 1 |
| | |
| FLASH9 | Port 1 on Wyse Flasher Board 2 |
| FLASH10 | Port 2 on Wyse Flasher Board 2 |
| FLASH11 | Port 3 on Wyse Flasher Board 2 |
| FLASH12 | Port 4 on Wyse Flasher Board 2 |
| FLASH13 | Port 5 on Wyse Flasher Board 2 |
| FLASH14 | Port 6 on Wyse Flasher Board 2 |
| FLASH15 | Port 7 on Wyse Flasher Board 2 |
| FLASH16 | Port 8 on Wyse Flasher Board 2 |
| | |
| FLASH17 | Port 1 on Wyse Flasher Board 3 |
| FLASH18 | Port 2 on Wyse Flasher Board 3 |
| FLASH19 | Port 3 on Wyse Flasher Board 3 |
| FLASH20 | Port 4 on Wyse Flasher Board 3 |
| FLASH21 | Port 5 on Wyse Flasher Board 3 |
| FLASH22 | Port 6 on Wyse Flasher Board 3 |
| FLASH23 | Port 7 on Wyse Flasher Board 3 |
| FLASH24 | Port 8 on Wyse Flasher Board 3 |
| | |
| FLASH25 | Port 1 on Wyse Flasher Board 4 |
| FLASH26 | Port 2 on Wyse Flasher Board 4 |
| FLASH27 | Port 3 on Wyse Flasher Board 4 |
| FLASH28 | Port 4 on Wyse Flasher Board 4 |
| FLASH29 | Port 5 on Wyse Flasher Board 4 |
| FLASH30 | Port 6 on Wyse Flasher Board 4 |
| FLASH31 | Port 7 on Wyse Flasher Board 4 |
| FLASH32 | Port 8 on Wyse Flasher Board 4 |

## 4.2  Multi-port Expansion Board Installation

### Software Installation

The software to install your multi-port expansion board is included with your THEOS system diskettes.

### Hardware Installation

A utility has been added to THEOS to ease  the installation of your multi-port expansion board.  To  install any  multi-port expansion board, enter the following command at the CSI prompt:

>SETBOARD

The menu appearing on the screen describes all the THEOS multi-port expansion board  drivers  available  on  your  system.   Choose  the appropriate  menu  selection  for  the  board  you  are  installing.  A

graphics display of the switch and jumper settings for your board will then appear on your screen. Follow these settings for a successful installation.

## Interrupts

On many of the boards, you can conveniently change the interrupt level if there are conflicts with other devices. If you select a different interrupt, you must be sure that the interrupt is not used by another device. Otherwise, both devices may fail. Check your hardware manuals for the interrupts used by your devices.

If you do select a new interrupt, the SETBOARD utility will automatically patch the device driver. No manual patching is necessary.

## 4.3  Conflicts

THEOS does not support multiple board types. For example, an Arnet board may not work with a DigiBoard multi-port board on one system.

---

## Streaming Tape Drives for THEOS 286-V

### Introduction

THEOS Software supports streaming tape drivers for tape backup of THEOS 286-V by Alloy Computer Products, Archive, Everex and Sperry. Each implementation supports the full set of powerful tape commands of THEOS, including ARCHIVE, BACKUP, COPYFILE, RESTORE and TAPE.

Attaching and using the Streaming Tape Drives follows standard THEOS syntax and format. Streaming tape drive specifications and instructions to install them are outlined here.

### Alloy Streaming Tape
THEOS 286-V supports the Alloy PC-QICTAPE, a 60 MB streaming tape drive for IBM AT and compatibles.

### Archive Streaming Tape
The Archive Scorpion Streaming Tape Drive is available for THEOS 286-V for the IBM AT and compatibles. Both the Archive SC 499 long and short controller cards are supported.

### Everex Streaming Tape
The Everex Excel 60 Streaming Tape Drive is available for THEOS 286-V for the IBM AT and compatibles. Three controller cards are supported, including the EV-811, EV-831 and the EV-833.

### Sperry Streaming Tape
The internal 60 MB Sperry streaming tape drive is available for THEOS 286-V for the Unisys (Sperry) IT.

### CPU
The streaming tape drives can be installed on any IBM AT or compatible system.

### Hard Disk
The streaming tape drive will function with the IBM AT hard disk.

### Memory Requirements
Use of the streaming tape drive requires at least two 16K buffers in addition to a 7K device driver. The driver will attempt to reserve up to eight 16K contiguous buffers for faster operation. However, at least two 16K buffers are required.

