



**iRMX<sup>®</sup>**  
**Installation and Startup**

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#### REVISION HISTORY

		DATE
-001	Original Issue	08/92
-002	Revision One	12/93
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# Notational Conventions

Most of the references to system calls in the text and graphics use C syntax instead of PL/M (for example, the system call **send\_message** instead of **send\$message**). If you are working in C, you must use the C header files, *rmx\_c.h*, *udi\_c.h* and *rmx\_err.h*. If you are working in PL/M, you must use dollar signs (\$) and use the *rmxplm.ext* and *error.lit* header files.

This manual uses the following conventions:

- Syntax strings, data types, and data structures are provided for PL/M and C respectively.
- All numbers are decimal unless otherwise stated. Hexadecimal numbers include the H radix character (for example, 0FFH). Binary numbers include the B radix character (for example, 11011000B).
- Bit 0 is the low-order bit. If a bit is set to 1, the associated description is true unless otherwise stated.
- Data structures and syntax strings appear in this font.
- r? denotes an invisible file.
- **System call names and command names appear in this font.**
- PL/M data types such as BYTE and SELECTOR, and iRMX data types such as STRING and SOCKET are capitalized. All C data types are lower case except those that represent data structures.
- Whenever this manual describes I/O operations, it assumes that tasks use BIOS calls (such as **rq\_a\_read**, **rq\_a\_write**, and **rq\_a\_special**). Although not mentioned, tasks can also use the equivalent EIOS calls (such as **rq\_s\_read**, **rq\_s\_write**, and **rq\_s\_special**) or UDI calls (**dq\_read** or **dq\_write**) to do the same operations.



## Note

Notes indicate important information.



## CAUTION

Cautions indicate situations which may damage hardware or data.

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# **CHOOSING YOUR INSTALLATION**

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This section helps you decide which iRMX installation procedure to perform. This chapter is in the section:

**Chapter 1.      Introduction**





## Welcome to the iRMX<sup>®</sup> Family of Operating Systems!

The iRMX<sup>®</sup> Operating System runs on Intel386<sup>™</sup>, Intel486<sup>™</sup>, Pentium<sup>®</sup>, and Pentium Pro microprocessor-based single board computers and other microcomputers based on these microprocessors. There are three versions of the iRMX Operating System (OS): iRMX for PCs, iRMX for Windows, and the iRMX III OS. With any iRMX OS, you can develop applications that require preemptive, priority-based multitasking and real-time response.

This manual:

- Guides you through the installation procedure appropriate for you
- Shows you how to get help on using the OS
- Shows you how to boot the system and enter simple commands
- Shows you how to get the most from the documentation

## Package Inventory

Before installing an iRMX OS, check the contents of your package against the contents listed in the Customer Letter. Make sure that you have all the tapes, diskettes, documentation, and other materials. If your package is not complete, contact Intel Customer Support. In the United States and Canada, call **1-800-257-5404** to contact your Intel Sales Representative or Intel Authorized Distributor.

## Software

The iRMX Software Package includes:

- iRMX III OS software, iNA 960, iRMX-NET, TCP/IP and NFS, demonstration software, and the Aedit text editor
- iRMX for Windows OS
- iRMX for PCs OS

These tools and languages are also provided with the OS:

- iC-386
- Support files for developing applications using third-party compilers.
- ASM386 and utilities (BLD386, BND386, LIB386, and MAP386)
- PL/M-386
- Soft-Scope Debugger

## Documentation

The following operating system documentation is included in this package:

- *Installation and Startup* (this manual)
- *Introducing the iRMX Operating Systems*
- *System Concepts*
- *Master Index*
- *Programming Concepts for DOS and Windows*
- *Driver Programming Concepts*
- *Network User's Guide and Reference*
- *TCP/IP and NFS for the iRMX Operating System, including Quick Reference to Telnet and FTP*
- *System Call Reference*
- *Command Reference, including Quick Reference to Commands*
- *C Library Reference*
- *Programming Techniques and AEDIT Text Editor*
- *Real-Time and Systems Programming for PCs* by Christopher Vickery
- *System Debugger Reference*
- *System Configuration and Administration*
- *MSA for the iRMX Operating System*
- *ICU User's Guide and Quick Reference*
- *iC-386 Compiler User's Guide*
- *Soft-Scope Debugger User's Guide, including the Quick Reference*
- *Intel386 Family Utilities User's Guide*
- *ASM386 Macro Assembler Operating Instructions and ASM386 Assembly Language Reference*
- *PL/M-386 Programmer's Guide*

For more background information, you can request these manuals through your nearest Intel Sales Office:

- *Intel386 Family System Builder (DOS)*, part # 481342-001
- *Bootstrap Loader Reference Manual*, part # 464244-002
- *80387 Support Library Reference Manual*, part # 455497-001

# Registration

Please complete the Product Registration card included with your package. Sending in your completed registration card enables you to receive telephone support during the term of the product warranty period.

To register the software, fill out the software registration card and fax it or mail it to Intel. Your registration number is listed on the registration certificate.



## Note

European customers must affix appropriate postage if mailing the registration. Alternatively, you may fill in the registration card and fax it to the USA fax number given on the card.

# Important “Getting Started” Files

After performing the installation you might want to examine these files:

*readme.txt* describes known problems and workarounds, and important last-minute information that did not make it into the manuals.

*notes.txt* describes incorporation information and lists problems fixed since the last release.

*features.txt* describes major and minor changes this release of the operating system.

You can find each of these files in the top-level directory *rmx386* after the installation is complete.

# Deciding Which Installation Procedure to Perform

Chapters 2 through 5 present different iRMX OS installation procedures. The one you use depends on the platform on which you are installing the software and whether you want to run the iRMX OS concurrently with DOS/Windows or run iRMX OS exclusively. Use this list to see which install procedure you should perform:

Chapter 2 Use the install procedure in this chapter if these conditions are true:

- The platform you are installing software on is a PC or a PC-compatible board in a Multibus I or II system. PC-compatible boards in a Multibus system include:

- SBC PCP4 (Multibus I)
  - SBC 386/SX (Multibus I)
  - SBC 486/DX33 (Multibus II)
  - SBC 486DX66 (Multibus II)
  - SBC P5090[V] (Multibus II)

- You want the iRMX OS to run concurrently with DOS/Windows (installation of iRMX for Windows). In this environment, Windows 3.0, 3.1, and 3.11 are supported. Windows for Workgroups 3.1 and 3.11 as well as Windows 95 and Windows NT are not supported in this environment.

or

The platform on which you are performing the installation will be a purely DOS/Windows-hosted development environment (no run-time iRMX OS available). DOS/Windows-hosted environments allow development of loadable iRMX applications using both Intel and third-party DOS/Windows development tools. With this environment you cannot run iRMX applications or fully develop embedded iRMX applications. To run the applications, you must use a separate system that has an iRMX OS installed. In this environment, any version of Windows or Windows for Workgroups is supported.

- Chapter 3 Use the install procedure in this chapter if these conditions are true:
- The platform you are installing software on is a PC or a PC-compatible board in a Multibus system (see the previous list of boards).
  - You want the iRMX OS to run exclusively (installation of iRMX for PCs). Running the iRMX OS exclusively means you will not be able to switch between DOS/Windows (if you have it on the system) and the iRMX OS without rebooting the system.

Chapter 4 Use the install procedure in this chapter if the platform you are installing software on is a Multibus I board that cannot be run as a PC. These boards include:

<b>CPU Boards</b>	<b>Controller Boards</b>
SBC 386/12(S)	SBC 208
SBC 486/12(S)	SBC 214
SBC 386/2x	SBC 215G
SBC 386/3x	SBC 220
	SBC 221(S)
	SCSI controller on SBC 386/12S and 486/12S boards

Chapter 5 Use the install procedure in this chapter if the platform you are installing software on is a Multibus II board that cannot or will not be run as a PC.

These boards include:

**CPU Boards**

SBC 386/120  
SBC 386/133  
SBC 386/258  
SBC 386/258D  
SBC 486/125  
SBC 486/150  
SBC 486/133SE  
SBC 486/166SE  
MIX 386/020  
MIX 386/020A  
MIX 486/020A  
MIX 486SX33  
MIX 486DX33  
MIX 486DX66  
SBC 486DX33  
SBC 486DX66  
SBC P5090CPU  
SBC P5120CPU

**CPU + I/O Server Boards**

SBC 386/258  
SBC 386/258D  
SBC 486/133SE  
SBC 486/166SE  
SBC P5090[V]  
SBC P5090ISE  
SBC P5120ISE

See also: *Introducing the iRMX Operating Systems* for information on iRMX for PCs, iRMX for Windows, and the iRMX III OS versions of the iRMX OS.

# What To Do If You Need More Help

Intel stands behind its products with a world-wide service and support organization. If you have problems installing the iRMX OS or have a question, call Customer Support. Use the remainder of this chapter to learn about support services terms and conditions, customer support offerings, and software licensing information.

## Support Services Terms & Conditions (World-Wide Services)

### 1. TO OBTAIN SERVICE

To be eligible for service under these terms and conditions, an authorized representative of your company must sign and return the Intel Product and Support Registration Certificate.

### 2. PHONE SERVICE

Please refer to Customer Support Offerings in this chapter for specific product detail. Technical phone service is available by calling one of the numbers listed on the inside back cover of this manual and enables you to communicate directly with members of Intel's software support staff. Service is available as listed Monday through Friday (excluding holidays). Technical phone support is provided for one person per Product Registration Certificate.

### 3. EXCLUDED SERVICES

The services provided specifically exclude: (i) service for Software not used on PCs based on the Intel386, Intel486 or Pentium, and Pentium Pro microprocessor or on non-PC hardware not designated by Intel product documentation as a supported configuration; (ii) hardware maintenance; (iii) problem assistance for non-Intel software products; (iv) service or support for source code and (v) service for software or hardware that has been discontinued by Intel. You may request application assistance or engineering time not covered under this Agreement. Intel may, at its option, issue a quotation for this service on a best reasonable efforts basis.

### 4. RESTRICTIONS/LICENSES

All services provided are subject to these terms and conditions. The Software is provided under the terms and conditions of the Intel Developer Software License Agreement.

### 5. TERM OF THE AGREEMENT

The period of software service begins upon Intel's receipt of the unaltered, executed Intel Product and Support Registration Certificate and shall continue for a ninety (90) day period.

**6. CONTINGENCIES**

Intel shall not be liable for its failure to perform any obligation under this Agreement due to unforeseen circumstances or causes beyond Intel's reasonable control, including but not limited to, acts of God, war, riot, embargoes, acts of civil or military authorities, fire, flood, accident, strikes, inability to secure transportation, facilities, fuel, energy, labor or materials. Time for performance will be extended by Force Majeure.

**7. LIMITED WARRANTY**

EXCEPT AS SET FORTH HEREIN, INTEL DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARE EXCLUDED AND SHALL NOT APPLY TO THE SERVICES PROVIDED UNDER THIS AGREEMENT. INTEL NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME ANY OTHER LIABILITIES IN CONNECTION WITH THE SERVICE OF THE SOFTWARE.

