COHERENT Operating System

Release 3.2.1

Installation Guide and

Release Notes

Read This First!

Revision 3.2.1 Printing 5 4 3 2 1

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Printed in the U.S.A.

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Section 1:

Introduction

Congratulations on your purchase of the COHERENT system! COHERENT gives your IBM AT or AT-compatible system the power of a fully multi-tasking, multi-user operating system — at a fraction of the cost asked by other vendors. Further, COHERENT achieves this goal through careful implementation of efficient designs, instead of by throwing in everything but the kitchen sink. We think you will appreciate the fact that COHERENT is powerful, yet inexpensive, small, and easy to install.

This pamphlet will show you how to install COHERENT on your system. It also includes information you should find helpful in using COHERENT. This includes information on how to contact Mark Williams Technical Support, and how to access the Mark Williams Bulletin Board.

Recent Enhancements

The 3.2 release of COHERENT includes:

- Driver for the Seagate ST0x series SCSI Host Adapter
- Driver for the Future Domain TMC-8xx series SCSI Host Adapter
- Enhanced keyboard driver, **nkb**, which supports user-defined keyboard layouts
- **ksh** — A clone of the UNIX System-V.2 Korn shell
- Enhanced version of the Bourne shell, **/bin/sh**
- New **mail** facility, supporting domain-style routing
- Enhanced **troff**, that supports PostScript and LaserJet binary fonts
- More than a dozen new commands
- Improved AT hard-disk driver, with IDE disk support
- New and updated on-line manual pages
- Numerous bug fixes and minor enhancements

The following new commands have been added:

- **cgrep** — Pattern search for C source programs
- **ckermit** — Enhanced communications and file-transfer utility
- **clear** — Clear the screen
- **cut** — Select portions of each line of input
- **detab** — Replace tab characters with spaces
- **fwtable** — Build font-width table for **troff**
- **ksh** — Clone of the UNIX System-V.2 Korn shell
- **more** — Display text one page at a time
- **paste** — Merge lines of files
- **prps** — Version of **pr** for PostScript printers
- **qfind** — Quickly find all files with a given name
- **whereis** — Locate source, binary, and manual files
- **which** — Locate executable files

How to Use These Notes

This pamphlet consists of the following sections:

1. The introduction — that is, the section you are reading right now.
2. List of hardware. This section lists hardware that we know works with COHERENT, and equipment that we know does *not* work with COHERENT. Be sure to check your equipment against the equipment listed in this section before you begin installation.
3. Installation guide. This sections walks you through the process of installing COHERENT on your computer. In the off chance that something goes wrong during installation, this section also describes problems that have occurred to some users, and how to work around them.
4. Bulletin board. This section describes how to dial into the Mark Williams Bulletin Board. This BBS gives you access to public-domain software that has been ported to COHERENT. It also gives new versions of device drivers, technical-support bulletins, product announcements, and bug fixes. You can also exchange mail with the Mark Williams technical support staff and other COHERENT users.
5. COHERENT user groups. This section describes COHERENT user groups throughout the world, and how you can contact them. It also describes how you can form a COHERENT user group and register it with Mark Williams Company.
6. Errata. This section describes errors in the manual, if any, that were discovered after the manual went to press. Try as we might, in a manual almost 1,200 pages long, mistakes are nearly inevitable. We suggest that you pencil the corrections into your manual, and we hope that you will accept our apologies for whatever inconvenience this may have caused you. This section also lists bugs that have been found in this version of COHERENT, but have not yet been fixed. Please note that as soon as a bug is fixed, you can download the corrected version of the program in question from the Mark Williams BBS.
7. Add-on products. This section details other products for use with COHERENT, including the Device Driver Kit, the various volumes of COHware, and third-party hardware and software.

Read these notes through before you do anything else. Then check your hardware against the machines listed in section 2. If you do not find a discrepancy between your machine and what is given in section 2, then continue on to section 3 and install COHERENT on your system.

How to Contact Mark Williams Technical Support

Mark Williams Company has a team of technical support specialists who are skilled at helping you solve the problems you may encounter with COHERENT.

Please note that the technical support staff try to respond promptly to all inquiries, whether by telephone, fax, E-mail, or ordinary mail. Sometimes, however, we receive E-mail from a customer only to find that our reply message is undeliverable. Therefore, if you send us E-mail, please also include a fax or telephone number, or mailing address. This will help ensure that we can contact you with our reply; after all, if we can't reach you, we can't help you solve your problem.

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To get the most out of your discussion with Technical Support, please follow these guidelines:

1. Have your COHERENT serial number at hand.

2. Know the hardware configuration you are using. This includes make and model for your motherboard, BIOS, hard drive, and any add-in cards.

3. Have an exact description of the problem. If you are getting an error message or "panic" message, write down *exactly* what appears on the screen. If a certain file, such as a C program or **nroff** document, causes a problem, try to whittle the file down to the smallest size that duplicates the problem, then mail the file on a floppy disk to Mark Williams Company.

4. If you are having problems with UUCP, please log in as **root** (the super-user) and enter the command **uucheck**. If you continue to have problems, have available (and if possible, fax to us) the contents of the following files: **/etc/ttys**, **/usr/lib/uucp/L.sys**, **/usr/lib/uucp/L-devices**, and **/usr/lib/uucp/Permissions**. Also, execute the following command to log file permissions on key UUCP files:

   ```
   ls -lR /dev/com* /usr/lib/uucp /usr/spool/uucp >/tmp/MWC.info
   ```

   Fax a hardcopy of file **/tmp/MWC.info** or copy the file onto a floppy and mail it to the Mark Williams Company Technical Support department.

6. If possible, call us when you are at your computer, with the computer turned on, so we can "walk you through" any diagnostic or repair measures needed.

Section 2:

Compatibility Information

It is impossible for Mark Williams Company to directly test more than a small fraction of the many computers, controllers, BIOSes, disks, and other devices that purport to be compatible with the IBM AT. The COHERENT system has been installed on tens of thousands of computers throughout the world, and we have received reports from many of our customers who have successfully installed and run COHERENT on their systems (as well as from the few who could not do so).

This section names the machines, add-on cards and BIOSes that have been reported either to work or not to work with the COHERENT operating system.

Before you continue, please note the following caveats:

First, this is only a partial list of the hardware on which COHERENT runs. We receive confirmation of new machine configurations almost daily. If you believe that you have a machine, BIOS, or add-on board that is **not** compatible with COHERENT but is listed below, please call our technical support department.

Second, manufacturers make changes to their hardware as part of redesigns or product improvements. These can include logic, timing, firmware, or functionality changes. Although we do try to support tested products, Mark Williams Company cannot guarantee compatibility with products not under its control.

If you believe that your computer cannot run COHERENT, please contact the Mark Williams Company technical support department. If you do not find your machine in this section, that does not mean that it will not run COHERENT; chances are that it will. Whatever happens, please contact Mark Williams Company and let us know what happened, so we can make your experience available to future users of COHERENT

Compatible Systems

The following systems have been tested with COHERENT, and have been found to be compatible. Note that configurations vary, especially with respect to disk controllers, so not all possible configurations have been tested.

ABM AT
Acer 910, 1100, 1116
AGI 1800A, 3000D, 3000G
AGL 286-12
ALR PowerFlex, 386SX, 386/220
ALR VEISA Tower 486/33
American Semiconductor 286 PC
AMI 386SX, 386
Arche 386/25
AST Premium 286, 386/33
AT&T 6386
Austin 386SX, 386/33
AUVA VIP, 300, 350/25
Bentley 286
Bitwise 33-386 Portable

Bondwell 286 Laptop
Cheetah International i486/25
Club AT, 1800
Commodore 286
Compaq 286, 386, 386 Portable
Compaq SLT 286, LTE/286
CompuAdd 286-10, 286-12
CompuAdd 216, 220, 320, 325
Compudyne 286, 386
Computer Directions 386SX
Comtex 386/20
Condor Adv 286 III
Dell System 210, 220, 300, 310, 325
DTK PEM-2000 386
Dyna 386/20
EDP 386SX
Emerson 8286ECV
EPS 386
Epson Equity II+, III+
Executive AT-286
Five Star 386/20
Gateway 2000 (RLL and ESDI)
Gateway 486, 33MHz (IDE)
GCH 386 AT
Giga-Byte 386-33
Hauppauge 386
HP Vectra RS/20 (ESDI), ES/12, QS/20
Hyundai LT3/286
IBM PC/AT (286)
Intel 301
ITC 286/12
Jameco 3550
JDR M386
Laser 286, 386, 486
Leading Edge 386, D3, 6000
Leading Technology 386SX
Logix 386-25
MAXAR 386
Micro-1 386
Micro-Designs 386, 25MHz
Micro Express 386
Micronics 386
Micronics 386SX
Mitsubishi 286L, 386
MTEK MS-23, MS-28, MS-35, MS-37, MS-41
MultiTech 900
MYLEX MWS386, 25 MHz
NCR 386, PC-810
NEC 386/25, Powermate 386/20, 386SX
Northgate 286/20, 386/16, 486
Novex 386
Olivetti M280, H28, M380
Omega 386/20
Optima 386

Packard Bell Axcel 386SX, PB900, PB286NB notebook
Packard Bell Pack-Mate, Legend V
Panasonic Notebook 270
PC Brand 386/20, 386/25
PC Designs ET 286
PC's Limited AT
PC Pros 486
PC Systems 386-20
PeaCock 286 AT
Pulse 386-SX
Samsung 5550, 5800
Schneider Euro AT
SEFCO 16 MHz 386SX
Sharp 5541
Siemens 750
Smart Micro 286, 386
Sperry IT 286
Standard Brands 386-25, 386/SX
Sunnytech 386-20
Sys Technologies 386
Tandon 386/20, 386/33
Tandy 3000HL, 3000HD, 3000NL, 4000DX, 4000SX
Televideo AT 8MHz
Telex 1280
Tera-Tek 386
Toshiba T1600 Laptop
Touche' 5550T
Tri-Star 386
Unibit DS212, DS216, DS316
Unisys 2850, 286 PW
UTI 386
Victor 386, V386S
Viglen Genie 1
Wang PC 240 AT, PC 350, PC 381
Wells American AT, 14 MHz
Wyse 2108, 2112, 2200, 3216
Zenith 248, SuperSport 286
Zenith SuperSport SX
Zenith TurboSport 386, 386/33
ZEOS 286, 386, 386SX, 386 Portable
ZEOS Notebook 286, 386SX

Compatible Add-On Products

The following add-on products have been tested with COHERENT, and have been found to be compatible. Note that board and firmware revisions may vary. Not all possible configurations have been tested.