### Tape Cartridges
The streaming tape drive utilizes 1/4-inch, 10,000 BPI, ANSI Standard X.355-1977 DC-300 tape cartridges of four lengths: 300, 450, 555 and 600 feet.

### Tape Capacity
The streaming tape drive supplies high capacity data storage. The following table illustrates the maximum storage for each length of tape.

| Tape Size | Capacity |
|-----------|----------|
| ======== | ======== |
| 300' | 31.0 megabytes |
| 450' | 45.5 megabytes |
| 555' | 57.4 megabytes |
| 600' | 62.1 megabytes |

## Tape Performance

The speed of tape operations depends on type of operation, buffer size and other processes performing on the CPU. For example, an ARCHIVE of an Alloy Hard Disk can be performed in 651,000 bytes per minute with two 32K buffers on the IBM PC/XT. The tape can rewind at 90 inches per second.

## 5.1 How to Use Your Streaming Tape

### Attaching the Tape Drive

New device names have been created for use with the streaming tape drive system. Each device name is used for a particular length tape. For example, to attach the tape drive for a 300 foot tape, use the command:

>ATTACH TAPE TAPE300

Each time a different length tape is used the tape should be detached and reattached with the new tape length.

### Tape Device Names

The new device names for the streaming tape drivers are listed below:

    TAPE300   300' Streaming Tape
    TAPE450   450' Streaming Tape
    TAPE555   555' Streaming Tape
    TAPE600   600' Streaming Tape

### Tape Initialization

Each tape must be initialized before it is used with the streaming tape drive. To initialize a tape, place the tape in the tape drive and enter the TAPE command at the CSI prompt. For example, to initialize a tape and label the tape T00001, the following command can be used:

>TAPE TAPE (INIT T00001

WARNING: Tapes initialized on other THEOS systems may not be compatible and must be reinitialized on the streaming tape drive before they can be used.

## Tape Usage

After the tape unit is attached, the device can be used for all THEOS tape commands. For example, to ARCHIVE the system disk to tape, the following command can be used.

>ARCHIVE S TAPE

The command to restore the file SAMPLE.FILE from an archive tape to the system disk is:

>RESTORE SAMPLE.FILE:TAPE S

The THEOS commands that support the tape option are ARCHIVE, BACKUP, COPYFILE, RESTORE and TAPE.

Warning: Only one file can be stored on a tape. Multiple files and shared archives are not supported on the streaming tape drivers because of hardware controller limitations.

## Problem Recovery

Should the streaming tape drive quit operating or "hang," simply detach the tape drive by entering:

>ATTACH TAPE

and then attaching the tape drive as shown above. Should the tape drive still be non-operational, the system should be rebooted by turning the power off and on for both the tape unit and CPU.

## 5.2 Streaming Tape Drive Installation

### Introduction

Streaming tape drives are not contained on your THEOS operating system diskettes. They must be ordered separately from THEOS Software Corp.

Warning: THEOS 286-V must already be loaded on your IBM Hard Disk before you can install your tape drive.

### Software Installation Procedure

1.  Insert the floppy disk containing the tape driver in the floppy drive and close the drive door.

2.  Logon to the SYSTEM account.

3.  At the CSI prompt enter:

        >INSTALL

4.  The system will automatically  prompt you for information and
    add the driver to your system.  If you are loading Alloy disk
    drivers, follow the directions under the Alloy Hard Disk chap-
    ter.

### Hardware Installation Notes

Note:  Unless specified, all  settings  should be  left at manufac-
turer defaults for the following products.

Alloy:  The  Alloy tape will use the default  manufacturer settings
        of 300H and DMA channel 3.

Archive: For the Archive SC 499  Long Card,  the DMA channel on the
         Archive  tape  should be  set  to DMA 3.   On latch
         catch/release drive  boards where  DRQ  and DACK  are  six
         adjacent pins, the jumpers  should  be moved  to DRQ3  and
         DACK3.  On internal catch/release  drive boards where  DRQ
         and DACK are two  sets of two  pins each, remove the jumper
         pins from both the  DRQ and DACK blocks.   The base address
         used  for  the  tape driver is  280Hex.  This is  set on the
         SC-499 tape controller board with the address jumpers at A7
         & A9.  The tape driver does not  use interrupts so no  IRQ
         should be set.