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**9. CONTROLLING LAW**

This Agreement shall be governed by, subject to and construed according to the laws of the State of Oregon. For purposes of applying Oregon law, this Agreement shall be deemed to have been entered into and wholly performed in Oregon.

YOU MAY CONTACT INTEL AT 1-503-696-5025 OR THE ADDRESS BELOW IF YOU HAVE ANY QUESTIONS ABOUT THIS AGREEMENT.

Intel Corporation 5200 N.E. Elam Young Parkway Hillsboro, OR 97124-9987

Attn: OEM Modules Operation Customer Support, HF3-55



## Customer Support Offerings

Intel offers a wide variety of customer support. These subsections provide an overview of the customer support offerings.

### When to Use Customer Support

Customer Support is important at all stages of the product cycle. Intel Support engineers have the experience and expertise that can save valuable development time. Their knowledge of Intel boards, systems, software, and development tools can help you get your product to market sooner, boost your productivity, and insure compatibility with future Intel products. As the application or product development is completed and production starts, sustaining support becomes a valuable service. Intel offers several services that allow you to pick the right type of support you need.

Intel's Software Support offers several ways to get help from qualified and professional engineers. To provide you with the support-level most convenient to you, Intel offers several avenues to get answers to your questions.

### Free Hardware Support

For customers requiring support for Intel-manufactured Multibus I and Multibus II products, Intel Hardware Support engineers staff the phones 5 days a week Monday to Friday.

To obtain hardware support and repairs, please refer to the telephone and fax numbers given on the inside back cover of this manual.

### CompuServe Forums

During normal business hours, Intel technical representatives periodically monitor the Multibus and iRMX OS sections in the CompuServe INTEL forum.

Intel has developed the Intel Information Center that consists of multiple forums. The Information Center is accessed by typing GO INTEL. The Multibus and iRMX OS sections are located in the INTEL Forum.

- The Intel Forum (GO INTEL)
- The Intel Architecture Labs Forum (GO INTELA)
- The Intel Components/Embedded Tools Forum (GO INTELC)

The Intel Components/Embedded Tools Forum contains sections that provide technical support for designers using or contemplating the use of the Intel iRMX Operating System Family of products and current Multibus I and Multibus II product families, including: SBC, MIX, and SBX. If you have a problem or question about the iRMX Operating System or Multibus hardware, simply post a message in the Multibus or iRMX OS sections within the INTELC forum. If you would like a list of features, documentation changes, or the latest update, you can find them in the Libraries area. In it you will find many of the more popular files that are also found on Intel's BBS.

## **24-Hour Automated Technical Support**

Get your products to market faster, better, and cheaper with the help of Intel's Automated Technical Support. Intel's Application Bulletin Board System (BBS) and FaxBack System are at your service, 24-hours a day, without any subscription charges. They are simple to use, so start today and you will have regularly updated technical information in your hands.

- Tools information
- Multibus firmware upgrades
- Presentations
- Revised software
- Insite libraries

## **Intel's Bulletin Board System**

You can rely on Intel's Application Bulletin Board System for the following type of information:

- iRMX software drivers
- Early software versions
- Sample code
- Documentation
- New product information

The BBS allows file downloads of any of these files, for free, excepting normal phone charges.

To use Intel's Application Bulletin Board System, just dial one of the numbers listed on the inside back cover of this manual, and the user-friendly system will prompt you along. For new users, the first log-in allows you to register with the system operator by entering your name and location. To access files on the BBS, log in again 24-hours later.

- Settings: 9600 baud,n,8,1
- Autobaud sensing for 1,200 through 14.4Kbaud modem.

## **FaxBack System**

Order documents by phone for prompt delivery to your fax machine. The following types of information are available:

- Design recommendations
- Stepping and errata notifications
- Multibus Exchange (MBX) notifications
- Product literature
- Tools and technical support material
- Application articles
- New product announcements

To use Intel's FaxBack System, just dial one of the numbers listed on the inside back cover of this manual, and you will be prompted for input. Be sure to have your fax number handy. Each catalog is assigned an order code number and is listed in the subject catalog. First time users should call FaxBack to order a subject catalog since there are many products represented on this system. Use the catalogs to reference the order number for the document you need, entering the number when prompted. An example of the catalogs available are:

- System Catalog
- Microcontroller and FLASH catalog
- Multibus & iRMX Software catalog
- Multibus & iRMX Software Fact Sheets
- Microprocessor and Peripheral catalog
- Quality and Reliability catalog

To request the iRMX software and Multibus catalog, select Catalog #6.

For Multibus and iRMX Software Fact sheets, order Document #4750.

## **Additional Product Support**

In addition to the basic support that is included with the product, a number of other sources of support are available.

## **Literature**

Intel maintains a literature service that provides User Guides, manuals, design specifications and data sheets for Multibus and iRMX software products. The literature service produces an Intel Literature Guide for OEMs and ISVs that is updated and published on a quarterly basis. To obtain this guide or to order any literature call the following numbers: In North America call 1-800-548-4725 or fax 1-708-296-3699 and in Europe contact your local Intel Sales Representative or Intel Authorized Distributor.

## Training

Intel can offer an iRMX OS Training workshop built to your needs. To find out more, call the following numbers in North America: 1-800-438-4769 or 1-503-696-5025.

## Intel's Real Time Users Group (iRUG)

Just by purchasing the iRMX OS development kit, you are entitled to a free one-year membership in Intel's Real Time Users Group (iRUG). Simply check the appropriate box on the Product and Support Registration Certificate to register as a member. iRUG is an international organization, formed in 1984, with several thousand members.

iRUG hosts an annual conference, bringing members, Intel management and technical staff together for three days of intensive technical seminars. iRUG also publishes the *Human Interface* newsletter six times each year, hosts the iRUG area within the INTEL C forum, and maintains the iRMX Program Library with hundreds of useful programs for the iRMX I, II, III, iRMX for PCs, and iRMX for Windows operating systems.

To contact the iRUG organization in North America, call 1-800-255-iRUG, 1-216-224-2760, or fax 1-216-224-2769.

## Software Licensing Information

As a registered licensee of the iRMX OS developer kit, you can begin development of your application right away. However, when you are ready to distribute your application, please follow the instructions below. Because the iRMX OS is an OEM<sup>1</sup> software product, Intel assumes that you will be making copies of the operating system to distribute with your product. Intel requires you to pay a royalty fee for each copy you make. This section explains how you can make copies of the software and describes how and when to use Intel Incorporation Permit Labels and Licenses.

### How to Make Copies of the Software

There are two different parts of your development kit software which you may copy and pass on to your customers: the iRMX OS and the TCP/IP run-time software. Every run-time copy you make must include the iRMX OS run-time and requires a royalty fee. The TCP/IP software is optional and requires a separate royalty fee.

First, you must sign a Software Redistribution License agreement, available from the iRMX Incorporations Administrator. To contact the Administrator from North America call 1-800-257-5404 or from any region call 1-503-696-5025 and ask for the iRMX Incorporations Administrator. After signing the agreement, you can make run-time copies. The files which can be included in your product are listed in *rnotes.txt*. This file may be found, once the iRMX Operating System is installed, in the */rmx386* directory.



#### Note

The developer kit contains other software that cannot be copied, such as the compilers, a debugger, and parts of the networking software. Contact the Intel Incorporations Administrator if you need to make copies of these items.

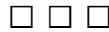
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<sup>1</sup> OEM (Original Equipment Manufacturer): Someone who purchases products, integrates them, adds their own value, and then sells the integrated product to an end user.

## Incorporation Administration and Permit Labels

Prior to redistributing the iRMX run-time software, you must sign a Software Redistribution License Agreement and purchase an incorporations permit label for each iRMX or TCP/IP run-time copy that you make. Both of these are available from the iRMX Incorporations Administrator. To contact the Administrator from North America call 1-800-257-5404 or from any region call 1-503-696-5025 and ask for the iRMX Incorporations Administrator. Optionally, you may fax the Administrator at 1-503-681-8497. In Europe, contact your authorized Intel distributor for more information.

Affix the labels to a part of the product *shipped to your end customer*. The labels may be affixed to the chassis of a system, a diskette, or a manual. The end customer's site must keep one label for each run-time copy of the iRMX operating system and one label for each run-time copy of TCP/IP. The sole exclusion to this rule is copies made for backup purposes.



# **iRMX INSTALLATION PROCEDURES**

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This section describes the iRMX OS installation procedures. These are the chapters in this section:

- Chapter 2.            Installing iRMX for Windows on a PC-compatible System**
- Chapter 3.            Installing iRMX for PCs on a PC-compatible System**
- Chapter 4.            Installing the iRMX III OS on Multibus I Systems**
- Chapter 5.            Installing the iRMX III OS on Multibus II Systems**





# Installing iRMX for Windows on a PC-compatible System **2**

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Use this procedure if the platform on which you are installing is a PC or PC-compatible board and you want the iRMX OS to run concurrently with the DOS/Windows operating system.

See also: Chapter 1 for a list of Multibus I and II boards that qualify as PC-compatible boards.

Before performing these installation steps, ensure that your computer meets the minimum requirements necessary to complete the installation. Check Appendix D for any special configuration requirements for your computer.

## Hardware Requirements

- A PC based on an Intel 386 processor (or above) or one of the PC-compatible Multibus boards listed in Chapter 1.
- 512 Kbytes of conventional memory if you are installing on a DOS partition; 640 Kbytes if you are installing on an iRMX partition.
- At least 6 Mbytes of total memory for DOS and iRMX.
- At least 8.5 Mbytes of total memory for DOS/Windows and iRMX.
- A 1.44 Mbyte 3.5-inch diskette drive.
- 18-57 Mbytes of free hard disk space, depending upon the product configuration you select during installation. The Product Selection Screen displayed during installation lists the specific disk space requirements for each product configuration.
- EGA, VGA, or Super VGA video controller.

See also: *Soft-Scope Debugger User's Guide* for Soft-Scope memory requirements beyond those listed above

### ⇒ **Note**

If you use a network interface controller (NIC), you must know which interface controller is used and whether it is supported by iRMX before you perform the installation procedure.

# Software Requirements

Installation of iRMX for Windows to a DOS partition must be done from the DOS prompt. The version of DOS running must be at least 5.0. You cannot install iRMX for Windows under any version of Windows or Windows for Workgroups.

Running the iRMX OS concurrently with DOS/Windows is supported with Windows versions 3.0, 3.1, and 3.11. Intel does not support running iRMX for Windows under Windows 95, Windows NT, or any version of Windows for Workgroups.