Adaptec AHA-1540A, AHA-1542A SCSI Host Adapter
Adaptec AHA-1540B, AHA-1542B SCSI Host Adapter
Adaptec 2372B, 2372C RLL 1:1
Arnet Multiport 4/8*
Arnet TwinPort 2*
ATI VGA Wonder
BTC 1505 Monochrome Graphic Printer Card

Chase Research DB4, DB8 serial card*
Cherry keyboards
Comtrol Hostess serial card*
Connect Tech Inc. Dflex-4/8 serial card*
Dale Universal I/O SCSI
Data Technology DTC7287 RLL 1:1
Dataworld 386
Digiboard PC/x serial card*
DPT Smart Connex SCSI Host Adapter (WD emulation)
DTK PTI-217 IDE HD/FD
DTK Graphicsmith
DTK PEI-301 32-bit memory expansion
Future Domain TMC-840/841/880/881 SCSI Host Adapter
Future Domain TMC-845/850/860/875/885 SCSI Host Adapter
Geesee Trading PC-COM 4 port serial card*
GTEK PCSSI-8I serial card*
IBM AT keyboard
IBM monochrome printer card
Keytronic KB101 PLUS keyboard
Maxspeed intelligent serial card†
Maxtor 7080AT IDE hard disk drive
MYLEX DCE376DR EISA SCSI Adapter (WD emulation)
National Computer Ltd NDC545 MFM
Northgate Omnikey 102 keyboard
Perstor PS180-16FN RLL
Seagate ST01, ST02 SCSI Host Adapter
Seagate ST-225, ST-4096 MFM disk
Seagate ST-4144 RLL disk
Seagate ST-296N SCSI disk
SeaLevel Com +2/4/8 serial card*
SEFCO serial adapter
SEFCO monochrome adapter
Specialix Serial Card*
Sritek FastCom*
Sritek FastCom Plus*
Sritek FastMux 4†
Sritek FastMux 8†
StarGate Plus 8 serial card*
Syquest SCSI removable cartridge disks
Ultrastore Ultra 12 ESDI
Western Digital WD1006V-MM2 1:1 MFM
Western Digital WD1006V-SR2 1:1 RLL
Western Digital WD1007 ESDI
Western Digital 930xx series IDE hard disks

* Denotes non-intelligent multi-user cards directly supported by COHERENT.
† Contact manufacturer for COHERENT device driver.

Compatible BIOS ROMs

The following BIOS ROMs have been tested with COHERENT, and have been found to be compatible.

AMI 286, 386, 486
AMI version 3.10, 3.10D

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DTK 386
IBM AT (286)
OPTI-Modular
PHOENIX 386
PHOENIX 386SX

When running protected mode software, certain releases of the AMI 386 BIOS fail to reset the system correctly when rebooting via a **<ctrl-alt-del>** key sequence. If you have this BIOS, use the **<reset>** button to reset your system correctly.

Certain releases of the AMI BIOS fail to correctly reset the keyboard controller until after the memory test has completed. On these systems, you will not be able to prematurely exit from the memory test by using the **<Esc>** key, but you may be able to exit by using the **<Num Lock>** key.

Certain releases of the AMI 486 BIOS incorrectly diagnose external cache memory as being bad after rebooting COHERENT via **/etc/reboot** or a **<ctrl><alt><del>** key sequence. If your system exhibits these symptoms, use the **reset** button to reboot your system.

Incompatible Hardware

The following hardware is known *not* to work with this release of COHERENT.

American Multi-Source model 1004 MFM/RLL
AT&T 6300, 6300+
Chicony 101B IDE adapter
Dataworld 386/33 (video incompatibility)
Fujitsu 2612ET IDE hard disk
IBM MicroChannel PS/1 and PS/2 computers.
Leading Edge D2
Microsoft InPort Mouse
OMTI 8620 disk controller
Orchid Privilege 386SX-16 motherboard
Suntac 286-chipset based motherboards
Western Digital 1004-27X, 1004-WX1, 1002 series
Western Digital XTGEN, XTGEN+, XTGEN-2, XTGEN-R
XT (i.e., all eight-bit) disk controllers
Zenith Z449 video card (older versions cause panics)

Section 3:

Installing COHERENT

This section describes how to install COHERENT onto your computer. Installation of COHERENT is straightforward, and Mark Williams Company has prepared a suite of programs that automate much of the work for you. Tens of thousands of users have successfully installed COHERENT onto their computers. Most have found the process to be easy and quick. A few have experienced problems with installation; so if installation does not go as smoothly as you would like, the end of this section describes the more common problems and how you can fix them. If all else fails, telephone Mark Williams Technical Support, as described in the introduction to this pamphlet.

Installation requires that you make a few decisions regarding how you want your system to be configured. We strongly urge you to read this section through at least once before you begin, so you can decide correctly whenever an installation program asks you to make a decision.

Before you begin, please note the following caveats:

First, the following conditions must be met if COHERENT is to work on your system:

1. COHERENT is designed for use on the IBM AT, or on computers that are totally compatible with the IBM AT. These include IBM-compatible systems built around the Intel 80286, 80386, or 80486 microprocessors. It does not work on any MicroChannel computer (although a MicroChannel version of COHERENT is currently under development); nor does it work on any computer that is not 100% compatible with the IBM AT.

2. Your system must have at least 640K of memory, and at least one high-density, 3.5-inch or 5.25-inch floppy-disk drive installed as drive A. The distribution disks for COHERENT cannot be read by a low-density floppy-disk drive, nor can they be converted from 3.5-inch to 5.25-inch, or vice versa.

3. Your system must have a hard disk, and the hard disk must have at least ten megabytes of space free on it. More is recommended, but ten megabytes is the minimum space required by COHERENT. If you do not have enough space on your hard disk, you will have to clear space by removing or compressing existing files.

4. COHERENT can only be installed onto all of a DOS partition, or into any part of a non-DOS partition on your hard disk. If you claim all of a DOS partition for COHERENT, COHERENT will format that partition and turn it into a COHERENT partition — and in the process, erase all MS-DOS data on that partition.

If you do not wish to convert an MS-DOS partition to COHERENT and you do not have a non-DOS partition of at least ten megabytes, then you must back up your data, use the MS-DOS version of **fdisk** *and make your MS-DOS partition smaller by at least ten megabytes or however much space you wish to allocate to COHERENT.*

5. COHERENT works with RLL, MFM, IDE and most ESDI hard-disk controllers. It also works with some SCSI host adapters. Please check the previous section for a list of supported hard disk controllers and host adapters.

6. If you intend to install COHERENT on a system which uses one of the supported SCSI host adapters, be sure that your host adapter is jumpered to enable interrupts and that the interrupt number and other configuration information is available prior to beginning the installation of COHERENT. See Lexicon articles **aha154x** and **ss** for further details.

If you are unsure whether your system meets any or all of these conditions, check the documentation that came with your system, or contact the dealer from whom you purchased your system. Section 2 of this pamphlet lists the hardware that is known to be compatible, as well as known incompatibilities. Check there before you begin installation. If you believe that your computer cannot run COHERENT, please contact Mark Williams Company.

Second, Mark Williams Company has made every effort to ensure that the installation process will not destroy data on your hard disk. Note, however, that the installation process requires that you assign at least one partition of your hard disk to COHERENT. *If you have any files on that partition that you wish to save, you must back them up or they will be lost.* It is also recommended that you keep a copy, on paper, of your computer's partition table. If you do not know how to obtain a copy of the partition table, one will be displayed for you during installation. We recommended that you jot it down at that time; if something should go wrong, this information will help to recover the data on your disk.

Note, too, that installation may require that the entire disk be repartitioned; in this case, you must back up all of your hard disk, or your data will be lost. The installation program will walk you through this process, so you do not have to decide ahead of time what partitions, if any, need to be backed up.

With these caveats in mind, please continue — and we hope you enjoy working with COHERENT!

What Does Installation Do?

The point of the installation procedure is to create one or more partitions on your hard disk to contain COHERENT and its files.

When you (or your dealer) installed MS-DOS on your computer, you (or he) divided your computer's hard disk into *partitions*. A hard disk on the IBM AT can have anywhere from one to four partitions. Not every partition has to be used — your hard disk may be divided into four partitions, but have MS-DOS file systems in only two of them, with the third and fourth partitions being idle. Note, too, that the four partitions do not necessarily have to encompass the entire hard disk — a disk may have space that is outside any partition and so just sits there unused.

The file systems for COHERENT and MS-DOS are very different, so it is not possible to have both systems use the same partition — each must have one or more partitions completely to itself.

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As you can see, installation must cope with a number of variables: the size of your disk, the number of partitions into which it is divided, the size of each partition, and the number of partitions that are in use. Installation thus will follow any of a number of possible scenarios, depending on how your disk is organized and how much space you wish to give over to COHERENT. The installation process will walk you through these decisions, to make them as painless as possible.

It may well be that you do not know the configuration of your hard disk. COHERENT can figure this out, and the information will be displayed for you at the appropriate point in installation.

You can abort the installation procedure at any time by typing **<ctrl-C>**. Note, however, that aborting installation does *not* mean that your hard disk will be returned to the state it was in before installation was begun. *When a disk is repartitioned, the files that were on any modified partitions are gone forever!*

The following sections describe the installation process in some detail. Be sure to read them through before you begin.

During the installation, COHERENT will give you easily understandable prompts, and it will notify you about all actions that could destroy data on your disk before they are run. You will always be asked to confirm that you wish to run an action that destroys data before COHERENT executes that action.

Getting Started

To begin installation, reboot the system by pressing the reset button, or cold-boot your system by turning it off, waiting 30 seconds, and turning it on again. Insert the **Boot** disk from your installation kit into drive A on your system. In a moment, you will be prompted with a question mark '?'. Type:

```
begin
```

followed by the **<enter>** key. The installation program will clear the screen and display some copyright information. After you press **<enter>**, you will see the following greeting:

```
Welcome to the COHERENT operating system!

Your computer is now running COHERENT from the floppy disk.
This program will install COHERENT onto your hard disk.
You can interrupt installation at any time by typing <Ctrl-C>;
then reboot to begin the installation procedure again.
Please be patient and read the instructions on the screen
carefully.
```

As the instructions say, you can interrupt installation at any point by typing **<ctrl-C>**. Be sure, as well, to read the instructions carefully.