         For the  Archive SC 499  Short Card, the jumpers should  be
         moved  to DRQ3 and  DACK3.  The  base  address used for  the
         tape  driver is  280Hex.  All  address  jumpers, except for
         address jumpers at  A7 & A9, should be set on the tape con-
         troller board.  No IRQ should be set.

Everex: The Everex tape unit uses the  default manufacturer address
        of 300Hex and  DMA channel 3.   The EV-811  and EV-831 tape
        controllers should be set up  as follows:

                    One Jumper on DA3EN (DAC 3 Enable)
                    One Jumper on DR3EN (DRQ 3 Enable)
                    One Jumper on DA 3   (DACK 3)
                    One Jumper on DR 3   (DRQ 3)
                    No Jumpers on IRQ   (No Jumper on IRQ)

| | | | | Switch SW-1 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| ON | ON | ON | ON | ON | ON | ON | ON | OFF | OFF |

EV-811

| | | | | Switch SW-1 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| ON | ON | ON | ON | ON | ON | ON | OFF | OFF | OFF |

EV-831

The EV-833 tape controller should be set up as follows:

                    One Jumper on DACK 3
                    One Jumper on DRQ 3
                    No Jumpers on IRQ

| | | | | Switch SW-1 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| ON | ON | ON | ON | ON | ON | ON | OFF | OFF | OFF |

EV-833

Sperry: The Sperry tape drive should be set to DMA channel 3.

# Chapter 6

## Starting Other Partitions

### Before You Begin

When you activate the system, there is only one user partition set up. It's just you and the computer. This condition is known as "single-user mode." To enable other users to log onto other terminals all at once, you need to set up a separate partition for each user. Your system can be configured to automatically start partitions during the boot process. However, if you should need to start an additional user during the day, this can be done by executing a simple procedure for each partition that is needed.

Note: A minimum of 64K of memory per user is required.

### 6.1 Setting Up User Partitions

If you should need to add another user to the system, you must execute the START command. The START command activates each user partition and attaches it to a specified terminal. Ports may be serial ports, SIO1 or SIO2, or expansion boards. (See the chapter entitled "Multi-port Expansion Boards" for device names.)

To start a user you must specify the port and parameters, including word length, parity, baud rate, handshaking and class code. For example, you can start a user on the Hostess expansion board by entering the command:

>START 2 (HOST2 W8 B9600 C54 PE E2

where:

HOST2    is the second port on the Hostess expansion board.

B9600    is the baud rate to be used.

C54    is the class code number for a Kimtron KT7. The class codes for each terminal are located in Appendix B.

PE    indicates the use of even parity. Other valid parity settings are PN, PO, PZ representing no parity, odd parity, and parity bit zero, respectively.

E2    specifies the desired "handshake" protocol. Valid handshakes are E1, E2, E3 and E4 representing DTR, XON/XOFF, ETX/ACK, and CTS protocols, respectively.

W8    specifies word length. Either W8 or W7 can be specified.

Each of these parameters must match the terminal settings for the partition to be activated.

See the "START" command chapter in the THEOS System Reference Manual for more information.

## THEOS 286-V Version 2.2 Enhancements

### Introduction

THEOS 286-V Version 2.2 contains major enhancements to the THEOS operating system and its languages. General enhancements include:

* Support for the standard IBM (and compatibles) EGA Display Adaptor for enhanced color graphics display, including 16 colors for text, eight colors for graphics and 640 x 350 pixel resolution.

* BASIC support for the Intel 80287 chip for increased performance.

* Support for PC terminals in native mode.

* Support for security devices.

* Support for eight-bit characters for international character sets, graphics and special symbols, such as fractions and degrees. Additionally, all utility text has been moved to external files to facilitate language translations, such as to Italian or French.

* Printer class code files now allow the user to define special attributes and characters for printers, such as underline, boldface, etc., when using Script, BASIC and C.

* Libraries of the same name will be searched on multiple hard disks before the "File Not Found" message appears, if necessary.

* The file name, file type and member name can now start with numerics.

* A reverse video selection bar has been added to many utility menus, such as HELP and DISK, to assist the user in selecting options.

### Operating System Enhancements

ATTACH    Allows ALF option (automatic line feed) for parallel printers. Allows attachment of COM ports 5 to 16 to CON (previously only 1 to 4). Now supports slave printers from terminals. For example:

        >ATTACH PRT CON

CHANGE    New default TOUCH option allows a file's date and time to be set to current date and time.