## Decisions You Must Make Before Installing Software

Before installing software on a PC or PC-compatible board, you need to be able to answer each of these questions:

### **Will the development environment be purely DOS/Windows-hosted or iRMX-hosted?**

For a purely DOS/Windows environment you will not be installing the iRMX OS. You will be installing only development tools. From this type of environment you can develop loadable iRMX applications using both Intel and third-party DOS/Windows development tools. You cannot run iRMX applications or fully develop embedded iRMX applications. To run the applications, you must use a different platform that has an iRMX OS installed.

For an iRMX-hosted environment, you will be installing iRMX for Windows onto a DOS partition.

### **Will the iRMX OS reside on a DOS partition or an iRMX named partition?**

After installing the iRMX OS onto a DOS partition, you can move it to an iRMX named partition if you need added security through file access permissions.

Leave the iRMX OS on the DOS partition if any of these apply:

- You will be exchanging data through Windows
- You need to maintain existing DOS files
- You are not changing partition size or adding an iRMX partition
- You are using DOS/Windows-hosted development tools, such as compilers and editors

## Installation Media

You can perform this installation procedure with either the compact disc (CD) or a set of forty-plus, 3.5-inch diskettes. Use the CD if you have a CD drive available.

## Install Procedure

To perform the installation, follow the steps in this section. Much of the installation process is menu driven and performed on-screen. The steps in this section, in many cases, supplement the on-screen process. However, some steps are independent of the on-screen install process.



### Note

Once the iRMX OS has been installed, be sure to review the *readme.txt*, *rnotes.txt*, and *features.txt* files in the `\rmx386` directory. These files contain the latest iRMX OS product information. You can also view updated information on the Intel Bulletin Board System (BBS).

## Step 1. Prepare the Hard Drive

You must have a hard disk with at least one DOS partition on which to install iRMX for Windows. Be sure that this DOS partition has enough space for the installation process. If it does not, add space using either of these methods:

- Use the DOS **fdisk** and **format** commands to create a DOS partition big enough to hold the iRMX OS.
- Add a larger capacity hard drive to your system.



### CAUTION

Be sure you have copies of all the files in a partition before changing the partition. If you use **fdisk** to change existing partitions on a hard disk, you will lose all information on the disk. Additionally, if you change the primary DOS partition you must re-install DOS.

See also: **fdisk**, your DOS manual

If you plan to copy the installed iRMX OS from the DOS partition to an iRMX partition, you must either have enough free disk space in which to create an iRMX partition, or you must have an existing iRMX partition with enough space for the iRMX OS. If you don't have enough free space, use one of these methods to get more:

- Use the DOS **fdisk** and **format** commands to resize the DOS partition(s) so that there is enough free disk space to create the iRMX disk partition later during the install process. If you change the primary DOS partition you must re-install DOS.
- Add a larger capacity hard drive to your system.
- Remove any DOS partitions from the disk that you will not need. Do not plan to use a secondary (extended) DOS partition by reformatting it with the iRMX **format** command. Instead, delete all the logical drives inside the extended DOS partition and then delete the extended DOS partition itself. This frees up the space on the disk.



### CAUTION

The iRMX OS allows you to access a primary or secondary DOS partition in addition to iRMX partitions from within the iRMX OS. However, having more than one primary DOS partition may cause system errors.

## Step 2. Execute Install

Insert the media (CD or the diskette labeled *PC-hosted iRMX® III Release 2.2 Disk 1 of x*) and execute the install script from the DOS prompt (you cannot do this from Windows):

```
C:\> d:install <CR>
```

where *d* is the drive letter, such as A.

When you execute this script, you must respond to on-screen questions that further define your installation. The order in which the actual screens appear depends on your responses. Use the descriptions below if you have trouble deciding how to answer a question.



### Note

During the execution of `install`, screens indicate that the `autoexec.bat` and `config.sys` files change. In reality, no changes are made to these files. However, you will be instructed to make changes to these files during a later step in the install procedure.

## DOS/Windows-hosted Environment or iRMX-hosted Environment

If you do not want to install the iRMX OS on this disk, choose a DOS/Windows-hosted environment. This choice installs iRMX development tools (such as assemblers, compilers and the Soft-Scope cross debugger) but not the iRMX OS. This choice lets you develop loadable iRMX applications on the installation platform. It is also possible to write and compile the code for embedded iRMX applications. However, to embed an application, you must run the Interactive Configuration Utility (ICU) on a platform that runs the iRMX OS.

If you choose the iRMX-hosted environment you will install iRMX for Windows on a DOS partition. Minimally, this choice provides you with the ability to execute loadable iRMX applications that you have developed. In a later step, you have an opportunity to copy the OS to an iRMX partition if this is your preference.

### Operating System Selection

You select the operating system from this screen. To let the iRMX OS run concurrently with DOS, select iRMX for Windows. (If you want to install iRMX for PCs, follow the instructions in Chapter 3.) This choice allows you to move freely back and forth between the two OSs (once the system has been booted) without having to reset the system.

### Development Capabilities

If you will be using the platform simply to run iRMX applications, select the *Basic Run/Time System* option. With a run-time system, you can run applications but will not be able to develop them.

If you will be using the platform to develop loadable applications but not generate custom versions of the iRMX OS, select the *Loadable Application Development* option.

Finally, if you will be using the platform to run, develop, and debug applications as well as generate custom versions of the iRMX OS, select the *Application and Customized O/S Development* option.

### TCP/IP Support

If you want TCP/IP support on the platform, select *Yes*. TCP/IP support allows you to use TCP/IP services such as TELNET, FTP, and NFS.

See also: *TCP/IP and NFS for the iRMX Operating System*

If you do not want TCP/IP support on the platform, select *No*.

## Development Tools Selection

For each of the listed development tools you can select or exclude the tool by toggling the *Yes/No* option. You can choose any combination of the available tools.

## Unsupported Software Selection

For each of the listed unsupported software types you can select or exclude the type by toggling the *Yes/No* option. You can choose any combination of unsupported software.

## Platform-specific Screen

If your platform is a standard PC, select the *Standard PC Compatible System*.

If your platform is an Intel-developed Multibus I or Multibus II PC-compatible processor board, locate the appropriate one from the list and select it.

## Drive Selection

Select the drive on which the iRMX OS and/or development tools will be installed. Once you make your selection, the install process attempts to access the drive and ensure that enough disk space is available.

## Deleting/Overwriting iRMX

If your platform has an older version of iRMX installed, you can choose to delete it, overwrite it, or quit the installation.

- Choosing to delete the old version causes the install procedure to remove all iRMX OS files from the drive. Note that any user-generated files are not deleted.
- Choosing to overwrite the old version causes the installation to check for enough free disk space to do the installation. If there appears to be enough space, the installation proceeds. If not, a warning appears that indicates the installation may fail. A failed installation will yield unpredictable results. You may want to exit the install procedure and clean up the disk.
- Choosing to quit the install procedure returns you to the DOS OS.

## iNA 960 Network Interface Type

Select the appropriate network interface type from the list. If you do not have a network interface controller (NIC), select the *No NIC* option.

## iNA 960 NIC Selection

Select the appropriate NIC from the displayed list. The selections depend on your platform and network interface type.

## iNA 960 Remote COMMengine Selection

Select the appropriate COMMengine board to use as a NIC for your platform. The list presented represents PC-compatible processor boards available from a Multibus II system.

## iRMX Network Name Selection

Provide a unique name for your network.

## Installing Screen

This is the final screen before installation proceeds. Pressing any key starts the installation.

## Step 3. Check *config.new* and *autoexec.new*

The installation process produces two new files: *config.new* and *autoexec.new*. You need to check to see that the contents of these files are acceptable, possibly edit them, and then rename them.

### A. Save Original Files

The *autoexec.new* file is the same as your original *autoexec.bat* file except that the **path** command is changed to include the iRMX for Windows software path. Similarly, the *config.new* file is identical to your *config.sys* file except that the **files**, **buffers**, and **lastdrive** commands have been modified or added.

Save your original *config.sys* and *autoexec.bat* files as *config.old* and *autoexec.old*.

### B. Edit *autoexec.new* and *config.new*

Edit the *autoexec.new* and *config.new* files to make these changes:

1. Remove, or comment out with the **rem** command, any lines which consume extended memory or switch the processor into Protected Mode. Some typical lines are listed below.

```
devicehigh=(filename)
device=emm386.sys
device=ramdrv.sys
device=smartdrv.sys
loadhigh (filename)
lh (filename)
```

2. Remove memory manager commands that cause expanded memory to be emulated in extended memory. iRMX for Windows does not conflict with expanded memory usage from DOS, as long as memory is hardware supplied. Software-emulated expanded memory is not supported.

See also: *Limitations, Appendix C, Programming Concepts for DOS and Windows*

3. Remove any line that logs the system onto a network. Always log on to the network after booting and starting iRMX for Windows.

See also: *Network User's Guide and Reference; Choosing a Network Job, System Configuration and Administration*

### C. Rename the Changed Files

Rename *config.new* as *config.sys* and *autoexec.new* as *autoexec.bat*.

## Step 4. Reboot the System

Remove the installation media and reboot your system using <Ctrl-Alt-Del>.

## Step 5. Copy iRMX for Windows to an iRMX Partition

### ⇒ Note

Perform this step only if you want the iRMX OS on an iRMX disk partition. This step copies iRMX for Windows from the DOS partition to your iRMX partition.

### A. Create or Prepare the iRMX Disk Partition

### ⇒ Note

Perform this step only if you do not have an iRMX partition. If you have an existing iRMX partition that you know is large enough to hold the iRMX OS then skip this part of Step 5.



Create the iRMX disk partition using the iRMX **rdisk** command. Enter the command from the DOS prompt:

```
rdisk
```



### **CAUTION**

Be sure you have copies of all the files in a partition before changing the partition. If you use **rdisk** to change existing partitions on a hard disk, you will lose information on the disk. Additionally, if you change the primary DOS partition you must re-install DOS.

See also: **rdisk**, *Command Reference*

## **B. Start iRMX for Windows from the DOS Partition**

Start iRMX for Windows from the DOS partition using the `\dosrnx\rnx.bat` file. This example starts the iRMX OS if it is installed on drive C:

```
C:\> rnx c <CR>
```

## **C. Switch to the iRMX Logon Prompt**

Press `<Alt-SysRq>` to toggle to the iRMX prompt from DOS. At the Logon: prompt, enter:

```
Logon: super <CR>
```

At the password prompt, enter:

```
Password: passme <CR>
```

## **D. Attach the iRMX Partition**

Attach the iRMX partition using the **attachdevice** command:

```
- attachdevice <device_name> as :w: <CR>
```

Where:

`<device_name>` Is the DUIB (Device Unit Information Block) name of the iRMX partition one device. For an iRMX partition on a fixed disk 1, use `c_rmxn`. For an iRMX partition on fixed disk 2, use `d_rmxn`. The `n` variable is the partition number on which iRMX for Windows will be loaded.