Selecting a Keyboard

The next menu asks you to select a keyboard table from the list shown. There are approximately 19 choices of keyboard tables.

The menu entries marked **(not loadable)** are the traditional COHERENT keyboard drivers, which are linked directly into the kernel. These include the traditional US, German, and French keyboards. These traditional keyboard drivers work with all keyboards, even the inferior ones sold with some "clones".

The other 16 or so menu entries represent loadable tables. These use the **nkb** driver and thus allow you to customize the tables to your liking, as well as load new tables at run time. Please note, however, that the **nkb** driver (and loadable tables) only work with well-engineered keyboards, such as those built by IBM, Cherry, MicroSwitch, or Keytronic; when used with an inferior "clone" keyboard, it may not work correctly.

When the menu appears, the line for the non-loadable US keyboard table is highlighted. This table will satisfy the needs of all users in the United States, and many users abroad. To select this entry, simply press **<enter>**; COHERENT will do the rest.

If you live outside the United States and so need a specialized keyboard table, press the **<space>** bar or the arrow keys until the table you want is highlighted; then press **<enter>** to select the highlighted entry. *The new keyboard layout takes effect as soon as COHERENT reboots to read the rest of the installation disks.*

Note that if you choose one of the entries marked **not loadable**, you can use only that keyboard layout; the only way to select another keyboard layout is to re-install COHERENT. Please note, too, that loadable keyboard tables will not work with inferior "clone" keyboards; these keyboards work only with the menu entries marked **not loadable**. Loadable keyboard tables are known to work correctly with keyboards manufactured by IBM, Cherry, MicroSwitch and Keytronic.

If your keyboard's layout does not correspond to one of the entries from the menu, select a loadable keyboard table layout that resembles your keyboard. After installation, you will be able to modify that entry to make it correspond to your keyboard. See Lexicon articles **keyboard tables** and **nkb** for further details on creating a new keyboard layout, or modifying an existing one. In addition, the Mark Williams Company BBS system contains additional keyboard tables. See the following sections of this manual for details on accessing the MWC BBS system and on contacting satellite COHERENT BBS systems around the world.

Entering the Serial Number

The next screen will ask you to enter a nine-digit serial number. This number is included on a paper supplied with your copy of the COHERENT system. The installation process cannot continue until you enter this number correctly.

Setting the Date and Time

The next screen asks you to set the date and time for COHERENT. Setting the date and time is vital to the correct operation of COHERENT; however, COHERENT records the date and time quite differently from the way MS-DOS does.

Time under COHERENT is recorded as the number of seconds since January 1, 1970, at exactly midnight. Internally, COHERENT always stores time as Greenwich Mean Time. GMT is used to make it easy for COHERENT systems around the globe to coordinate time with each other. When COHERENT time-stamps a file or displays the time, it converts Greenwich Mean Time to your local time, depending on what time zone you live in and whether Daylight Savings Time is in effect. (For a detailed discussion of this topic, see the Lexicon's entry for **TIMEZONE**.)

The installation program will display the following text:

```
It is important for the COHERENT system to know the
correct date and time.  You must provide information
about your timezone and daylight savings time.

According to your computer system clock, your current
local date and time are:
date and time
```

You will be asked if this is correct. If it is not correct, the installation program will prompt you for the correct date and time.

You will then be asked about daylight savings time:

```
You can run COHERENT with or without daylight savings
time conversion.  You should normally run with daylight
savings time conversion. However, if you are going to use
both COHERENT and MS-DOS and you choose to run with daylight
savings time conversion, your time will be wrong (by one
hour) during daylight savings time while you are running
under MS-DOS.
```

You will be asked if you want to run in daylight-savings mode. You should answer yes unless you have an overwhelming reason not to.

The installation program then describes the default daylight-savings settings:

```
By default, COHERENT assumes daylight savings time begins
on the first Sunday in April and ends on the last Sunday
in October.  If you want to change the defaults, edit the
file "/etc/timezone" after you finish installing COHERENT.
```

The default settings are those enacted by law for the United States. COHERENT will then display a timezone menu similar to the following and then ask you what time zone you live in:

```
Please choose one of the following timezones:
        0       Central European
        1       Greenwich
        2       Newfoundland
        3       Atlantic
        4       Eastern
        5       Central
        6       Mountain
        7       Pacific
        8       Yukon
        9       Alaska
        10      Bering
        11      Hawaii
        12      Other
```

If you select 0 through 11, COHERENT will set your local time automatically. If you select "Other", you will be asked how many minutes of time you live east or west of Greenwich, and then asked to name your time zone. If you are unclear on these concepts, consult the Lexicon article on **TIMEZONE**. If you are unsure about how your local time relates to Greenwich time, consult an atlas, check with your local library, or telephone a local radio

station.

COHERENT will then display the corrected local time and ask if it is correct. If not, you can repeat the process until the time is correct.

Installing Onto a SCSI Hard Disk

If you are installing COHERENT onto a SCSI disk drive, you will will be prompted with a menu resembling:

```
COHERENT currently supports the following SCSI host adapters:

(1) Adaptec AHA-154x series
(2) Seagate ST01 or ST02
(3) Future Domain TMC-845/850/860/875/885
(4) Future Domain TMC-840/841/880/881

Enter a number from the above list or 0 to exit:
```

If you intend to install COHERENT on a system which uses one of these supported SCSI host adapters, be sure that your host adapter is jumpered to enable interrupts and that the interrupt number and other configuration information is available. See Lexicon articles **aha154x** and **ss** for further details.

Back Up the Hard Disk

After the time is set, installation moves on to its next phase, partitioning the hard disk. Before you become seriously involved in partitioning, however, you have one last chance to back up your hard disk. As you enter the partition phase of installation, you will see the following text:

```
This installation procedure allows you to create one
or more partitions on your hard disk to contain the
COHERENT system and its files.  Each disk drive may
contain no more than four logical partitions.  If all
four partitions on your disk are already in use, you will
have to overwrite at least one of them to install COHERENT.
If your disk uses fewer than four partitions and has enough
unused space for COHERENT (ten megabytes), you can install
COHERENT into the unused space.  If you intend to install
MS-DOS, you should install it before you install COHERENT.

The next part of the installation procedure will let you
change the partitions on your hard disk.  Data on unchanged
hard disk partitions will not be changed.  However, data
already on your hard disk may be destroyed if you change
the base or the size of a logical partition, or if you
change the order of the partition table entries.  If you
need to back up existing data from the hard disk, type
<Ctrl-C> now to interrupt COHERENT installation; then
reboot your system and back up your hard disk data onto
diskettes.
```

If you need to back up your hard disk and have not yet done so, please do so now.

The COHERENT System

Use the COHERENT Bootstrap?

If you have already backed up your hard disk, continue to the next phase, which is to decide whether to use the COHERENT master bootstrap. When you press **<return>**, you will see the following text:

```
COHERENT initialization normally writes a new master
bootstrap program onto your hard disk.  The COHERENT
master boot allows you to boot the operating system on
one selected disk partition automatically; it also allows
you to boot the operating system on any disk partition by
typing a key when you reboot.  However, the COHERENT master
boot may not work with all operating systems.  If you do
not use the COHERENT boot, you must understand how to
boot the COHERENT partition using your existing bootstrap
program.
```

As explained in the prompt text, a *bootstrap* is a program that pulls an operating system into memory and sets it to running — the name relates to the fact that the operating system "pulls itself up by its boot straps". The COHERENT master bootstrap can boot COHERENT as well as many other operating systems, including MS-DOS (at least, the many versions of MS-DOS that have been tested). If you choose not to use the COHERENT master bootstrap, you must consult the documentation that came with your system to see how you can use your operating system's current bootstrap routine to boot another operating system. If, however, you choose to use the COHERENT master bootstrap and find that it has trouble booting your current operating system, you should be able to boot your current operating system by using a boot floppy disk; you will not be able to boot it off of the hard disk, but at least it will be available to you. For these reasons, we strongly suggest that you use the COHERENT master bootstrap routine.

Prior to overwriting the bootstrap, the COHERENT installation procedure will ask:

```
Do you want to save the original boot block?
```

If you wish to save a copy of your existing bootstrap, you will need to have a *high density formatted floppy* available. The floppy disk may have been formatted using MS-DOS. The boot block is not saved as a file — it is merely written into the first sector on the floppy disk. You will need to save your original boot block should you ever want to remove COHERENT from your system. While we cannot imagine why anyone would want to do such a thing, you may want to save your original boot block, just in case.

install then asks:

```
Do you want to restore a previously saved boot block?
```

You should answer yes only if you are removing COHERENT from your system and need to restore a previously saved boot block.

After you answer this prompt, you will move into the next phase, partitioning the disk.

Partitioning the Hard Disk

Installation then moves into the next phase: selecting a disk partition for COHERENT. As described above, partitioning can vary greatly from disk to disk; how the disk is partitioned will determine how much space is allocated to COHERENT and how much to MS-DOS. This is the trickiest part of installation, so be sure to read carefully.

How a Disk Is Organized

This phase begins by displaying the current layout of your hard disk: the number of partitions, the size of each partition, and the operating system associated with each partition. Note that the partition table is displayed in *physical* order (i.e., the actual order in which the partition table entries occur). Some operating systems display the table in *logical* or sorted order.

The following gives the printout for a typical hard disk. This hard disk, called disk **0**, has approximately 33 megabytes on it organized into two MS-DOS partitions, as follows:

```
Drive 0 Current has the following configuration:
             [In Cylinders] [  In Tracks  ]
Number  Type  Start End Size Start  End Size Mbyte Blocks Name
0 Boot MS-DOS     0  149  150     0  899  900  7.83  15300 /dev/at0a
1      EXT-DOS  150  614  464   900 3684 2784 24.28  47430 /dev/at0b
2       UNUSED    0    0    0     0    0    0     0      0 /dev/at0c
3       UNUSED    0    0    0     0    0    0     0      0 /dev/at0d
```

If you have more than one hard disk on your machine, then you will see the table for the second disk after you have finished partitioning the first.