CLASSGEN   An additional option, PRT, is now available to print out class files. Terminal class drivers will now support slave printers through terminal AUX ports. Terminals and printers may be configured for international characters.

COPYFILE   New options -- BYREC, FRKEY and TOKEY -- have been implemented for ISAM, keyed and direct files. They allow part or all of a file to be copied to another file of the same type. The new file may be of different key-length or record-length. The new options may be used to reclaim the deleted record area.

CSI        The ! will now search for matches past spaces. PGBCK and PGFWD now allow the user to step forward and back through the history of last 16 commands.

DIAL       A pause character for Hayes modems has been added. The "&" will cause DIAL to wait for a dial tone.

DISK SHOW  Now sets the return code to non-zero if misallocations are found.

FILELIST   Now works with more files, and will recognize the default library for wild card selection. Browse features have also been added for PAGEBCK, PAGEFWD and QUIT. The GROW ratio is now displayed, such as 0.7 or 3.0, and a new sort option (SORT8) will sort by file organization, fn, ft, mn and date. FILELIST can now search the library of the same name on multiple disks. Summary line added for option PRTn.

FORCE      Now wakes up sleeping phantom or background process and logs off.

GETFILE    It can now use THEOS wild cards and DOS paths. Additionally, the GROW rate now is set to default values (0.3) for THEOS 8 files. GETFILE will also access files on the DOS partition. For example:

>GETFILE DOS.TXT:S THEOS.FILE:S

KEYWORD    It will use the SYSTEM.THEOS286 library instead of giving an error message on language codes other than 0.

LIST       Now supports the browse features: TOP, BOTTOM and pause on the last page.

PATCH      A new option, BINARY, allows for patching all files as if they were sequential. Also added is a full screen FIND to search for pattern after a specified address.

PRINTER    This new command tests various printer functions.

PUTFILE    Now writes to THEOS 8 diskettes. PUTFILE (THEOS transmits sequential files to THEOS 8 systems over COM lines using THEOS 8 RECEIVE. PUTFILE also now tranfers files to a DOS partition. For example:

>PUTFILE THEOS.FILE:S DOS.TXT:S

RENAME     Restricts renaming libraries into library members.

RESTORE    Options CLEAR, FROM and wild cards are now fully supported.

SEND       Option VER7 allows 286-V systems to send files to 8-bit systems using THEOS 8 via the RECEIVE86 utility.

SETBOARD   Menu is available for configuring expansion boards for a system. (XTs, ATs and compatibles only.)

SHOW       Now has a page-wait for multiple pages of the SHOW user display. A new subcommand, SHOW VERSION, displays the version number of the operating system.

SPOOLER    Can now initialize spooler from accounts other than SYSTEM. Additionally, open spooler print file with LOCK will suppress final page eject. New display shows printer numbers and physical attach paramenters. It now supports 16 printers instead of four.

SYSGEN     SYSTEM.SPOOLER file need not be on system disk, and can now be placed on RAM disk. Screen display now allows 16 printer support, 26 disk support and 32 user support. System will automatically initialize and build spooler file, if needed. Additionally, user need not SYSGEN PRT1 in order to have PRT3 attached to spooler.

TERMINAL   A pause character -- "&" -- has been added for Hayes modems. The following new options let you use the TERMINAL command directly from the command line without going into a menu screen. These options allow TERMINAL to be automatically invoked in an EXEC or BASIC program -- without user interaction.

           SEND <file name> Selects file to be sent and automatically sets the NOMENU option. After transmission, TERMINAL will quit.

           RECEIVE <file name> Selects file to be received and automatically sets the NOMENU option. After transmission, TERMINAL will quit. The syntax is:

           >TERMINAL (RECEIVE file.name

           EOF=<char> Sets end-of-file character for file SEND/RECEIVE. The character is the name of an ASCII control character -- NUL through US.

The following command line options are new protocols to be used for file SEND/RECEIVE: XMODEM, ETX or ETX/ACK, and XON or XON/XOFF.

## EDIT Enhancements

EDIT       The Help function key can now be entered directly. Break C will also exit the HELP screen and go back to the editor. PUT now moves current line pointer.

New extended commands include FORMAT, VIEW, PRINT and EDIT. By placing the cursor on the first line of a paragraph, FORMAT will refill the paragraph and display it on the CRT screen. Following FORMAT with an "*" will refill all paragraphs to the end of the file. VIEW will script a file to the screen. Using the full screen editor, PRINT will print a file directly to a printer.