See also: **attachdevice**, *Command Reference*

## E. Copy the iRMX Software

Copy the iRMX software from the DOS partition to the iRMX partition:

```
- installrmx :w: <CR>
```

The installation utility will prompt you for configuration options. The prompts are listed below along with criteria for answering them.

i. Format Options [0=None;1=Bootstrap Only;2=Full]

Value	Meaning
0	Skip formatting. Enter 0 if you already have a formatted iRMX partition with the bootstrap files loaded.
1	Load only the bootstrap files because there is already an active iRMX partition with files on that partition.
2	Reformat the partition because you have just created an iRMX partition and/or are loading an iRMX OS for the first time.

ii. Enter the number of files for the partition (1000 to 65000)

This prompt is only for a Full format, as described above. Enter the maximum number of files that can be placed on the iRMX partition. Use increments of 5000 for every 40 Mbytes of partition space. For example, if you have a 120 Mbyte partition, enter 15000.

iii. Enter any extra parameters desired during the format:

See also: **format** command, *Command Reference* for other parameters to enter in the **format** command

## Step 6. Install Soft-Scope Cross Debugger

The iRMX for Windows installation includes the kernel for the Soft-Scope Debugger and the command-line version of Soft-Scope that runs on the iRMX OS.

You can also install Soft-Scope for Windows, either on this system or a separate system connected by a serial cable or TCP/IP network. Soft-Scope for Windows is on a separate set of diskettes from the iRMX OS installation.

See also: *Soft-Scope Debugger User's Guide* for details on the Soft-Scope for Windows installation process

## Step 7. Where to Go Next

The installation process is complete. Here are other areas of the manual that you should investigate:

Chapter 6 describes system-level operations specific to iRMX for Windows.

Chapter 8 helps you get acquainted with the iRMX OS.

Chapter 9 shows you where to go beyond this manual.

Appendix B describes what is new in this release of the OS.

Appendix C describes iRMX limitations.

⇒ **Note**

Chapter 8 describes the installation process for online iRMX manuals and the Windows Help file for the iRMX system calls supplied with this release. Installation of both these features is performed separately from the installation procedure in this chapter.





# Installing iRMX for PCs on a PC-compatible System **3**

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Use this procedure if the platform on which you are installing is a PC or PC-compatible board and you want the iRMX OS to run exclusively on the platform.

See also: Chapter 1 for a list of Multibus I and II boards that qualify as PC-compatible boards.

Before performing these installation steps, ensure that your computer meets the minimum requirements necessary to complete the installation. Check Appendix D for any special configuration requirements for your computer.

## Hardware Requirements

- A PC based on an Intel386 processor (or above) or one of the PC-compatible Multibus boards listed in Chapter 1.
- 512 Kbytes of conventional memory if you are installing on a DOS partition; 640 Kbytes if you are installing on an iRMX partition.
- At least 4 Mbytes of total memory (conventional and extended).
- A 1.44 Mbyte 3.5-inch diskette drive.
- 14-52 Mbytes of free hard disk space, depending upon the product configuration you select during installation. The Product Selection Screen displayed during installation lists the specific disk space requirements for each product configuration.
- EGA, VGA, or Super VGA video controller.

### ⇒ **Note**

If you use a network interface controller (NIC), you must know which interface controller is used and whether it is supported by iRMX before stepping through the installation procedure.

## Software Requirements

Installation of iRMX for PCs to a DOS partition must be done from the DOS prompt. The version of DOS running must be at least 5.0.

## Decisions You Must Make Before Installing Software

Before installing software on a PC or PC-compatible board, you need to be able to answer this question:

### **Will the iRMX OS reside on a DOS partition or an iRMX named partition?**

Install the iRMX OS on an iRMX named partition if either of these apply:

- You have no need for DOS on your application system
- You need added security through file access permissions

Install the iRMX OS on the DOS partition if any of these apply:

- You need to maintain existing DOS files
- You are not changing partition size or adding an iRMX partition
- You are using DOS-hosted development tools, such as compilers and editors

# Installation Media

The installation media you begin with depends on your particular installation and the availability of a compact disc (CD) drive. This list summarizes the installation media that starts the install procedure:

Media	Install Conditions
Compact Disc (CD)	Start with this media if you want the iRMX OS to reside (boot from) a DOS disk partition and you have a CD drive available.
Diskettes	Start with this media if you want the iRMX OS to reside (boot from) a DOS disk partition but do not have a CD drive available.
Boot and Commands Diskette	Start with this media if you want the iRMX OS to reside (boot from) an iRMX disk partition regardless of whether you have a CD drive available or not.

# Install Procedure

To perform the installation, follow the steps in this section. Much of the installation process is menu driven and performed on-screen. The steps in this section, in many cases, supplement the on-screen process. However, some steps are independent of the on-screen install process.



### Note

Once the iRMX OS has been installed, be sure to review the *readme.txt*, *rnotes.txt*, and *features.txt* files in the `\rmx386` directory. These files contain the latest iRMX OS product information. You can also view updated information on the Intel Bulletin Board System (BBS).

## Step 1. Copy DOS Software



### Note

Perform this step only if you are installing iRMX for PCs on an iRMX disk partition.

1. Make copies of the following diskettes using the DOS **diskcopy** command:

#### Diskette Name

*Boot Diskette*

*PC-hosted iRMX<sup>®</sup> III Release 2.2 Disk 1 of x*

*Commands Diskette*



### Note

Use these copies for the remainder of the installation.

2. Insert the copy of *Boot Diskette* and transfer the basic MS DOS files to it with:

```
sys x:
```

where *x* is either A or B depending on your system.

3. Insert the copy of the *Commands Diskette* and execute the following command:

```
x:prepare y x
```

where *x* is either A or B (the drive letter for your 3.5-inch diskette) and where *y* is the drive letter on which your *\DOS* directory is located.

4. Insert the copy of the *PC-hosted iRMX<sup>®</sup> III Release 2.2 Disk 1 of x* and execute the following **copy** command:

```
copy \DOS\COMMAND.COM x:
```

where *x* is either A or B depending on your system.



## Step 2. Hard Drive Preparation (DOS Disk Partition)



### Note

Perform this step only if you are installing iRMX for PCs on a DOS disk partition.

To install iRMX for PCs on a DOS partition both of these must be true:

- DOS is installed and running. Minimally, you need a bootable system. Optionally, you can have a full DOS installation.
- The partition on which you are installing the iRMX OS has enough space.

If your disk drive is blank, create and prepare a bootable DOS disk partition on which to install the iRMX OS by using the DOS **fdisk** and **format** commands.

If installing the iRMX OS onto an existing DOS disk partition and the partition doesn't have enough space for the OS, add space using either of these methods:

- Use the DOS **fdisk** and **format** commands to create a DOS partition big enough to hold the iRMX OS.
- Add a larger capacity hard drive to your system.



### CAUTION

Be sure you have copies of all the files in a partition before changing the partition. If you use **fdisk** to change existing partitions on a hard disk, you will lose information on the disk. Additionally, if you change the primary DOS partition you must re-install DOS.

See also: **fdisk** and **format**, your DOS manual



### CAUTION

The iRMX OS allows you to access a primary or secondary DOS partition in addition to iRMX partitions from within the iRMX OS. However, having more than one primary DOS partition may cause system errors.

## Step 3. Hard Drive Preparation (iRMX Disk Partition)



### Note

Perform this step only if you are installing iRMX for PCs on an iRMX disk partition.

To install iRMX for PCs on an iRMX disk partition the hard disk must have enough space to hold the OS. If your disk has one or more DOS partitions, be sure that the remaining free disk space is large enough to hold the iRMX partition that you will later create. If not, add disk space using any of these methods:



### CAUTION

Be sure you have copies of all the files in a partition before changing the partition. If you use **fdisk** to change existing partitions on a hard disk, you will lose information on the disk.

See also: **fdisk**, your DOS manual

- Use the DOS **fdisk** and **format** commands to resize the DOS partition(s) so that there is enough free disk space to create the iRMX disk partition later during the install process. If you change the primary DOS partition you must re-install DOS.
- Add a larger capacity hard drive to your system.
- Remove any DOS partitions from the disk that you do not need. Do not plan to use a secondary (extended) DOS partition by reformatting it with the iRMX **format** command. Instead, delete all the logical drives inside the extended DOS partition and then delete the extended DOS partition itself. This frees up the space on the disk.



### CAUTION

The iRMX OS allows you to access a primary or extended DOS partition in addition to iRMX partitions from within the iRMX OS. However, having more than one primary DOS partition may cause system errors.

If you plan on installing iRMX onto an existing iRMX disk partition, be sure the partition is large enough to hold the new version of iRMX. If it is, the install process will prepare it during a later step. If the existing partition is not large enough, delete it now using the DOS **fdisk** command.

## A. Insert Boot Diskette

Insert the *Boot Disk* in diskette drive A:. Make sure that the diskette is not write-protected.

## B. Reboot System

Reboot the system using <Ctrl-Alt-Del> or the system's reset button.

### ⇒ **Note**

The error message `Error in CONFIG.SYS line 5` may appear as the iRMX OS is being installed. This is a normal part of the installation.

## C. Switch to Commands Diskette

When the drive A: prompt appears, remove the *Boot Disk* and insert the *Commands Disk* in diskette drive A:.

## D. Create the iRMX Disk Partition

### ⇒ **Note**

Perform this step only if you do not have an existing iRMX disk partition.

Create the iRMX disk partition with the iRMX **rdisk** command. Enter the following command from the DOS prompt:

```
rdisk
```

Use the menu system to create and correctly size the iRMX partition. Be sure that you mark it as the active partition if you want to boot the machine using iRMX.



### **CAUTION**

Be sure you have copies of all the files in a partition before changing the partition. If you use **rdisk** to change existing iRMX partitions on a hard disk, you will lose information on the disk. Additionally, if you change the primary DOS partition you must re-install DOS.

See also: **rdisk**, *Command Reference*

## E. Switch to the iRMX Prompt

Switch to the iRMX prompt by pressing <Alt-SysRq>.

## F. Run Install from Commands Diskette

At the Logon: prompt, enter `install`. At the Password: prompt, press <CR>.

### ⇒ **Note**

You will install only certain diskettes, based on your system configuration and selected options. Be sure to install the proper diskettes by carefully reading the diskette labels.

The installation utility will prompt you for configuration options. These prompts are listed below along with criteria for answering them.

1. Format Options [0=Bootstrap Only;1=Full]

<b>Value</b>	<b>Meaning</b>
--------------	----------------

- |   |  |
|---|--|
| 0 | Load only the bootstrap files because there is already an active iRMX partition with files on that partition.            |
| 1 | Reformat the partition because you have just created an iRMX partition and/or are loading an iRMX OS for the first time. |

2. Enter the number of files for the partition (1000 to 65000)

This prompt is only for a Full format, as described above. Input the number of files which can be placed on the iRMX partition. Use increments of 5000 for every 40 Mbytes of partition space. For example, if you have a 120 Mbyte partition, enter 15000.