Note that MS-DOS names each "drive" by a letter of the alphabet, beginning with C. (This nomenclature is a hold-over from the days when MS-DOS only ran on floppy disks, with 'A' and 'B' reserved for the two floppy-disk drives.) Because MS-DOS allows you to have only two DOS partitions on any given hard disk, then if an MS-DOS system has more than two "drives" on one hard disk, the additional drives are *logical* drives and are a division of the EXT-DOS partition. COHERENT cannot be installed onto a logical drive.

As mentioned above, we suggest that you copy down this table before continuing; if an error were to occur, this information will help you recover the data on your disk.

As you can see, this disk has four partitions, numbered 0 through 3. Partition 0 is marked as the boot partition; what this means is explained below. COHERENT has given each partition a name, **/dev/at0a** through **/dev/at0d**; you will not be working with these, however, so you can safely ignore them for now.

Note that the middle columns of the table give the size of each partition in three ways: in cylinders, in tracks, and in megabytes. How do these differ? Megabytes is the easiest to understand: that the number of bytes that can be written into the partition. Cylinders and tracks, however relate to the way a hard disk is built. A moment spent here on background can make what is to come much easier to understand.

Cylinders and Tracks

Consider a high-density floppy disk. Its surface is organized into 80 concentric rings, or *tracks*, numbered 0 through 79. Each track holds a fixed amount of data, with the amount depending upon the density of the disk. When the disk is in your disk drive, a *head* moves back and forth, reading tracks as directed. Unlike a phonograph cartridge, however, the head jumps from track to track discretely — it does not spiral in. Thus, you can measure space on a disk simply by counting the tracks. Note, too, that the term "head" is often used to describe one surface of a multi-sided disk.

As you've probably noticed, a floppy disk has two surfaces: the top and the bottom. The top is usually refered to as side 0, the bottom as side 1. Each surface has its own system of tracks, each numbered 0 through 79, giving a floppy disk a total of 160 tracks. Also, to read the disk a floppy disk drive actually has two heads, one for each surface.

A *cylinder* is the set of identically numbered tracks from both surfaces of the disk. A floppy disk organizes its 160 tracks into 80 cylinders: side 0 track 0 plus side 1 track 0 form cylinder 0; side 0 track 1 plus side 1 track 1 form cylinder 1, etc. If you think of a track as being a ring on the disk, then origin of the term "cylinder" should be obvious.

Now, consider a hard disk. The term "hard disk" is somewhat incorrect, because one hard disk actually contains many hard disks, or *platters*, inside itself. The platters are stacked on a spindle, much like a set of 45-rpm records stacked on a record changer — except that heads move between the platters, one head for each platter surface (or two per platter). The number of platters and the number of tracks on each platter determine both the number of cylinders and the amount of data that can be written to the disk. Consider the disk described in the above table, which is a fairly typical device. It has three platters (six heads). Each head has 615 tracks, each of which holds 8,704 bytes. Thus, the device has a total of 3,690 tracks (6 times 615), organized into 615 cylinders, with each cylinder holding 52,224 bytes (6 times 8,704).

Different operating systems organize disk partitions in different ways. MS-DOS, for historical reasons, organizes partitions along track boundaries; under this scheme, the tracks of a cylinder can be divided between two partitions. UNIX, COHERENT, and similar operating systems prefer to organize partitions along cylinder boundaries: all of the tracks of a cylinder belong to only one partition. This lessens movement of the heads, which in turn speeds up reading of the disk. Note that, strictly speaking, "megabytes" has no meaning when thinking about disk partitioning: partitioning must be done either in tracks, or in cylinders. Humans tend to think of partitions in terms of megabytes, that is, in terms of the amount of data we can write into a partition, but when organizing your disk it is much easier to think in terms of cylinders. However, it is simple to translate cylinders into megabytes, which gives you the best of both worlds; this will be discussed in the following sub-section.

Partitioning the Disk

When you enter the partitioning phase of installation, the installation programs will display the configuration of your hard disk for you, using a table like the one shown above. It then displays the following menu:

```
Possible actions:
   0 = Quit
   1 = Change active partition (or make no partition active)
   2 = Change one logical partition
   3 = Change all logical partitions
   4 = Delete one logical partition
   5 = Change drive characteristics
   6 = Display drive information
   7 = Proceed to next drive
```

Before we discuss what these options do, note that you must *not* alter the *size* of an MS-DOS partition using any of the above options. You must install COHERENT into *all* of an MS-DOS partition, or into any part of the drive that has space unallocated to MS-DOS. Changing the *size* of an MS-DOS partition at this point, to make room for COHERENT, will invalidate the MS-DOS partition table, may corrupt MS-DOS data, and may make it unbootable from the hard drive. If you do wish to change the *size* of an MS-DOS partition, abort installation of COHERENT, back up all of your MS-DOS data, use the MS-DOS version of **fdisk** to change the layout of your hard disk, restore your MS-DOS data, and only then install COHERENT.

The following describes each option in detail.

0. Option 0 is self-explanatory.

1. The *active partition* is the partition that the bootstrap program reads by default. When a partition is made the active partition, the operating system mounted on that partition is booted automatically when your turn on your computer. This option allows you to change the active partition, or to designate **no** active partition, in which case the computer will prompt you at boot time for the partition number to boot. You will need this option only if your hard disk has more than one logical partition, and the partitions contain different operating systems. Note that if later you wish to change the active partition, you can use the COHERENT command **fdisk** to do so. See the Lexicon entry on **fdisk** for details.

2. This option lets you change one logical partition — in effect, it lets you select a logical partition for COHERENT. You should use this option if your hard disk has more than one partition and you wish to install COHERENT on only one of them. The partition you select must hold at least ten megabytes. Note that the contents of the partition will be deleted.

3. This reconfigures the entire disk. You can reset the number of partitions, and the size of each.

4. Option 4 is self-explanatory.

5. This option allows you to change the drive parameters associated with each drive on your system.

6. Give summary information about the disk.

7. This option will only appear if you have more than one hard disk drive. Use this option to select the next hard disk drive.

Begin by entering option 6, to receive more information about your disk. The following display gives the display for the hard disk described in the above table:

```
Drive 0 has 615 cylinders, 6 heads, and 17 sectors per track.
It contains:
        615 cylinders of 52224 bytes each,
        3690 tracks of 8704 bytes each,
        62730 sectors of 512 bytes each
or a total of 32117760 bytes (32.12 megabytes).
```

If the owner of this hard disk wanted to organize his hard disk by megabytes, all he would have to do is divide 1 million by 52,224 to find that one megabyte is approximately equal to 20 cylinders; thus, to make a ten-megabyte partition, he would assign it 200 cylinders. The size of a cylinder may be different on your system, but the principle is the same.

The next step depends on two factors: the current organization of your hard disk, and the amount of space you wish to give to COHERENT. The current limit for a COHERENT partition is 95 megabytes, but 70 to 80 megabytes is more realistic. If your disk has only one logical partition, you must use option 3 to create at least one new logical partition. If your disk already has more than one logical partition, you can use option 2 to assign one to COHERENT or use option 3 to assign more than one, reserving the rest for your current operating system. Of the partition(s) that you assign to COHERENT, one must hold at least ten megabytes — you cannot use two five-megabyte partitions; thus, if no partition on your disk holds ten megabytes, you must use option 3.

How much space should you give COHERENT? COHERENT is a multi-user, multi-tasking operating system; the more space you assign to it on your disk, the more users and the more processes it can support. COHERENT, via UUCP and other communications programs, also gives you access to information on other COHERENT and UNIX systems throughout the world; you will want to exchange mail with other users and possibly download news and information. All of this takes up space. You must have one ten-megabyte partition to hold COHERENT's root file system (that is, the file system that holds the files that make COHERENT go), and you would be well advised to assign at least one more partition of at least half the size to hold users' accounts and their files.

If you have a large disk drive that is organized into one partition that you wish to assign to COHERENT, you are well advised to divide it into two smaller partitions. For example, if you wish to allocate 40 megabytes to COHERENT, you should create two 20-megabyte partitions rather than one 40-megabyte partition. In addition, if you anticipate wanting to perform a full restore of a dumped root partition, you are well advised to have a spare COHERENT partition in addition to the root partition. An alternative strategy would be to boot from the COHERENT Boot diskette and then restore your root partition. This assumes that the device you dump and restore from is different than your boot floppy!

The following two sub-sections describe what happen when you invoke options 2 or 3.

Changing One Logical Partition

You will first be asked which partition you wish to change. Reply by entering the partition you want. The system replies with the following text:

```
Existing data on a partition will be lost if you change
the base or the size of the partition.  Be sure you have
backed up all data from any partition which you are going
to change.

You may specify partition bases in cylinders or in tracks.
```

Reply 'y', to use cylinders. The system then asks:

```
You may specify partition sizes in cylinders or
in megabytes.
```

Reply 'y', again to use cylinders. Next, the system says whether the partition is initialized to MS-DOS or is unused. It then asks you whether you wish to install COHERENT into the partition, leave the partition unchanged, or mark the partition as unused. You must select one of these possibilities: **install** cannot install any operating system other than COHERENT into a partition. To install COHERENT into this partition, reply 'y' when asked if you want this to be a COHERENT partition.

The final two questions ask you to enter the new base cylinder for the partition and the size of the partition in cylinders. Each question will prompt you with the current value for the partition. Simply pressing **<return>** would leave this current value unchanged. It is possible to make the partition smaller, but this serves no practical purpose if you simply intend to install COHERENT into this partition.

If you have made a mistake during this process, the system will prompt you and ask you to correct it. Otherwise, you will proceed to the next phase of installation, which is to scan for bad blocks (described below).

One last word of warning: you should *never* use the COHERENT version of **fdisk** to change the size of an MS-DOS partition. Use it to change the size of an unused partition, or of a partition that contains an operating system other than MS-DOS; these include COHERENT itself. If you wish to change the size of an MS-DOS partition, back up all data in that partition, then use the MS-DOS version of **fdisk**.

Changing All Logical Partitions

This process mirrors what occurs when only one partition is changed, except that it is iterated for every existing partition. If you have four partitions and wish to eliminate one, simply set its size to zero. If you have fewer than four partitions, you will be asked if you wish to create any additional ones.

Note one additional feature: the table that displays the layout of partitions (an example of which is shown above) is redisplayed after every partition, showing the changes you have made (if any). By looking at the table, you will find it easy to keep straight just what you have done — when you work with this table, you will see the value of working in cylinders.