EDIT saves a current file being edited and calls a second file to the screen for editing. A user can take information from the second file (using "PUT"), exit that file, and then transfer that information (using "GET") into the first file, which now appears back on the screen.

The new <ESC> GRAPH command converts alpha characters into line graphics. The new <ESC> SYMBOL command converts text into international symbols.

Multiple levels of CSI statements are now supported.

## SCRIPT Enhancements

* Spacing with the colon now works similarly to the period.

* All defined footings and headings will remember the current .CPI and .SIZE formats already specified.

* .LSIZE and .RSIZE following the .SIZE format will shift the left and right margins.

* .PITCH followed by a list of numbers now informs SCRIPT what fonts of pitches are available. The default is 10 and 15.

## BASIC Enhancements

* The compiler and interpreter will now use the Intel 80287 chip for floating point math if the chip is available. The 80287 support is transparent to the user. A system's performance will increase significantly -- in some cases, simply by installing the chip. (Note: Applications need to be recompiled on Version 2.2 to take advantage of the chip.)

* Two new operators are now available -- & and | -- for bitwise AND and OR operations. The following examples use these operators:

```
-10  J% = 12
-20  I% = 3
-30  IF J% | I% THEN PRINT "true" ELSE PRINT "false"
-RUN
 true

-10  J% = 8
-20  I% = 4
-30  IF I% & J% THEN PRINT "true" ELSE PRINT "false"
-RUN
 false
-
```

* The LPLIST function now allows use of number ranges. For example:

```
-LPLIST 200 500
200      WHILE (X > 5)
  .         .
  .         .
  .         .
500      WEND
-
```

* Multiple levels of CSI statements are now supported.

* New matrix operations have been added: MAT CON sets every element to one; MAT ZER sets every element to zero; and MAT IDN sets all elements to zero except the major diagonal, which is set to one. For example:

```
-10  DIM A%(2,2)
-20  MAT A% = IDN
-30  MAT PRINT A%
- RUN
 1
 0
 0
 1
```

* MAT SORT will sort a single dimensional array of integers, floats or strings into ascending order. For example:

```
-10  DIM A%(3),SA%(3)
-20  A%(1) = 6
-30  A%(2) = 8
-40  A%(3) = 4
-50  MAT SA% = SORT (A%)
-60  FOR I% = 1 to 3
-70  PRINT A%(SA%(I%))
-80  NEXT I%
-RUN
 4
 6
 8
-
```

* MAT PRINT to a file works the same in the interpreter and compiler. When printing out the elements of a matrix, it will place commas between the elements.

* CLEAR statement now can clear an array. The following example will clear the array and assign all elements to zero:

```
-10  DIM A% (10)
-  .      .
-  .      .
-  .      .
-80  CLEAR A%
```

* PRINT statement now writes sequential files with a length greater than 2048 bytes.

* READPREV and OPTION SERIAL are now fully supported.

* TAB function now uses the cursor position independent of terminal type (or embedded attributes).

* Full multitasking SEMAPHORE and TIMER functions now supported.

* Relations will now all return -1 or 0.

* The relations AND and OR are bitwise unless OPTION LOGICAL is specified.

* FLOOR command is now included in BASIC compiler.

* GET will allow mixed case.

* After compiling a program, a command file will be saved in FILENAME.COMMAND if the account does not have a default command library. To execute it, simply type the file name. The object file will no longer be saved unless a default object library is created or set up for that particular account.

Trapped Errors

The BASIC language now supports more trapped errors to help programmers catch and repair errors. The new trapped errors include:

```
 1 BREAK C
28 FILE IS OPEN
```

THEOS C Enhancements

* The auto structure definition will not allocate space.

* Structure member typedef is now allowed.

Debug and Link Enhancements

* A virtual Debugger is now available in both the THEOS C language and THEOS Software's Multi-User Development Kit.

* The LINK option DISK now creates fn.LINKMAP rather than LINK.MAP.

* The option NOMAIN will now compile programs with no main module.

* The LINKER will now test for duplicate symbols and missing MAIN modules.

* The output of LINK will now automatically be placed in the CMDLIB library.