3. Enter 1 to create a duplicate set of fnodes, Enter 0 otherwise:

This prompt lets you reserve disk space for a backup copy of the fnode table. Entering a 1 creates the special file `r?save` at the end of a volume after formatting. The volume label file and the fnode file are copied to `r?save`. You can use this file in conjunction with the **diskverify** utility to back up the fnodes file on the volume. The `r?save` file is not updated when files are altered; you update the file by using **diskverify** or by specifying backup in the **shutdown** command.

4. Enter any extra parameters desired during the format:

See also: **format** command and the `reserve` parameter, *Command Reference*.

## G. Switch Back to the DOS prompt

When the Logon: prompt reappears, switch back to the DOS A: prompt by pressing <Alt-SysRq>.

## H. Establish DOS Network Drive Z

From the DOS A: prompt, enter `netrdr`. This DOS batch file establishes the iRMX partition as a DOS network drive Z:.

## I. Remove Commands Diskette

Remove the *Commands Disk* from the diskette drive.

## Step 4. Execute Install

Insert the media (CD or the diskette labeled *PC-hosted iRMX<sup>®</sup> III Release 2.2 Disk 1 of x*) and execute the install script from the DOS prompt (you cannot do this from Windows):

```
C:\> d:install <CR>
```

where *d* is the drive letter, such as A.

When you execute this script, you will respond to on-screen questions that further define your installation. The order in which the actual screens appear depends on your responses. Use the descriptions below if you have trouble deciding how to answer a question.

### ⇒ **Note**

If you are installing the iRMX OS to a DOS partition, the installation procedure renames the *config.sys* file to *config.dos*, renames the *autoexec.bat* file to *autoexec.dos*, and creates a new *autoexec.bat* file that contains only commands necessary to start iRMX. Do not change these names if you want to boot your system as both a DOS and iRMX machine.

### **DOS/Windows-hosted Environment or iRMX-hosted Environment**

If you do not want to install the iRMX OS on this disk, choose a DOS/Windows-hosted environment. This choice installs iRMX development tools (such as assemblers, compilers, and the Soft-Scope cross debugger) but not the iRMX OS. You can develop loadable iRMX applications on the installation platform. It is also possible to write and compile the code for embedded iRMX applications. However, to embed an application, you must run the Interactive Configuration Utility (ICU) on a platform that runs the iRMX OS.

If you choose the iRMX-hosted environment you will be installing iRMX for PCs on a DOS partition. Minimally, this choice provides you with the ability to execute loadable iRMX applications that you have developed.

### **Operating System Selection**

You select the operating system from this screen. To let the iRMX OS run exclusively on the platform, select the iRMX for PCs version. (If you want to install iRMX for Windows, follow the instructions in Chapter 2.) Once the system is booted, you cannot freely move back and forth between operating systems as with iRMX for Windows. If you want DOS available from the system, you must have it on a separate disk partition. And, you must boot the platform from that partition.

### **Development Capabilities**

If you will be using the platform simply to run iRMX applications, select the *Basic Run/Time System* option. With a run-time system you can run applications but will not be able to develop them.

If you will be using the platform to develop loadable applications but not generate custom versions of the iRMX OS, select the *Loadable Application Development* option.

Finally, if you will be using the platform to run, develop, and debug applications as well as generate custom versions of the iRMX OS, select the *Application and Customized O/S Development* option.

### **TCP/IP Support**

If you want TCP/IP support on the platform, select *Yes*. TCP/IP support allows you to use TCP/IP services such as TELNET, FTP, and NFS.

See also: *TCP/IP and NFS for the iRMX Operating System*

If you do not want TCP/IP support on the platform, select *No*.

### **Development Tools Selection**

For each of the listed development tools you can select or exclude the tool by toggling the *Yes/No* option. You can choose any combination of the available tools.

### **Unsupported Software Selection**

For each of the listed unsupported software types you can select or exclude the type by toggling the *Yes/No* option. You can choose any combination of unsupported software.

## **Platform-specific Screen**

If your platform is a standard PC, select the *Standard PC Compatible System*.

If your platform is an Intel-developed Multibus I or Multibus II PC-compatible processor board, locate the appropriate one from the list and select it.

## **DOS or iRMX Partition**

If you are installing the iRMX OS on a DOS partition, you need to select the *DOS* option. Otherwise, select the *iRMX* option.

## **Drive Selection**

Select the drive on which the iRMX OS and/or development tools will be installed. Once you make your selection, the install process attempts to access the drive and ensure that enough disk space is available.

## **Deleting/Overwriting iRMX**

If your platform has an older version of iRMX installed, you can choose to delete it, overwrite it, or quit the installation.

- Choosing to delete the old version causes the install procedure to remove all iRMX OS files from the drive. Note that any user-generated files are not deleted.
- Choosing to overwrite the old version causes the installation to check for enough free disk space to do the installation. If there appears to be enough space, the installation proceeds. If not, a warning appears that indicates the installation may fail. A failed installation will yield unpredictable results. You may want to exit the install procedure and clean up the disk.
- Choosing to quit the install procedure returns you to the DOS OS.

## **iNA 960 Network Interface Type**

Select the appropriate network interface type from the list. If you do not have a network interface controller (NIC), select the *No NIC* option.

## **iNA 960 NIC Selection**

Select the appropriate NIC from the displayed list. The selections depend on your platform and network interface type.

## **iNA 960 Remote COMMengine Selection**

Select the appropriate COMMengine board to use as a NIC for your platform. The list presented represents PC-compatible processor boards available from a Multibus II system.

## iRMX Network Name Selection

Provide a unique name for your network.

## Installing Screen

This is the final screen before installation proceeds. Pressing any key starts the installation.

# Step 5. Clean-up Steps When Installing on an iRMX Partition



### Note

Perform this step only if you are installing iRMX for PCs on an iRMX disk partition.

## A. Insert the Commands Diskette

When the DOS A: prompt appears after iRMX for PCs is installed, remove the CD or diskette and place the *Commands Diskette* in the diskette drive.

## B. Return to the iRMX Logon Prompt

Press <Alt-SysRq> to return to the iRMX Logon: prompt.

## C. Logon

Enter `finish` at the Logon: prompt and <CR> at the Password: prompt.

## D. Follow Console Instructions

Instructions on what to do next are displayed on the console.



## E. Use the iRMX for PCs Bootstrap Loader

The iRMX for PCs Bootstrap Loader displays default settings as shown below.

```
iRMX for PCs Bootstrap Loader  
Copyright Intel Corporation 1987 - 1995
```

```
Boot File Name: /dosrmx/dosrmx
```

```
Debug: OFF
```

```
Boot DOS: NO
```

```
Directory: /dosrmx
```

```
<Esc> for next field. <Space> to toggle. <CR> to boot
```

### ⇒ Note

If the Bootstrap Loader screen does not appear, do the following:

- Insert the *Boot Diskette* (making sure that it is not write-protected).
- Reset the system with either <Ctrl-Alt-Del> or the system's reset button.
- When the drive A: prompt appears, remove the *Boot Diskette* and insert the *Commands Diskette* in diskette drive A:.
- Be sure you have the right number and type of disk partitions configured. Use the **rdisk** command to make the first iRMX partition active for boot.

Enter a <CR> to begin loading the default */dosrmx/dosrmx* boot file or press the <Esc> key to make changes to the default settings. For example, if you are using the Multibus I SBC PCP4 board and want to boot the *pcp4s* OS that supports native PCI-SCSI, press the <Esc> key and change */dosrmx/dosrmx* to */boot32/pcp4s*. When the boot file begins loading a status line displays the loading status.

### ⇒ Note

If you do not press the <Esc> or <Space> keys when the Bootstrap Loader screen appears, it will automatically begin loading the default boot file after a brief period of time.

## Step 6. Reboot the System



### Note

Perform this step only if you are installing iRMX for PCs on a DOS disk partition.

Remove the installation media and reboot your system using <Ctrl-Alt-Del>.

## Step 7. Where to Go Next

The installation process is complete. Here are other areas of the manual that you should investigate:

Chapter 7 describes system-level operations specific to iRMX for PCs.

Chapter 8 helps you get acquainted with the iRMX OS.

Chapter 9 shows you where to go beyond this manual.

Appendix B describes what is new in this release of the OS.

Appendix C describes iRMX limitations.



### Note

Chapter 8 describes the installation process for online iRMX manuals and the Windows Help file for the iRMX system calls supplied with this release. Installation of both these features is performed separately from the installation procedure in this chapter.



# Installing the iRMX III OS on Multibus I Systems **4**

---

Use this procedure if the platform on which you are installing is a Multibus I board that cannot run as a PC.

Use the instructions in this chapter to make a first-time installation of the OS, or to install over a previous version. During the installation you will:

- Run the board diagnostics.
- Bootstrap load the system from a diskette.
- Log on as the system manager.
- Format the computer's hard disk, either partially or completely.
- Install the OS software and support products.
- Reboot the Multibus system.
- Generate a boot system.
- Establish the default boot system.
- Merge user files with the new software if you installed over a previous version of the OS.

# Minimum System Requirements

The installation procedure in this chapter assumes you have an Intel System 310, System 310AP, System 320, or compatible Multibus system.

You need a minimum of 75 Mbytes of space on your hard disk to install the iRMX III software. You need a minimum of 4 Mbytes of RAM to boot the iRMX III OS.

## Multibus I Boards

The iRMX III OS supports these Multibus I boards:

<b>CPU Boards</b>	<b>Controller Boards</b>
SBC 386/12(S)	SBC 208
SBC 486/12(S)	SBC 214
SBC 386/2x	SBC 215G
SBC 386/3x	SBC 220
	SBC 221
	SBC 221S
	SCSI controller on SBC 386/12S and 486/12S boards

## Preparing for the Installation

1. If you are not installing the OS on a new Multibus system, back up all current files on tape, especially before formatting the Multibus system's hard disk. In a later step you will format the hard disk. At that point you choose whether to do a complete or partial format. Choosing the partial format allows you to retain all current files on your disk.
2. Write down the option code of the hard disk in your Multibus system if you are using an Intel Multibus system. You can find the option code information on documents delivered with the hardware, or on a label on the bottom cover of the Multibus system. If there are two hard disks, choose the option code of the disk on which you want to make the installation. If you are building a custom system, the supported device types are listed in Tables 4-3 through 4-5.
3. Determine the type of the processor board and peripheral controller board in your Multibus system. If you are using an Intel Multibus system and do not know what type of boards you have, refer to the label on the bottom of the cover of the Multibus system.
4. Read your Multibus system's hardware installation manual to be sure that the equipment is set up correctly and that the terminal is connected with the correct cable.