If you make a mistake, the system will prompt you to correct it. A common error is requesting overlapping partitions — that is, setting the base cylinder of a partition within an area already allocated to another partition. Another error would be to request an impossibly large partition.

It is strongly recommended that you *not* include the last cylinder of your hard disk in any partition. This cylinder is often used by diagnostic programs, and, as such, is not available for general use.

This concludes the discussion of partitioning the disk. The system will then move to the next phase of installation.

Scanning for Bad Blocks

When a partition on an MFM, RLL or IDE interface disk drive is assigned to COHERENT, it must be scanned for bad blocks. (The terms *block* and *sector* are often used interchangeably.) Most hard disks have at least a few blocks in which the disk's surface is flawed and therefore cannot be trusted to hold data reliably. Note that scanning is not required on SCSI interface devices.

The COHERENT System

COHERENT keeps a list of bad blocks for each partition, to ensure that it does not write data into an unreliable area. This checking is performed automatically, but takes a few minutes. Patience is recommended.

Creating COHERENT File Systems

Once COHERENT has created a list of bad blocks, it can generate a file system for each of the partitions that you have assigned to it. One partition must be assigned the root file system; the root file system is the one that holds the files owned by COHERENT itself, the files that make the system go. If you are assigning more than one partition to COHERENT, you will be asked which you want to hold the root file system.

Mounting File Systems

The next step is to mount the file system assigned to the physical partition. You are not required to mount any file system except the root file system, although for most purposes there is no reason not to mount a file system that you have created. The system will ask you to assign a name to each file system. For historical reasons, a file system is usually given the name of a single letter from the end of the alphabet, such as 'v' or 'x', although there's no reason not to name a file system 'work' or 'usr'. Each name must be preceded by a slash '/'.

Rebooting

Now that partitions have been allocated and file systems have been created and mounted, the next step requires that COHERENT be booted from the hard disk. If you have elected to use the COHERENT bootstrap, and if you have the COHERENT boot partition the active partition, all you have to do is remove the **Boot** disk from the floppy-disk drive when prompted, and then reset your computer.

If you have made an MS-DOS partition the active partition, you must perform one additional step: type the number of the partition that holds the COHERENT root file system as the system is attempting to access the floppy disk for the bootstrap program. The number must be typed from the numeric keys at the top of the keyboard, *not* from the keypad. Before it begins the rebooting process, the system will tell you which number to press.

You can reconfigure the bootstrap at any time after installation. For more information on booting, see the Lexicon article **boot**.

Copying Files

If rebooting occurs correctly, you will then be running COHERENT off of the hard disk. Now comes the event for which all of this preparation has occurred: the system copies the COHERENT files onto your hard disk. The system will prompt you to insert the three remaining disks that hold the COHERENT files, one after the other.

The system will ask you whether you want the full set of manual pages on line in uncompressed form, and whether you want the dictionaries used by the COHERENT spelling checker also in uncompressed form. These files must be uncompressed before they can be used, but take up much more room on the disk. You must decide whether the extra convenience of having on-line manual pages and a spelling checker is worth the extra space they require.

Touring the COHERENT File System

Finally, for the last step in installation the system will ask you if you wish to take a tour of the COHERENT file system. We suggest you answer yes, for this is the best way to become familiar with the layout of your newly installed COHERENT system.

And with that, the installation of COHERENT is finished!

If at some later time you wish to review the tour, simply run **/etc/coh_intro**.

In Case of Difficulty

As we mentioned earlier, tens of thousands of users have successfully installed COHERENT onto their computers. Most encountered no difficulties whatsoever during installation; chances are you will not encounter any either. If problems do arise, however, the Mark Williams support staff will gladly help you. Before you call, however, be sure to check the following sub-sections. They describe many of the more commonly encountered problems, and gives advice on how to overcome them. If your problem is not covered in this chapter — or if you've tried what it suggests and it does not work — call Mark Williams. Information about contacting Mark Williams Technical Support is given in the introduction to this pamphlet.

Are you booting COHERENT Disk 1 via <ctrl-alt-del> (warm boot)?

It may help to cold boot your system; turn power off, wait at least 30 seconds, then turn power back on. Rebooting via cold boot is more resistant to getting a virus from something you have already loaded, and avoids a family of bugs in the AMI BIOS, MS-DOS, and Windows that relate to warm boots.

Do you have a defective RAM chip?

We have seen cases in which computers go through normal startup and even run MS-DOS without difficulty, but give panic errors or stack overflow errors randomly when running in protected mode. Weak memory chips and some defective or poorly designed motherboards can be found by running a thorough, protected-mode diagnostic program on memory, then replacing all defective parts that it discovers.

Are you running in Turbo mode?

Sometimes customers, especially those experiencing panic traps, can install when they change processor speed. Although the improvement, when it occurs, usually happens when the CPU is slowed down, we have seen one case where it helped to speed up the processor. In general, panics that vanish or significantly change their pattern of appearance when CPU speed is changed, strongly suggest that the problem is due to a poorly designed or incompatible motherboard (see below).

Will it help to change the master boot procedure?

If you are having trouble selecting the partition your computer boots from, it may help to modify the master boot sequence, as follows. (1) Use the command **/etc/fdisk** to select *no* active partition, or, during startup, hold down the key corresponding to the root COHERENT partition (over the alpha keyboard, *not* on the numeric keypad) until startup halts with a keyboard error. (2) Press **<F1>** to continue. Boot should progress to COHERENT.

The COHERENT System

Is CMOS configured correctly for drive A?

Some customers who ordered the wrong size of diskettes switched floppy-disk drives A and B, but failed to update the setup for the computer. This often produces an error message of the form

```
fsminit: no root dev (4,14)
```

The solution is to configure the CMOS correctly. See your computer's technical documentation for details on how to do this.

Do you have an incompatible hard-drive controller?

If you have a Western Digital controller model WD1006V-SR2 and it is a Feature 3 board, you may need to replace it. Some of these controllers have defects that cause them to latch up.

If you have a Western Digital controller model WD1006V-SR2 and it is a Feature 5 board (Feature 5 boards have all the jumper headers installed), install the "non-latched" mode jumper, which is the first one (J1).

If you have an old machine such as an IBM XT-286, you may have an eight-bit XT controller rather than a 16-bit AT controller. The eight-bit XT controllers are not compatible with COHERENT.

The following Western Digital controller types are eight-bit XT devices, and are therefore incompatible with COHERENT:

1004-27X
1004-WX1
1002-anything
XTGEN, XTGEN+, XTGEN-2, XTGEN-R

In any case, please contact Mark Williams Technical Support with the make and model of the controller. It may lead us to a new pattern that we can accommodate. Some customers have Perstor, IDE, ESDI, or SCSI controllers and did not know it until they checked the controller type; there are known compatibility issues with some controllers of all the above types.

Do you have incompatible hard-drive parameters?

If you were *unable* to install COHERENT, check the contents of **CONFIG.SYS** from the MS-DOS root directory on drive C. If you find one of the following **DEVICE=** entries there that configures the hard drive, it may be an indication that your hard disk layout is non-standard. However, many users of the following device drivers have successfully installed COHERENT, so please be sure that you have attempted installation *prior* to contacting Mark Williams Technical Support.

DMDRVR.BIN
EDVR.SYS
SSTOR.SYS
HARDRIVE.SYS
FIXT_DRV.SYS

Before you call, note your hard-drive's make, model number and parameters (i.e., number of heads, cylinders, and sectors per track) from the documentation supplied with the hard

drive. Most drives are configured with 17 sectors per track when used with MFM encoding, 26 sectors per track with RLL encoding, and 31 sectors per track with Perstor controllers. Check these parameters against what is in the CMOS setup: CMOS specifies parameters by storing the drive type number, which specifies an entry in the BIOS disk parameter table. If there is a setup program in the BIOS, it may give drive parameters explicitly; or, it may be necessary to look up the entry in the manual for the BIOS.

If the number of cylinders is greater than 1,024, you may have an incompatible drive: the standard PC partition table format does not allow cylinder numbers greater than 1,024. However, some disk controllers and most IDE drives support a "translation mode" that allows them to operate with BIOS parameters that do not match the actual parameters of the disk drive (i.e., physical drive geometry). For example, the following table lists the physical and translation mode parameters for the Western Digital WD93044-A IDE drive:

	Physical	*Translation*
Cylinders:	782	977
Heads:	4	5
Sectors:	27	17
Landing Zone:	862	977

The Adaptec 2372 and Western Digital 1006V-SR2 series controllers simulate the presence of valid drive parameters when the drive type is set to '1' in the system setup. With these controllers, it is possible to install COHERENT when the drive parameters do not correspond to any drive type in the BIOS, but you must be sure to set the drive type to "1" in the CMOS setup.

Some instances of incompatible hard drives do not permit installation of older releases of COHERENT, but do allow version 3.2 to be installed. In version 3.2, drive parameters can be entered manually from the keyboard during installation.

Do you have an incompatible keyboard?

If you are experiencing problems with respect to key mappings, and you installed one of the loadable keyboard mapping tables from the keyboard selection menu, you may have an incompatible keyboard. Please note that the COHERENT **nkb** driver (and loadable tables) only work with well-engineered keyboards, such as those built by IBM, Cherry, MicroSwitch, or Keytronic; when used with an inferior "clone" keyboard, it may not work correctly. If you wish to use an incompatible keyboard with COHERENT, you will need to re-install COHERENT and specify one of the keyboard entries marked **not loadable** from the keyboard menu.

Most of the incompatible keyboards exhibit one or more of the following symptoms:

- SHIFT, CONTROL, or CAPS LOCK keys are transposed
- CAPS LOCK, NUM LOCK, or SCROLL LOCK keys do not function
- the system hangs when trying to load the keyboard mapping table

If your keyboard works correctly except for one key, such as the key containing the '|' or the '\', you only need update the keyboard mapping table for your particular keyboard layout. See Lexicon articles **nkb** and **keyboard tables** for further details.

Do you have an incompatible video board?

If you are using a Zenith Z449 series CGA/VGA video adapter and are experiencing panic traps, there is a known defect in this board. Contact Zenith Data Systems, or try a different video board.

Some (unlabeled) monochrome boards do not work in protected mode. Symptoms include immediate panic or loss of video when booting from disk 1. If possible, try exchanging video boards.