## Commonly Used Drives with THEOS

| CYL | HD | RWC | WPC | LAND | Name |
|-----|-----|-----|-----|------|------|
| 306 | 4 | --- | 128 | 305 | Standard XT drive |
| 615 | 4 | --- | 300 | 615 | ST 225, Standard AT 20MB |
| 612 | 4 | --- | 128 | 612 | Eagle Spirit, MiniScribe 3012 |
| 640 | 6 | --- | 256 | 639 | Rodime RO206 |
| 612 | 4 | --- | 300 | 611 | Micro Science |
| 306 | 6 | --- | --- | 305 | Tandon 503 |
| 695 | 5 | --- | --- | 694 | Tandon 703 |
| 981 | 5 | --- | --- | 980 | Tandon 755 |
| 830 | 5 | --- | 400 | 829 | Micropolis 1303 |
| 830 | 6 | --- | --- | 829 | Micropolis 1304 |
| 306 | 8 | --- | 128 | 319 | ST425, MMI M225, RO204, Fujitsu M2235 |
| 733 | 5 | --- | --- | 733 | ST4038, Standard AT 30MB |
| 830 | 3 | --- | --- | 830 | Micropolis 1302 |
| 639 | 4 | --- | --- | 650 | Tulin TL/226 |
| 612 | 4 | --- | --- | 612 | Micro Science HH725A |
| 697 | 5 | --- | --- | 697 | Wren I 9415-5-36 |
| 695 | 5 | --- | 486 | 695 | Falcone |
| 925 | 5 | --- | 128 | 925 | Sperry IT, 40MB CDC |
| 1000 | 5 | --- | 512 | 1000 | Sperry IT, 44MB Miniscribe |
| 1024 | 8 | --- | 512 | 1024 | Micropolis 1308 |

Note: Drives with more than 8 heads cannot be supported by PC/XT drivers.

Appendix C

Terminal Class Codes

| Class Name | Class Code | Terminal |
|---|---|---|
| BEEHIVE | 1 | BEEHIVE B100 |
| ADDS580 | 2 | ADDS 580 ENVOY |
| ADM3A | 3 | ADM 3A |
| SOROC | 4 | SOROC IQ 120 |
| H1500 | 6 | HAZELTINE 1500 |
| TVI912 | 7 | TELEVIDEO 912 & 920 |
| FOX | 8 | PERKIN-ELMER FOX |
| BANTOM | 9 | PERKIN-ELMER BANTOM |
| H19 | 10 | HEATH H19 (ANSI mode) |
| INFOTON | 11 | INFOTON 100 |
| ELBITT | 14 | ELBITT VDU 1920 |
| ADDS20 | 15 | ADDS 20 REGENT |
| INFORMER | 20 | INFORMER 304 |
| DATMEDIA | 21 | DATA MEDIA |
| IBM3101 | 22 | IBM 3101 |
| INTERTUB | 24 | INTERTUBE |
| VC404 | 25 | VOLKER-CRAIG VC 404 |
| TELERAY | 26 | TELERAY 1000 |
| TEK4020 | 27 | TEKTRONIX 4020 |
| VIS200 | 28 | VISUAL 200 |
| HEATH | 29 | HEATH H19 (Native mode) |
| ZENTEC | 30 | ZENTEC ZEPHYR |
| TVI950 | 31 | TELEVIDEO 950 |
| TVI910 | 32 | TELEVIDEO 910+ |
| SEIKO | 41 | SEIKO 3620 |
| ALTOSII | 43 | ALTOS-II |
| KT7PC | 53 | KIMTRON KT-7 PC |
| KT7 | 54 | KIMTRON KT-7 |
| WYSE50 | 55 | WYSE 50 |
| WYSE30 | 57 | WYSE 30 |
| WYSE60PC | 58 | WYSE 60 PC keyboard |
| LINKPC | 59 | LINK 125/PC Terminal (ASCII mode) |
| IBM 3151 | 60 | IBM 3151 ASCII Display |
| CIEANT | 62 | CIE ANT |
| CANBERRA | 63 | CANBERRA Color Terminal |
| DMS1280 | 80 | Digital Micro Systems 1280 |
| PCTERM | 90 | PC Terminal-U.S. keyboard |
| UKPCTERM | 91 | PC Terminal-U.K. keyboard |
| FRPCTERM | 92 | PC Terminal-French " |
| GRPCTERM | 93 | PC Terminal-German " |
| ITPCTERM | 94 | PC Terminal-Italian " |
| SPPCTERM | 95 | PC Terminal-Spanish " |
| VT100 | 100 | DEC VT-100 |
| TVI914 | 102 | TELEVIDEO 914 |