5. See Appendix F, *Hardware Modifications*, to determine if you need to make any changes to your hardware so that it can run the iRMX III OS.
6. Gather the materials you need for the product(s) you will install. For low-density boot diskettes, you need separate boot and commands diskettes. For high-density diskettes, the commands are included on the boot diskette.
7. Choose which diskette(s) your system requires from this list, based on the processor board in your Multibus system:
  - SBC 386/12 and 486/12 ST506 and ESDI Start-up Boot Diskette, plus the iRMX III Multibus I Start-up Commands Diskette (low-density diskettes)
  - SBC 386/2x/3x ST506 and ESDI Start-up Boot Diskette, plus the iRMX III Multibus I Start-up Commands Diskette (low-density diskettes)
  - SBC 386/12S and 486/12S SCSI Start-up Boot Diskette (high-density diskette that includes the Multibus I Start-up Commands)

You will also need these tapes or diskettes:

- OS tapes
- Tapes or diskettes for products to be installed that are not included in the iRMX III OS software package

If you are missing an item for a product you have purchased, contact your sales representative.

8. Check that all the diskettes and tapes are write-protected.

The installation process described in this chapter can take two hours or more, depending on the type of disk format and the amount of software being installed.

## Step 1. Running the Board Diagnostics

Multibus I processor boards use System Confidence Test (SCT) board diagnostics. The SCT is supplied in firmware as part of an Intel Multibus system. It tests all parts of the system.

### Running the System Confidence Test

1. Turn on the power for the system console and the Multibus system. In about five seconds, the system console displays a series of x's, which is the prompt.
2. Within ten seconds after you see the prompt, type the uppercase letter U repeatedly, until the diagnostics begin to execute (the U does not show on the screen).
3. If you see this prompt, enter n <CR> (after ten seconds, n is assumed):

```
Break to DMON-386 monitor (y or [n]) ? n <CR>
```

If you see this prompt, enter y <CR> (after ten seconds, automatic booting begins):

```
Exit to iSDM after testing? Enter y or n [n] y <CR>
```

The diagnostics execute tests and display a test status report on the system console. When the tests are complete, the SDM monitor is invoked. It displays an entry address (xxxx:yyyy) and a dot prompt (.) as shown:

```
Interrupt 3 at <xxxx:yyyy>
```

.

See also: The manual for your Multibus system for information about the test results

# Step 2. Booting from the Start-up Boot Diskette

Two procedures are described here, one for a low-density diskette and one for a high-density diskette.

## To Boot from a Low-Density Diskette

1. Insert the boot diskette for your processor board.
2. At the dot prompt, enter this to boot from a low-density diskette controlled by the SBC 214, SBC 221(S), or SBC 215G controller board (where WF0 ends in a 0, not the letter O):

```
.b :wf0: <CR>
```

When bootstrap loading is complete, the system console displays this message:

```
Insert the Start-up Commands Diskette and type G <RETURN>  
Interrupt 3 at <xxxx:yyyy>  
.
```

3. Remove the boot diskette.
4. Insert the commands diskette for your system.
5. Enter g (the SDM monitor's go command):

```
.g <CR>
```

## To Boot from a High-Density Diskette

Table 4-1 lists the device names for supported diskettes and controllers. Find the appropriate device name for your system.

**Table 4-1. BSL Device Name, Diskette, and Controller Information**

BSL Device Name	Granularity	Density	Controller
wf0	iRMX standard	low	SBC 214, 221(S), and 215G
sqf0	uniform	high	SCSI to floppy adapter
t55_0	uniform	high	SCSI to embedded SCSI Teac 5.25-inch diskette
t235_0	uniform	high	SCSI to embedded SCSI Teac 3.5-inch diskette

1. Insert the boot diskette for your processor board.
2. At the dot prompt, boot from a high-density diskette (controlled by an on-board SCSI interface) by entering:

```
.b :sqf0: <CR>
```

or

```
.b :t55_0: <CR>
```

or

```
.b :t235_0: <CR>
```

To boot from a diskette controlled by an SBC 221(S) or SBC 214, enter:

```
.b :wf0: <CR>
```



## Step 3. Logging On and Setting the Date and Time

The console displays this bannerhead:

```
*-----*-----*-----*-----*-----*-----*-----*-----*
          iRMX* Ver.# Operating System
* iRMX is a Registered Trademark of Intel Corporation
*-----*-----*-----*-----*-----*-----*-----*-----*
Logon:
```

You now log on as the system manager, Super. The system manager has access to all files used during the installation process, and can change access rights to all iRMX files.

1. Enter the Super logon at the prompt:

```
Logon: super <CR>
```

2. The system prompts you for a password. For now, enter the default password for Super, passme. The password must be in lower-case letters. It is not shown on the screen.

```
Password: passme <CR>
```

The OS signs on with this message:

```
iRMX HI CLI, Vx.y: USER = 0
Copyright years Intel Corporation
All rights reserved
-
```

3. When you see a prompt for the date, enter the date in one of these formats. If the displayed date is already correct, enter e instead.

month/day/year (for example, 01/15/1994)  
day month year (for example, 15 JAN 1994)  
day month year (for example, 15 JANUARY 1994)

Example:

```
DATE: 01/15/1994 <CR>
```

If your system does not include a global clock, you will see the message:

```
E$EXIST, Global Clock not present - will query for  
local date
```

4. The system prompts you for the time, which is based on a 24-hour clock. Enter the time in hours:minutes:seconds format, using either one or two digits for each field. If you omit the minutes and seconds, the system sets them to 0. If the displayed time is already correct, enter e instead.

For example, at 7:36 AM and 40 seconds, enter 07:36:40 or at 2:00 PM, enter 14:00.

Example:

```
TIME: 7:36:40 <CR>
```

If you enter either the date or the time in the wrong format, you get a message to re-enter it.

If your system does not include a global clock, you will see the message:

```
E$EXIST, Global Clock not present - will query for local time
```

Two **submit** files named *:prog:alias.csd* and *:config:alias.csd* are executed.

These files define aliases for command names. To see the complete list of aliases, use the **alias** command. Do not modify the aliases in the *:config:alias.csd* file because the iRMX software uses them as defined.

The OS defines the logical name *:tape:*. In these steps, the command that formats the hard disk requires this logical name.

## Step 4. Determining Disk Parameters

The **submit** commands in these steps require parameters specific to the hardware in your system. In this step, you determine the parameters based on your peripheral controller board and hard disk. For an installation over a previous release, you need only the device name parameter, described in Item 2.

1. If you are not installing over a previous release, use Table 4-2 to determine the parameters for your disk drive. You will need the device name, number of files, and interleave factor.

**Table 4-2. Interleave Factors**

<b>Controller Board</b>	<b>Interleave Factor for 5.25- and 3.5-inch Hard Drives</b>	<b>Interleave Factor for 8-inch Hard Drives</b>
SBC 214 or 221(S) <sup>1</sup>	1	--
SBC 215G	4	5
SCSI	1	--

<sup>1</sup> Device names for the first hard disk (or for systems with only one hard disk) end in 0. Device names for a second hard disk end in 1.

2. Refer to Tables 4-3 through 4-5 to locate the type of hard disk on which you will install the software. Table 4-4 applies only if you are using a 221S controller board.

When you locate the type of hard disk, make a note of the device names and number of files for that disk type. If your system includes multiple hard disks, choose the appropriate device name based on which disk you will use.

### ⇒ **Note**

The `files` parameter used in the `submit` commands is the total number of files that can be created on the hard disk. If the number of files needs to be changed later, you will have to back up your files and reformat the hard disk. The recommended numbers listed in Tables 4-3 through 4-5 are approximations based on 125 files per megabyte of disk capacity. You may choose a different number. The maximum number of files that the OS can handle is 65,528.

**Table 4-3. Device Names and Numbers of Files for ST506 and ESDI Hard Disks**

<b>Hard Disk Model Number</b>	<b>System 310 Designation</b>	<b>System 310AP Option Code</b>	<b>System 320 Option Code</b>	<b>Device Name</b>	<b>Recommended Number of Files</b>
Maxtor XT-1140	140 Mbyte 5.25-inch	GK3	T1GF4 T1GF9	mma0 mma1	18000
Maxtor XT-1085	86 Mbyte 5.25-inch	GK8	none none	mmb0 mmb1	11000
Maxtor XT-4175E	none none	none none	T1GF10 T1GF12	mmc0 mmc1	22000
Maxtor XT-4380E	none none	none none	T1GF11 T1GF13	mmd0 mmd1	48000
Maxtor XT8760E	none none	none none	T1GF16 T1GF17	mme0 mme1	65528
Seagate ST-251	43 Mbyte 5.25-inch	GK12	none	sma0 sma1	5400
Toshiba MK56FB	85 Mbyte 5.25-inch	none T1GF8	T1GF3 tma1	tma0	11000

**Table 4-4. Device Names and Numbers of Files for Generic SCSI Hard Disks on an SBC 221S Controller**

<b>Generic SCSI Size</b>	<b>Device Name</b>	<b>SCSI ID Number (n)</b>	<b>Recommended Number of Files</b>
500 Mbyte or larger with 512-byte granularity	GW500M_ <i>n</i>	0, 1	62500
700 Mbyte or larger with 512-byte granularity	GW700M_ <i>n</i>	0, 1	65528
1 Gbyte or larger	GW1G_ <i>n</i>	0, 1	65528
2 Gbyte or larger	GW2G_ <i>n</i>	0, 1	65528
4 Gbyte or larger	GW4G_ <i>n</i>	0, 1	65528

**Table 4-5. Device Names and Numbers of Files for SCSI Hard Disks  
(386/12S and 486/12S only)**

Hard Disk Model Number	Device Name	SCSI ID Number ( <i>n</i> )	Recommended Number of Files
Maxtor XT-3170S	M3170_ <i>n</i>	2, 3	22000
Maxtor XT-4170S	M4170_ <i>n</i>	2, 3	22000
Maxtor XT-4380S	M4380_ <i>n</i>	2, 3	48000
Maxtor XT-8380S	M8380_ <i>n</i>	2, 3	48000
Maxtor XT-8760S	M8760_ <i>n</i>	2, 3	65528
Hewlett-Packard 97536	HP97536_ <i>n</i>	2, 3	40000
Siemens Megafire 2300	S2300_ <i>n</i>	2, 3	48000
Micropolis 1578	MP1578_ <i>n</i>	2, 3	39000
Quantum Pro 80	Q280_ <i>n</i>	2, 3	11000
Generic SCSI 512 byte granularity	GSCW5_ <i>n</i>	2, 3	depends on drive size
Generic SCSI 1024 byte granularity	GSCW_ <i>n</i>	2, 3	depends on drive size

3. Replace the *n* in the device name in the second column in Tables 4-4 and 4-5 with the appropriate SCSI ID Number from the third column. For example, the device name for the Maxtor XT-4380S drive with SCSI ID 2 is M4380\_2. Use the Generic SCSI DUIDs for hard disks not listed in the table.

See also: Your hard disk drive reference manual for the appropriate SCSI ID number;  
Appendix F, *Command Reference* for information on partitioned SCSI hard disk drives

## Step 5. Formatting the Disk and Installing Software From Tape

You must now format the hard disk. There are two options, a full format or a partial format (track 0 only).

**Full format**                      Formats the entire hard disk.

Choose this option if you have a new Multibus system with nothing on the hard disk. All Intel Multibus systems are shipped with unformatted hard disks. You may also choose this option for a system whose software you want to completely erase.