Do you have a system incompatible with the MWC master boot program?

The Mark Williams master boot program is known *not* to work with certain Zenith 241- and 248-series computers using Zenith's BIOS. It should be possible to install and run COHERENT as long as the master boot program is *not* used.

Do you have an incompatible clock device?

If the install process fails when trying to set the system time and date (**ATclock** failure), please contact Mark Williams Technical Support.

It is common to see an **ATclock** failure when a computer has less than megabytes of RAM. If you have less than 640 megabytes of RAM, you should upgrade your memory. Not only will the clock problem be solved, but your system's performance will improve as well.

Is your system extremely slow?

If you are running COHERENT on a SCSI disk drive and your system is running very slowly, odds are that your host adapter is not correctly configured. Some non-COHERENT systems "busy wait" the host adapter when performing SCSI I/O. Since COHERENT is a multi-tasking, multi-user system, it requires the use of interrupts to signal when the host adapter has completed an I/O operation and is ready for the next request. If your host adapter is not correctly configured, it may not be asserting the correct interrupt, or it may not be asserting any interrupt. Please check the jumpers on your host adapter to verify that the correct interrupt is being asserted. If you have further questions, see Lexicon articles **aha154x** and **ss** for further details, or contact the hardware manufacturer.

Do you have an incompatible system?

If you have problems that cannot be helped by any of the above, then your computer system may not be capable of running COHERENT. Note that it is possible for a system that cannot run COHERENT to be made up entirely of components known to work on other systems running COHERENT. The greatest number of these cases is seen with customers running an AMI BIOS, IDE hard drives, or any kind of DTK motherboard. Please record as much information as possible about make and model of motherboard, BIOS, hard drive controller, hard drive, and all other equipment installed; then contact Mark Williams Technical Support.

Section 4:

Mark Williams Bulletin Board

Mark Williams Company has set up a COHERENT UUCP node for dial-up use by our customers. It serves three major purposes:

1. As a remote site with which you can test your UUCP configuration.
2. As a source of news, bug fixes, and public-domain software for you to download. In addition, the BBS lists new "third party" software and hardware that work with COHERENT.
3. As a mail drop for customers who request an account. If you wish, you can can exchange electronic mail with MWC and other COHERENT users.

Accessing the MWC BBS

This section describes how to access the MWC BBS via UUCP. The following examples assume you have a 2400-baud Hayes-compatible modem connected to COM1 unless stated otherwise. You can also access the MWC BBS by using a 1200-baud modem, a 9600-baud V.32 modem, a 9600-baud HST modem, or a 9600-baud Trailblazer modem. See your modem's instruction manual for more information if your modem is not Hayes compatible.

Set Up Your Modem

The first set to accessing the MWC BBS is to set up your modem to use UUCP.

First, check the cable that connects your modem to your computer. You must use a cable that provides "full modem control" — that is, a cable that transmits all the modem control signals from your modem to your serial port. *A simple three-wire connection will not work correctly!*

The Lexicon article on **RS-232** describes the pin-out of such a connector. However, if you are not experienced at soldering cables and connectors, you are well advised to go to your local computer dealer and purchase a cable that provides "full modem contro". The few dollars you spend there will be more than offset by sparing yourself the aggravation of trying to wire and check a cable on your own.

The next step is to check the file **/etc/ttys**. This file must contain a valid entry for the port into which you have plugged your modem. (In the following examples, user commands are shown in **bold**, the command's replies are shown in monospaced font, and comments are in *italics*.) The following entry is typical:

```
11Pconsole
1rLcom1r
11Pcom21
```

As you can see, there are two entries for **COM** ports. The first, **1rLcom1r**, describes COM1: the port is enabled (that is, someone can dial into your system via it), it is plugged into a remote device (i.e., the modem), and it is set to 2400 baud. For details how to interpret the entries in file **etc/ttys**, see the entry **ttys** in the Lexicon.

The next step is to ensure that your modem's registers are initialized properly. To check the settings of your modem, turn it on and then type the following script:

```
/etc/disable com1r                    disable port
kermit cbl 2400 /dev/com1l
kermit: connected...
at&v                                  use atn? for the Trailblazer
```

These commands print the contents of the modem's registers.

The modem should be configured for "no echo" and "terse" mode. Usually, these are indicated by settings **E0** and **V0** for Hayes-compatible modems. If they are not so set, type the commands **ATE0** and **ATV0** to give them the proper settings.

You may wish to set your modem so that it is always set properly for UUCP. Modems can be set this way either via setting DIP switches or commands; your modem's documentation will explain how to do this.

When the modem is set up properly, exit from **kermit** by typing **^c** — that is, a caret followed by letter 'c'.

Set Up UUCP

Once your modem is set, check that UUCP is set up properly.

During the initial set-up of UUCP, you should ensure that no stale UUCP control or data files exist in directory **/usr/spool/uucp**. To remove any stale files, enter the command:

```
rm  -f  /usr/spool/uucp/LCK*  /usr/spool/uucp/TM*
```

Next, check that the UUCP subsystem can access your modem device. For example, entering the following command changes the permissions on all variants of our sample modem port:

```
chmod  666  /dev/com1*
```

Next, check that file **/usr/lib/uucp/L-devices** contains an entry for your modem. The file included with COHERENT version 3.2 contains sample entries for low-speed (1200- or 2400-baud) and high-speed (9600-baud Trailblazer) modems. The entries are commented out, but you can make the correct one available to your UUCP system by removing the '#' character that appears at the beginning of its entry. The following shows typical entries for the sample configuration:

```
ls -l /usr/lib/uucp/L-devices
-rw-r--r--  1 uucp     uucp      197 Wed July 18 20:54 L-devices
cat /usr/lib/uucp/L-devices
#type   line     disable baud   brand
#----   -----    ------- ----   ------
ACU     com1l    com1r   2400   hayes
#ACU    com1l    com1r   9600   tbfast
DIR     com2l    com2l   9600   direct
```

Be sure that this file have only one entry active (that is, uncommented) for each port, or problems may occur.

Next, file **/usr/lib/uucp/L.sys** must have an entry for site **mwcbbs**. In COHERENT version 3.2, this file contains an entry for this site; it is commented out, but you can make it available to your UUCP system by removing the '#' that appears before it. Note, too, that

you must edit the **mwcbbs** entry to suit your equipment; be sure to replace the string **SERIALNUM** with your nine-digit COHERENT serial number, or you will not be able to access the BBS.

The following access information is used in the **mwcbbs** entry of **/usr/lib/uucp/L.sys**. Note the information that matches your modem and system:

Modem Speed and Type	*BBS Phone Number*
1200/2400 baud generic	1-708-559-0412
9600 baud Trailblazer	1-708-559-0445
9600 baud V.32 or HST	1-708-559-0452

Expect String	*Send String*
""	\r\d\r
in:--in:	nuucp
word:	public
word:	*(your COHERENT serial number)*

The following gives the displays the sample entries in **L.sys** for site **mwcbbs**. In the example below, entries are continued over multiple lines; in the actual file, each entry must be on a single line, but the line may exceed 80 characters in length. Note, finally, that **mwcbbs** must have only one uncommented description in **L.sys**; if it has more than one, problems may result:

```
ls -l /usr/lib/uucp/L.sys
-rw-r--r--  1 uucp    uucp      269 Tue Oct  9 16:18 L.sys
cat /usr/lib/uucp/L.sys
...
mwcbbs Any ACU 2400 17085590412 \
      "" \r\d\r in:--in: nuucp word: public word: SERIALNUM
#mwcbbs Any ACU 9600 17085590445 \
      FAST \r\d\r in:--in: nuucp word: public word: SERIALNUM
```

Finally, file **/usr/lib/uucp/Permissions** must have a **MACHINE** entry for **mwcbbs**. Normal use of the BBS is in anonymous UUCP mode, in which all callers appear to have a site name of **bbsuser**. The **MYNAME** keyword in **/usr/lib/uucp/Permissions** allows you to appear to the called site as **bbsuser**. COHERENT distributions include a sample entry for the Mark Williams BBS node in file **/usr/lib/uucp/Permissions**.

```
ls -l /usr/lib/uucp/Permissions
-rw-r--r--  1 uucp  uucp     359 Tue Oct 9 01:38 Permissions
cat /usr/lib/uucp/Permissions
...
MACHINE=mwcbbs MYNAME=bbsuser \
        COMMANDS=rmail:uucp \
        READ=/usr/spool/uucppublic:/tmp \
        WRITE=/usr/spool/uucppublic:/tmp \
        REQUEST=yes SENDFILES=yes
...
```

For further details regarding cabling and setting up UUCP, see the tutorial *UUCP: Remote Communications Utility* in the COHERENT reference manual, as well as the Lexicon articles **modem**, **RS-232**, and **terminal**.

Downloading Files

For your initial contact with **mwcbbs**, we recommend that you download the introductory message **howto.start** from directory **/usr/spool/uucppublic/mwcnews**. For example, the command:

```
uucp  mwcbbs!/usr/spool/uucppublic/mwcnews/howto.start  /tmp
```

queues up a request to copy file **howto.start** to directory **/tmp** on your system. This file contains information on available downloads, new COHERENT developments, and how to obtain an individual account on the system. If the time at which you type the **uucp** command is within the range of times allowed in the **/usr/lib/uucp/L.sys** entry, your modem will call **mwcbbs** immediately — you can check this with the commands **ps** or **uulog**. If you wish to force polling of mwcbbs at a time not specified in **/usr/lib/uucp/L.sys**, you can do so with the command:

```
su  uucp  /usr/lib/uucp/uucico  -Smwcbbs  &
```

You can then monitor the progress of the transfer via the command:

```
uulog  -f  mwcbbs
```

To stop monitoring the call, type **<ctrl-C>**.

Electronic Mail Access

The following electronic mail addresses are available to customers. For issues relating to administration of the BBS node, you can send mail to **mwcbbs!admin**. For matters relating to support of COHERENT and related products, send mail to **mwcbbs!support**. Additional mail aliases may appear from time to time. Please remember that mail sent to either of the aforementioned addresses will only be sent to **mwcbbs** when **uucico** is invoked. This can be accomplished from the command line, as shown in the example above, or at regular intervals as a **cron** task in **/usr/lib/crontab**. The following gives a sample line for **/usr/lib/crontab**:

```
15 20 * * * su uucp /usr/lib/uucp/uucico -smwcbbs
```

This line will check every day at 8:15 PM for **uucp** and **mail** requests which have been queued for **mwcbbs**, and, if any are found, will call **mwcbbs**. See the Lexicon article **cron** for further information about **/usr/lib/crontab**.