**Partial format**                      Formats only track 0 of the hard disk with the second stage of the iRMX bootstrap loader.

Choose this option if your disk was formatted with any earlier release of the iRMX OS. This option does not delete any current files, but it does rename some of them.

Either option also installs the OS, along with any included support software. Enter your commands after the hyphen (-) prompt.

### Full Format Option



#### CAUTION

Do not perform this option if you want to keep the files on your hard disk. The Full format option deletes all files. Proceed to the Partial format option if you want to save existing files.

1. Insert the first OS tape.
2. To format the hard disk, enter a **submit** command with the proper parameters for the disk you want to format. Substitute a device name, the interleave factor, and the number of files appropriate for your system:

```
submit :tape:form_disk(device, interleave, files) <CR>
```

This command is valid for a Maxtor XT-4380E disk that is the first hard disk in the system, and is controlled by an SBC 221 board:

```
submit :tape:form_disk(mmd0, 1, 48000) <CR>
```

The OS formats the hard disk, which can take 30 minutes or longer. Then it displays a summary of alternate tracks assigned for bad tracks found during the format.

```
The following tracks have been assigned an alternate:
```

```
{disk information}
```

Following formatting, the **submit** file sets up a directory structure on the hard disk. It invokes the **restore** command and copies all the files from the tape to the hard disk. It establishes World permission rights for files. Then it switches the system device from the diskette drive to the hard disk, so that the OS reads future commands from the hard disk. This process can take up to 45 minutes.

3. When you receive the logon prompt, remove the *Start-up Commands* diskette and OS tape from their drives. Store them in their covers.

## Partial Format Option

If you performed the Full format option, skip these instructions and go to Step 6.



### CAUTION

If you have performed this installation once, and want to repeat the partial format option on a disk, read the instructions for saving current files before a partial format. If you do not follow those instructions, repeating the partial format option can overwrite files you want to save.

## What Happens to Current Files When Installing Over a Previous Release

The iRMX III OS uses some directories from previous releases. The current iRMX directories and files are renamed so that you may choose what to do with them. Files you have created will not be deleted when installing over a previous release.

To save the current iRMX files in those directories, the **submit** file renames directories as shown in Table 4-6. Following an installation over the previous release, current iRMX files reside in the *\*\_old* directories/files specified in Table 4-6.

**Table 4-6. Directories Renamed in a Multibus I Installation**

Previous Directory/File	Renamed To
/user	/user_old
/msa32	/msa32_old
/boot32	/boot32_old
/rboot32	/rboot32_old
/net	/net_old
/system/rmx86	/system/rmx86_old
/system/rmx86.386	/system/rmx86_old.386
/msa/config/bps	/msa/config/bps_old
/rmx386/config/terminals	/rmx386/config/terminals_old
/rmx386/config/udf	/rmx/config/udf_old
/rmx386/config/user/super	/rmx386/config/user/super_old
/rmx386/config/user/world	/rmx386/config/user/world_old

### Renaming Files With Existing `_old` Extensions

If your hard disk has any of the target files listed in the Renamed To column in Table 4-6, the **submit** file renames the current files from the Previous Directory/File column in Table 4-6 to have an extension of `_dd.#` where # is the lowest number that doesn't overwrite an existing file.

### Performing a Partial Format

1. Using the device name you selected in Step 4, enter this **submit** command to format track 0 of the hard disk:

```
submit :tape:form_trk0(device_name) <CR>
```

Use this command for a Maxtor Model XT-1140 hard disk:

```
submit :tape:form_trk0(mma0) <CR>
```

The **submit** file formats track 0 of the hard disk. It renames directories and files to preserve current files.

After formatting, the **submit** file creates a directory structure on the hard disk. It invokes the **restore** command and copies all files from the tapes to the hard disk. Enter `Yes <CR>` after switching tapes. It establishes World permission rights for files and then it switches the system device from the diskette drive to the hard disk (so that the OS reads future commands from the hard disk).

2. When the logon prompt appears, remove the Start-up Commands Diskette and OS tapes from their drives.



## Step 6. Logging On and Copying the Start-up Boot System

1. Enter the Super logon and the default password (in lower case) as:

Logon: **super** <CR>

Password: **passme** <CR>

2. When prompted for the date and time, enter the letter e:

DATE: **e** <CR>

TIME: **e** <CR>

The start-up boot system is now copied from the diskette to the hard disk. The Multibus system can now be rebooted from the hard disk if a failure occurs.

## Step 7. Setting Up Your Terminal

The command described below selects terminal attributes, so you can use your terminal with the Aedit text editor and the Command Line Interpreter (CLI). Put this command in your `:prog:r?logon` file. Until you do so, you must enter the command each time you log on.

1. Select the appropriate terminal name from Table 4-7.

**Table 4-7. Terminal Names Defined in the *termcap* File**

Terminal Type	Description
ANY	Default ANSI terminal for terminals not listed
1510E	Hazeltine 1510 with escape lead-in
1510T	Hazeltine 1510 with tilde lead-in
ADM3A	Lear Seigler ADM-3A
AT386	PC system console
RMXPC or PC	PC system console
QVT102	Qume QVT102, in QVT102 mode
RGI	SBX 279 Graphic Subsystem
S120	PC system console
TV910P	Televideo 910 Plus
TV950	Televideo 950
VT100	DEC VT100, VT101 (also for Wyse 75 and Wyse 85)
VT102	DEC VT102
VT52	DEC VT52
WYSE50 or WY50	Wyse 30, Wyse 50
XTERM	X-Windows terminal
ZENTEC	Zentec Zephyr and Cobra

2. Enter this command using this terminal name:

```
- set terminal = terminal_name <CR>
```

## Step 8. Updating Your Software

For information on updating your iRMX III software, please see the Release Notes.

Updating the software and generating a new version could cause the size of the OS to exceed the amount of memory allocated for it in the ICU definition file. If you get an error message to this effect, you must increase the amount of memory available to the OS.

See also: Changing the Memory Size, Appendix E

## Step 9. Generating a Default OS

In this step, you make a new version of the OS using the **mksys** command. This version will independently boot the processor board in your Multibus system.

### A. Additional Step for Non-SCSI Boards

#### ⇒ **Note**

Perform part A of this step only if you are running a non-SCSI board. Otherwise, skip to part B.

The installed system comes with the following iRMX OSs pre-generated:

- /boot32/38612.386
- /boot32/38620.386

Before you generate your new version of the operating system, you will need to reboot the system from one of the pre-generated operating systems. Use the following list to see which OS to reboot with:

<b>CPU Board</b>	<b>Boot File Pathname</b>
SBC 386/12	/boot32/38612
SBC 486/12	/boot32/38612
SBC 3862x	/boot32/38620
SBC 3863x	/boot32/38620



### Note

Before generating your new version of the OS with **mksys**, you should rename the pre-generated OS to something which will not be over written during the OS generation process. For example:

```
rename /boot32/38612 to /boot32/i38612
rename /boot32/38612.386 to /boot32/i38612.386
```

You must rename both the third stage bootstrap loader (*38612* in this example) and the iRMX OS (*38612.386* in this example).

To reboot the system with the pre-generated version of the OS, follow these steps:

1. Shut down the OS with the **sh** command (an alias for **shutdown w=0**):
  - **sh <CR>**
2. When you see a SHUTDOWN COMPLETED message, reset the system. Press the RESET button or turn the RESET switch on the front panel of the computer.
3. The SCT runs again. Answer its prompts as you did in Step 2, to invoke the SDM monitor.
4. When you see the monitor prompt (**.**), enter this command to bootstrap load the OS. Use the boot file pathname from the previous page:

```
.b /boot32/board_name <CR>
```

If the system does not boot, call your Intel Customer Support representative.

# B. Making a New Version of the OS



## CAUTION

For any one definition file, do not invoke the **mksys** command again after you have successfully used it once to generate the OS. Because **mksys** does not use your modified file for input, it will overwrite the local copy of your definition file. You will lose any modifications that you have made to the file. Instead of using **mksys**, invoke the ICU using the definition filename as the input parameter.

Table 4-8 shows the files used and generated by the **mksys** command for different processor boards. It also shows the board name to use for your processor board in these commands.

See also: Multibus I Standard Definition files, *ICU User's Guide and Quick Reference*

**Table 4-8. Files Generated by mksys for CPU Boards**

<b>CPU Board</b>	<b>Board Name</b>	<b>ICU Definition File</b>	<b>Generation Directory</b>	<b>Boot File Pathname</b>
SBC 386/12	38612	38612.bck	:home:38612	/boot32/38612.386
SBC 386/12S	38612S	38612S.bck	:home:38612S	/boot32/38612S.386
SBC 486/12	48612	48612.bck	:home:48612	/boot32/48612.386
SBC 486/12S	48612S	48612S.bck	:home:48612S	/boot32/48612S.386
SBC 386/2x	38620	38620.bck	:home:38620	/boot32/38620.386
SBC 386/3x	38620	38620.bck	:home:38620	/boot32/38620.386

To generate a default OS:

1. From Table 4-8, find the board name that corresponds to your processor board. For instance, the SBC 386/3x board has board name 38620.

2. The **mksys** command takes approximately 15 minutes to execute. Sometimes the screen scrolls faster than you can read it. This is because the **mksys** command rapidly shows the ICU screens as it executes. The scrolling is not a cause for concern.

Enter this command substituting `board_name` for your processor board:

```
- mksys board_name <CR>
```

Various ICU prompts are displayed on the screen; they are answered by a **submit** file. Do nothing until you see an `END submit` message.

The **mksys** command creates a directory under your `:home:` directory. It attaches that new directory as your default prefix. It creates a local copy of the appropriate ICU definition file. Then it generates on disk an updated version of the OS suited to the processor board specified in the command.

The command ends with a line similar to this:

```
-END submit :config:cmd/mksys.CSD
```

3. Following the `END submit` message, use either the Aedit editor or the **skim** command to discover if errors occurred in the process.

See also: **skim** command, *Command Reference*

While the **mksys** command was running, it recorded its progress in an output file. Use the **skim** command to read this output file to find out if any errors occurred during the generation process. Replace `board_name` with the same name you used in the **mksys** command:

```
- skim board_name.out <CR>
```

Press the space bar at the `more?` prompt to page through the file.

If the output file contains any error messages, a problem occurred during the **mksys** generation. Use an example file to identify the errors.

See also: Generation output file, *ICU User's Guide and Quick Reference*

If you receive this error message, use the ICU to change the amount of memory reserved for the iRMX III OS.

```
ERROR 192: NO SPACE FOR SEGMENT - BASE NOT SET
```

See also: Changing memory size, Appendix E

If you receive a different error, call Intel Customer Support.

⇒ **Note**

The **mksys** command copies a third stage bootstrap loader for you. If you create a different boot system using the ICU rather than **mksys**, you must remember to copy the correct third stage from the bootstrap loader directory to the */boot32* path. For example:

```
copy /bsl/38612.32 to /boot32/38612 <CR>
```

Third Stage files in the iRMX III system have the suffix *.32* to indicate that they load 32-bit code.