Please note that while the BBS supports inbound electronic mail from your system to **mwcbbs** via anonymous UUCP, we have no mechanism for replying to your electronic mail messages unless you have an account on **mwcbbs**. To request an account on **mwcbbs**, download the file **howto.start** from directory **/usr/spool/uucppublic/mwcnews** on machine **mwcbbs**, and follow its directions.

Related Reading

For further discussions on UUCP, networking and electronic mail, see the Lexicon articles for **UUCP**, **modem**, **RS-232**, **L-devices**, **L.sys**, and **Permissions**, as well as the UUCP tutorial in the COHERENT reference manual.

Section 5:

COHERENT User Groups

This section describes COHERENT user groups and how you can contact them. User groups can be found throughout the United States, and in many other countries. Most groups sponsor meetings and electronic bulletin-board services. We hope that you will want to talk to and meet with other COHERENT users so that you can share experiences, information, and advice.

If there is not a COHERENT user group in your area, we can help you establish one. If you are in a user group that is not listed below, please write to the User Group Co-ordination Director at Mark Williams Company so that your group can be registered and listed in our future publications.

If you are outside a large metropolitan areas, electronic communication will be your primary link with the community of COHERENT users. The Mark Williams Company Bulletin Board System remains the biggest source for COHERENT updates, news, and public-domain software, but there are a growing number of other BBS's worldwide that are support the international COHERENT community. Some of these BBS's have been designated as Preferred BBS's and are authorized to post COHERENT system updates. Please refer to the list below for the Preferred BBS closest to you.

Mark Williams Company makes every effort to keep the listings in this section up to date. However, we cannot guarantee that all the user groups listed are still active, nor can we guarantee that the BBS information is current. If you do discover a discrepancy, please contact the User Group Co-ordination Director at Mark Williams Company.

COHERENT User Groups Worldwide

The following lists all registered COHERENT user groups throughout the world.

United States

Bay Area COHERENT Users Group
P.O. Box 622
El Cerrito, CA 94530
Telephone: 510-549-1876
Group Administrator: Viki Tamaradze

Australia

The Australian COHERENT Users Group
Group Administrator: Richard Lindner
PUBnet: ...!spectre!rjl
Internet: rjl@spectrum.pub.uu.oz.au
Telephone: +61-3-882-4690
FAX: +61-3-824-0655

Japan

Japanese COHERENT Users Group
c/o Yoshihisa Suda
924-111 Misawa
Hino City
Tokyo, Japan T191
Telephone: +81-425-92-1412
FAX: +81-425-92-4646

Preferred COHERENT Bulletin Boards

The following lists the preferred bulletin boards throughout the world. These bulletin boards are authorized to carry updates to COHERENT software, among other services.

Australia

Australian COHERENT Users Group BBS
System Administrator: Richard Lindner
PUBnet: ...!spectre!rjl
Internet: rjl@spectrum.pub.uu.oz.au
Telephone: +61-3-882-4690
FAX: +61-3-824-0655

Germany

European COHERENT Support BBS
System Administrator: Joachim Riedel
Internet: jr@connie.de.convex.com
Modem: +49-6985-8711 24,PEP,V32 (8 AM-6 PM, 9 PM-6 AM CET)
Telephone: +49-6985-6225

Registering Your COHERENT User Group

If you are the member of a COHERENT user group or special interest group and your group is not listed above, you can register your group with Mark Williams Company by writing to the User Group Co-ordination Director. By doing so, you ensure your group's inclusion in the next listing. When you register your group, please include the following information:

- The name and address of the group.
- The name of the group's administrator (if any).
- Size of the group.
- Date group was established.
- Frequency and nature of group meetings.

The COHERENT System

Section 6:

Errata

Known Limitations

As of this printing, no known major problems with the COHERENT system remain uncorrected. Check with the MWC BBS for the most current list of known limitations to COHERENT, and for work-arounds and fixes to them.

Section 7:

Additional Products for COHERENT

Numerous products are available for COHERENT, both software and hardware. This section describes some of them.

An order form is available at the back of these notes for ordering the products produced by Mark Williams. If you prefer, you can telephone the Mark Williams sales department at 1-708-291-6700, or you can FAX us your order at 1-708-291-6750.

The COHERENT Device Driver Kit

The COHERENT Device Driver Kit contains everything that an experienced programmer needs to write a device driver for COHERENT, including source code for over a dozen COHERENT drivers. The COHERENT Device Driver Kit brings a new level of support for writing drivers and has greater detail than UNIX versions. And unlike some drivers, COHERENT's can be loaded — and unloaded — without shutting down your system, and without producing a new kernel.

The kit's 125-page manual includes in-depth tutorials for two sample device drivers, and details the kernel's accessible functions in the user-friendly, Lexicon format. Plus, you get machine-readable source code for the following COHERENT drivers, which you can modify or use as examples for different peripherals:

- Archive SC-499 streaming tape
- AT hard disk
- ATI Graphics Solution adapter
- Dual RAM disk
- Floppy drive
- Generic polled multi-port serial
- IBM Color card (640x200) graphics display
- Memory-mapped video
- Microsoft Bus Mouse
- Parallel line printer
- Raw serial (COM1 and COM2)
- Serial line (COM1 thru COM4)
- Tiac PC-234/6 ARCNET LAN driver
- Traditional keyboard

The price is right, too. Like all Mark Williams software, our COHERENT Device Driver Kit is extremely affordable ... just $39.95. Use the order form at the end of this manual to get your hands on the best value in driver kits around — yet one more reason why COHERENT is on the way to becoming the most widely used PC-based development system in the world.

Introducing COHware

COHERENT users, who number in the tens of thousands, are already doing amazing things with COHERENT — and at an amazing rate!

The amount of contributed software appearing on our Bulletin Board System is already much, much more than we ever imagined it would be. And it keeps on growing. This software can be downloaded freely from the BBS. However, assuming that you have a 2400-baud modem, downloading can easily cost $30.00 per megabyte, not to mention the time and inconvenience. So, we have come up with the answer.... COHware!

Now all the contributed software from our BBS is available on floppy disk. All of the programs are in source-code form. You can use them as is, or you can modify them for your own applications. Don't waste your time on a problem that has already been solved within one of these programs, and don't tie up your modem for hours on end. COHware opens up the world of C programming under UNIX — take a look at how a sophisticated shell is built from the inside out — find out how a text editor is written — all this and much more can be found within COHware!

COHware Volume I

COHware Volume I brings you four high-density diskettes packed with terrific COHERENT software — over six megabytes of source code! Here's what you get ...

adventure A text-based "adventure" game.

almanac Calculate the ascension and declention of the Sun, Moon, and three major planets when given the calendar date and time. Also calculates the azimuth and altitude for the Sun, Moon, and eight planets.

browser Utility for indexing and scanning files.

calls Utility to trace hierarchy of called functions in C programs.

cdiff Similar to COHERENT **diff**, but produces Berkeley 3.2-style **diff** output.

clam C shell-style shell for COHERENT.

comb An alternative to COHERENT's standard mailer, **/bin/mail**. Features screen oriented menuing and reply functions.

cursive Generates "cursive" banners based upon input from *stdin*.

cut Berkeley style **cut** and **paste** utilities.

deliver Local mail delivery agent to be used with a mail router, (e.g., **smail**).

dmake Enhanced version of COHERENT **make** utility.

dtree Formatted directory tree version of the traditional COHERENT **ls** command.

dumpscreen Copies (dumps) contents of console screen.

elle EMACS-like screen editor. Uses EMACS-style commands and can handle huge files.

emacs Enhanced binary of COHERENT MicroEMACS editor that understands eight-bit character sets.

The COHERENT System

GNUtar Replacement for COHERENT **tar** file-archiving utility. GNUtar format is portable to other systems that support **tar**.

kermit Enchanced C-Kermit file transfer and terminal-emulation package.

laser Utility for printing using a laser printer. Lets you specify landscape or portrait layout.

less Enchanced version of Berkeley **more** pager.

lharc File-archiving utility.

libndir Directory-access subroutine library.

llesh Command history overlay for the COHERENT Bourne shell, **/bin/sh**.

make Enhanced version of COHERENT **make** utility.

maze Multi-user maze game.

menu A menuing package.

patch20 File-patching utility.

patches Enhancements and patches to the Clam shell.

pcmail A menu driven **mail** utility with numerous features, including a reply function.

qq Sample device driver which reads from and writes to the console. Requires the COHERENT Device Driver Kit.

screen Utility for setting screen colors.

shar Utility to create shell archives.

shells Collection of Bourne shell scripts to help format floppy disks, create file systems, and copy diskettes.

smail A COHERENT version of the popular *smart mailer* utility.

tools COHERENT utilities for checking the polling rate of polled serial ports, displaying the hard-disk drive parameters that the COHERENT kernel is working with, etc.

tools1 A series of tools that display the user's UID.

unzip Unarchiver for use with **zip**-format archives.

uptime Utility that displays the last time that COHERENT was booted.

xargs Wrapper that allows many arguments to be passed to a command.

xxu Converts DEC-20 and VAX/VMS style file names to COHERENT-style file names.

zmodem COHERENT version of popular file-transfer utility.

COHware Volume II

COHware Volume II brings you five high-density diskettes — over seven megabytes of source code! Here's what you get ...

admshot A set of files and scripts that allow for the simple execution of one-shot procedures.

arcwtmp Utility for archiving login history.

banner Banner printing utility.

beuucp Change the effective group and user ids to **uucp**.

booz Unpacker for ZOO-format archives.

cflow Produces a listing of the program's calling hierarchy based upon C function calls and declarations.

chess This program plays a fairly respectable game of chess, although it is not competetive with state-of-the art commercial programs.

choose Randomly selects lines from its input. Useful for building your own **fortune**-like games.

cmenu A menu package that lets you execute commands from a menu.

cnews A distribution of **cnews** for COHERENT.

comb An alternative to COHERENT's standard mailer, **/bin/mail**. Features screen-oriented menuing and reply functions.

crc Computes encrypted checksums. Can improve security of your file transfers or your system.

ctags This is the Berkeley version of **ctags**, ported to COHERENT.

curses2 Header with additional functions for the COHERENT **curses** library.

finger Displays information about a user.

focal **focal** language interpreter.

fonts Computer Modern shareware font collection for HP LaserJet and compatible printers.

getppid A C program that returns your parent process id.

gnews A nice "news" system which includes everything you need to receive and read news.

GNUgo This program plays quite a respectable game of *go*.

gomoku An *Othello*-style game played on a 19 by 19 grid.

hd Similar to COHERENT's command **od -c**, but dumps files in a friendlier hexadecimal format.

hotel A board game of hotel development. Players take turns placing tiles on the board and buying stock in the hotels they create.

less An enhanced version of the traditional Berkeley screen pager **more**.

libndir Directory-access subroutine library.

mc A powerful shareware spreadsheet program for COHERENT.

menubar Creates a menu window. Usefel for writing programs that prompt the user for menu choices.

month An appointment calendar.

mtalk A small, simple multi-user "chat" program.

mterm A basic terminal-services program. This program utilizes the serial-port handler portions of the **kermit** program supplied with COHERENT as the base for a simple terminal package.

mwdl A simple shell script used to download files from the Mark Williams Company bulletin board, **mwcbbs**.

ogre A game of tank warfare in the 21st Century.

origami A powerful folding screen editor that is able to use the same key bindings as MicroEMACS.

pclist Yet another screen pager.

ps This archive contains a collection of independent, self-documented PostScript programs, including **pscal**, a useful calendar printing utility.

prolog A Prolog logic programming language interpreter. Includes a manual and some tutorial information.

quebbs This is a Bulletin Board System that was ported to COHERENT.

rcs A revision control system. Manages software libraries, stores and retrieves multiple revisions of text files, and much more.

rn Larry Wall's popular news reading program.

sc A greatly modified version of the public domain spreadsheet, **vc**.

sdbm A clone of the Berkeley **ndbm** library.

shar Combines files into shell archive (shar) files.

sokoban A clone of the popular **Boxxle** game.

TASS A full-screen, threaded news reader.

tassgn Allows you to use TASS 3.2 for reading and posting news articles with the GNEWS package.

tetris A clone of the popular arcade game Tetris.

trek73 A computer simulated battle based on the famous *Star Trek* television series and the game *Star Fleet Battles*.

umodem This version of **umodem** was modified for COHERENT. It is based upon **umodem** version 4.0 which is also included.

uucp An **awk** script for COHERENT that lets you to see the cost of your UUCP communications.

vtree A utility which shows the layout of a directory tree or file system.

which An implementation of the Berkeley **which** command. It searches your path for the first executable file that matches the command line argument.

wmail A **mailx** clone which is easy to use and one of the best mailers for small systems. WMAIL needs SMAIL25, included in COHERENT Volume I.

wnews A small news package which resembles a subset of the original B-News package.

wsh A shareware window shell for COHERENT.

xcmalt XCMALT is a massive expansion and modification of XCOMM 2.2, a UNIX dialout telecommunications program.

xlisp XLISP is an experimental programming language combining some of the features of LISP with object-oriented extensions.

xo A tic-tac-toe game.

zoo Contains two programs, **zoo** and **fiz**. **zoo** manipulates archives of files in compressed form. **fiz** analyzes damaged **zoo** archives for data recovery.

Order Now!

Don't miss the chance to give your COHERENT system even more power. Further volumes of COHware will follow, but you can order Volume I for the only $35, or Volume II for $40, including shipping anywhere in the USA or Canada. Use the order form at the end of this manual ... get COHware and put more power in your PC!

We know how you value Mark Williams Company's commitment to user support. However, because of the nature of these products, we cannot offer technical support on either the Device Driver Kit or COHware.

/rdb Relational Data-Base Manager

/rdb from Revolutionary Software gives you everything you ever wanted in a relational data-base management system, for only $79.95. It provides the functionality and features found in systems costing far more.

/rdb is fully relational. It provides source code for most of its more than 100 data-base commands. It's easy to program. You can learn it quickly, see how it works immediately, and modify it as you go along. It's ideal for both small and large data bases, which means it can be used for everything from keeping track of expenses, budgets, and addresses, to managing data for a small business.

/rdb is being offered and supported by Mark Williams Company. This includes technical support from MWC, by voice during business hours, or via the MWC BBS.

Features and Benefits

/rdb offers the following to COHERENT users:

- Multi-user relational data base. Many users can use or access each data base.
- Remarkably flexible. It lets you generate the same or different data bases simultaneously.

- Uses the COHERENT shell as a fourth-generation language, to allow you to enter, manipulate, and output data quickly and easily.
- It is fast and efficient. It uses COHERENT pipes to avoid the clumsy record-at-a-time processing found in most 4GL's.
- It is simple and easy to use. With **/rdb** tools functioning in a manner similar to COHERENT **tools**, you can create what you want without having to learn a new environment.
- All **/rdb** tables and files are stored in flat ASCII format, rather than binary. This lets you pass data among operators, commands, and other programs without conversion, while incorporating ASCII data into spreadsheets, word processors, and other 4GLs.
- Five fast-access and searching methods are available. This lets you choose whichever is most apprpriate to your task, without losing the ability to access **/rdb** tables as flat ASCII files.

Additional Features

- On-line support from Mark Williams Company, via the MWC BBS or via voice telephone during business hours.
- User-definable entry screens.
- Comprehensive, 300-page manual that contains tutorials, examples, and command reference in the Mark Williams Lexicon format.
- Data-base debugging for testing and debugging **/rdb** scripts.
- Cross-reference to dBASE commands.
- PROLOG interface.
- Record locking.

Order Now!

/rdb is available from Mark Williams Company for $79.95. To add the power of a relational data base to your COHERENT system, call or write MWC today!

Third-Party Hardware

The following describes cards and peripherals for which COHERENT device drivers are available from third-party suppliers. This is addition to disk drives, and in addition to modems, printers, and other devices that can be plugged into your computer's serial and parallel ports.

Non-Intelligent Serial Cards

COHERENT now supports the following non-intelligent serial cards for up to ten terminals plus the console. Please note that no additional licenses are required for terminals connected to a COHERENT server.

Arnet Multiport
Arnet Corporation: 800-366-8844 (USA)

Chase DB/4, DB/8
Chase Research Inc: 615-872-0770 (USA)
Chase Research UK: 44-256-52260 (United Kingdom)
Chase Research Germany: 49-711-7287-155 (Germany)

Comtrol Hostess
Comtrol Corp: 800-926-6876 (USA)

Connect Tech Dflex 4/8
Connect Tech Inc: 519-836-1291 (Canada)

DigiChannel PC/X
Digiboard: 800-344-4273 (USA)

GTEK PCSS-8I
GTEK INC: 601-467-8048 (USA)

Sea Level Com +2/4/8
Sea Level Systems: 803-843-4343 (USA)

Specialix
Specialix Corp: 408-378-7919 (USA)

Sritek Fastcom
Sritek Inc: 216-468-3380 (USA)

Star Gate Plus 8
Stargate Technologies Inc: 800-STAR GATE (USA)

Intelligent Serial Cards

The following intelligent serial cards are now available for COHERENT:

Maxspeed SS-8/Y2
Maxspeed Corp: 415-345-5447 (USA)

Sritek Fastmux 4/8 (RISC based)
Sritek Inc: 216-468-3380 (USA)

Tape Drives

COHERENT's Device Driver Kit Archive tape driver directly supports the following Archive model tape drives:

Fast Tape 60
Scorpion 5945L
FT60
VP60
FT150
VP150

For information on the prices of the Archive tape drives and how to order them, telephone Maynard Electronics in the USA at 407-263-3500.

Third-Party Software

The following software products are available now for COHERENT from third-party suppliers. This list is continually increasing, so be sure to check the Mark Williams BBS from time to time for information on new products for COHERENT. Applications for COHERENT include:

ADFprofi

ADFprofi is a data-base management and office automation package that lets users access customer lists quickly, and easily produce standardized documents.

Contact: Arosoft, Str. d. Befreiung 17, O-1136 Germany (telephone +37-5252150).

ash **ash** is an advanced shell written specifically for COHERENT. **ash** provides all of the interactive features that make the C-shell so powerful, including aliases, command history, and job control. In addition, **ash** provides many new features designed to make your computer environment even more configurable. **ash** costs $35.

Contact: Freecloud Software, 306 Thayer Street, Box #82, Providence, RI 02906 (telephone 401-861-8154).

Basmark Quick BASIC

The BasMARK QuickBASIC Compiler compiles for COHERENT programs written in IBM PC BASIC (versions 1 and 2), Microsoft QuickBASIC 4.0, or Microsoft BASIC 6.0. Language features include: real, separately compiled module/subroutines, including those with global variables; user-defined data types; automatic variables; symbolic constants; and all major structured programming constructs, including select case and function. Multiuser features include file-sharing with file- and record-locking, **termcap** screen handing, and the ability to interactively call system commands.

Contact: Basmark Corp., 216-621-7652.

Btree/Isam

Btree/Isam is an easy-to-use file-access utility. It features keyed access files, both high- and low-level file access, and supports multiple key types. Over 6,000 copies are in use world wide. BTree/Isam costs $115 for the single-user version and $175 for the multi-user version.

Contact: Softfocus, 1343 Stanbury Road, Oakville, Ontario, Canada L6L 2J5 (telephone 416-825-0903).

c_ps.lib

c_ps.lib is a C library for creating PostScript output from C applications. **c_ps.lib** costs $149 and includes source code.

Contact: Barton Creek Software, 2222 Western Trails, Suite 106, Austin, TX 78745 (telephone 512-441-8354).

CCsh **CCsh** is a Bourne-shell compiler. It transforms Bourne shell code into C-language source code that is then compiled into an executable binary file. With **CCsh**, you can create shell scripts that run faster, take up less overhead, and are more secure. **CCsh** for COHERENT costs $49.95 ($79.95 with textbook).

Contact: Comeau Computing, 91-34 120th Street, Richmond Hill, NY, 11418 (telephone 718-945-0009).

Shellware General Ledger System

Shellware GLS is a full-featured general-ledger bookkeeping system written entirely in the Bourne shell. The package includes full source code.

Contact: Berkeley Decision Systems, 803 Pine Street, Santa Cruz, CA 95062 (telephone 408-458-9708).

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