## Step 10. Testing by Booting from the Hard Disk

To test the previous installation, you must shut down the OS, then reset and reboot the Multibus system.

1. Shut down the OS with the **sh** command (an alias for **shutdown w=0**):  

```
- sh <CR>
```
2. When you see a **SHUTDOWN COMPLETED** message, reset the system. Press the **RESET** button or turn the **RESET** switch on the front panel of the computer.
3. The SCT runs again. Answer its prompts as you did in Step 2, to invoke the SDM monitor.

### ⇒ Note

If you interrupt the SCT with a <Ctrl-C> and proceed directly to the boot phase, on some configurations a spurious parity error can cause a break to the SDM monitor. To avoid this problem let the SCT run to completion. However, if this spurious break to SDM does occur, simply type **g <CR>** at the SDM prompt and the boot will continue.

4. When you see the monitor prompt (**.**), enter this command to bootstrap load the OS. Use the same board name that you used in previous commands:

```
.b /boot32/board_name <CR>
```

If the system does not boot, call your Intel Customer Support representative.

5. When prompted for the date and time, enter the letter **e**:

```
DATE: e <CR>
```

```
TIME: e <CR>
```

6. At the Logon prompt, enter the Super logon and the default password:

```
Logon: super <CR>
```

```
Password: passme <CR>
```



# Step 11. Copying the New Version over the Start-up Version

⇒ **Note**

If you do not perform this step, or you copy incorrect file names, the system will not boot automatically the next time you start it. If that occurs, repeat Step 10 to boot the system, then perform this step.

Assuming the new OS is running, use this procedure to copy the new bootable image over the image first used to boot the system. If the OS is not running, call your Intel Customer Support representative.

This step allows you to automatically boot the OS, rather than setting boot parameters each time you start the Multibus system.

Issue these **copy** commands, using the same board name as in previous commands:

- `copy /boot32/board_name over /system/rmx86`
- `copy /boot32/board_name.386 over /system/rmx86.386`

Appropriate values for `board_name` are found in the second column of Table 4-8.

The file `/system/rmx86` is the default BSL third-stage pathname for the bootstrap loader on Multibus I systems. After executing the above commands, the file contains the BSL third-stage for your processor board. The file `/system/rmx86.386` contains the OS system for your processor board. From now on, you may let the system boot on its own, or you may enter `b` at the monitor dot prompt. The OS boots using the target BSL third-stage file `/system/rmx86` and the target OS file `/system/rmx86.386`.

## Step 12. Taking Precautions for System Security

Use this step to protect the security of your system. You want to make sure that unauthorized people cannot log on as the system manager because a system manager can make changes to the OS. Memorize the new password you enter below. You must know the password to perform system maintenance.

A password can be up to eight characters long. It may consist of any printable ASCII characters, and is case-sensitive.

1. Change the system manager password using the **password** command:

```
- password <CR>
```

2. You are prompted with a series of commands. Select **c** to change the password:

```
Enter the command: c <CR>
```

3. You receive these prompts. Respond to each. The password entries that you make will not be shown on the screen:

```
Enter your user name - super <CR>
```

```
Enter the old password - passme <CR>
```

```
Enter the new password - new_password <CR>
```

```
Repeat the new password - new_password <CR>
```

4. To exit, enter **e** as follows:

```
Enter the command: e <CR>
```

There is another logon called World that does not have the powers of the system manager. The World default password is <CR> (press <CR> at the password prompt). Do not change the password for World. If you want to remove the ability of the user World to access your system, delete the file `:config:user/world`, and use the **password** command to remove the World user from `:config:udf`.

Do not routinely log on as the system manager. Instead, log on either as World or as some other user that you define. Log on as Super only to manipulate system files. This reduces the chance of deleting or modifying a system file by mistake.

To log off as Super, use the **logoff** command. To become Super while logged on as another user, enter the command **super**, then the Super password. To return to the ordinary user logon, enter the **exit** command.)

## Step 13. Merging the User and Configuration Files



### Note

Perform this step only if you have installed over a previous version of the OS, using the Partial format option. If you formatted the whole disk, the installation is finished.



### CAUTION

The default *r?logon* file submits the file *:config:alias.csd* in addition to *:prog:alias.csd*. The file *:config:alias.csd* contains aliases used by the OS. Installation instructions and example code use these aliases as defined. Do not modify the existing aliases in *:config:alias.csd*; adding new aliases is acceptable.

## User and Alias Files

The **submit** file for the installation renamed the existing */user* directory to */user\_old*.

1. Enter these commands to restore user files to their original directory structure, and put the boot system in Super's *:home:* directory. Replace *board\_name* in the last command below with the same board name you used in previous commands.

```
- rename /user to /user_new <CR>
- rename /user_old to /user <CR>
- rename /user_new/super/board_name
  to /user/super/board_name <CR>
```

You can now delete the */user\_new* directory.

2. The default *r?logon* file for each user submits *:config:alias.csd* in addition to submitting *:prog:alias.csd*.

To allow users access to the aliases in *:config:alias.csd*, add this line to the *:prog:r?logon* file for each user:

```
submit :config:alias
```

3. Some of the aliases in *:config:alias.csd* are the same as aliases defined in the old *:prog:alias.csd* file. An alias defined in *:config:alias.csd* should not also be defined in *:prog:alias.csd*.

From this list, delete duplicate aliases in file *:prog:alias.csd*. Invoke the 32-bit languages with the **run86** utility.

```
alias ad=attachdevice
alias af=attachfile
alias crdir=createdir
alias dd=detachdevice
alias df=detachfile
alias flim=floppyimage
alias install=submit :config:cmd/instal(#0)
alias tinstall=submit :config:cmd/tinstall(#0)
alias mksys=submit :config:cmd/mksys(#0)
alias plm386=run86 -fixplm :lang:plm386
alias asm386=run86 :lang:asm386
alias bnd386=run86 :lang:bnd386
alias bld386=run86 :lang:bld386
alias lib386=run86 :lang:lib386
alias map386=run86
alias ic386=run86 :lang:ic386
```

## Alias Additions

4. You may want to add the new user aliases listed below to your *:prog:alias.csd* file. These are defined in the file *:config:default/alias.csd*.

```
alias s=submit
alias m=skim
alias trv=traverse
```

## Configuration Files

These instructions help you decide how to merge your old iRMX II or iRMX III configuration files with the newly installed files in the `:config:` directory. After you have merged these files to your satisfaction, you may remove the old versions of the files.

The new system configuration files in the `:config:` directory are compatible with previous releases of the OS. This release can boot and use the old versions with no problems. For some of the files, however, if you simply overwrite the new version with your previous version, some important enhancements are lost.

5. The `:config:termcap` file is the iRMX HI CLI terminal attribute file. The information in this file provides terminal attribute definitions for the CLI and for Aedit. Using the CLI's `set` command allows Aedit to operate without creating a specific `aedit.mac` file, as was necessary in the past.

Compare the new `termcap` file with changes you made to your previous version. Decide whichever file provides a better starting point for merging your changes; adding your changes to the new file may be easier. If `:lang:aedit.mac` or `:home:aedit.mac` exist, they need to contain only utility macros, not terminal attributes. Also, `:lang:useful:mac` contains some valuable macros.

6. The `:config:terminals` file is the Human Interface (HI) user terminal configuration file. The format of this file allows a Network Server system to provide remote system device services to a diskless remote file consumer. The `terminals` file allows multiple remote consumers to use one copy of the file for each of their unique terminal definitions.

Read the description of `:config:terminals` in the *System Configuration and Administration* manual for more information. The original form of the file will work fine for the local system. To restore the original iRMX II version, enter:

```
- copy /rmx286/config/terminals over :config:<CR>
```

To restore the old iRMX III version, enter:

```
- copy /rmx386/config/terminals_old over :config:terminals <CR>
```

7. The `:config:udf` file is the user definition file. No changes have been made to this file's format.

If you defined users in a previous version of the iRMX II UDF file, restore it with this command:

```
- copy /rmx286/config/udf over :config:<CR>
```

For a previous version of the iRMX III UDF file:

```
- copy /rmx386/config/udf_old over :config:udf <CR>
```

8. The `:config:cdf` file is the Administration Unit definition file for network consumer systems. No changes have been made to this file's format.

If you defined any networking Administration Units (subnets) in a previous version of the iRMX II CDF file, restore it with the command:

```
- copy /rmx286/config/cdf over :config:<CR>
```

For a previous version of the iRMX III CDF file:

```
- copy /rmx386/config/cdf_old over :config:cdf <CR>
```

9. All users that you created in an iRMX II system are still valid in your iRMX III system. The process of adding and configuring users has not changed. To add all of your iRMX II users to your iRMX III system, enter:

```
copy /rmx286/config/user/* to :config:user <CR>
```

For a previous version of the iRMX III OS users, enter:

```
copy /rmx386/config/user/*_old to :config:user/* <CR>
```

10. The `:config:r?init` file is the iRMX System Initialization file. This submit file is executed when the HI is initialized. Its output goes to the first entry in `:config:terminals`. No CLI commands, such as **background** or **alias**, can be used, because no CLI job is created when the file is executed.

A default version of the `config:r?init` file is provided. It contains a description of how to set the file up to load one of the SBX 279(A) menus. To select the default version, enter:

```
copy :config:default/rinit over :config:r?'init
```

Modify the file as necessary.

11. The `:config:logon.msg` file is the logon message file. Modify the `logon.msg` file as needed.

## Where to Go Next

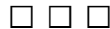
If you want to turn off the Multibus system, first invoke the **sh** command (as Super). You may leave the system running, but you should first log off as Super by invoking the **logoff** command.

To learn more about your new OS, see these manuals:

<b>Topic</b>	<b>Manual</b>
Basic operations, such as logging on, entering commands, etc.	Chapter 8 of this manual
Features of the iRMX Operating Systems	<i>Introducing the iRMX Operating Systems</i>

⇒ **Note**

Chapter 8 describes the installation process for online iRMX manuals and the Windows Help file for the iRMX system calls supplied with this release. Installation of both these features is performed separately from the installation procedure in this chapter.







# Installing the iRMX III OS on Multibus II Systems **5**

---

Use this procedure if the platform on which you are installing is a Multibus II board and you will not be running it as a PC.

The standard Multibus II installation assumes you have an I/O Server board compatible with the System 520 system.

Use the instructions in this chapter to make a first-time installation of the OS, or to install over a previous version. During the installation you will:

- Run the system diagnostics.
- Bootstrap load the system from a diskette.
- Log on as the system manager (Super).
- Format the computer's hard disk, either partially or completely.
- Install the OS software and support products.
- Generate a boot system and reboot the Multibus II system.
- Establish the default boot system.
- Merge user files with the new software (if you installed over a previous version of the OS).

# Minimum System Requirements

A minimum of 75 Mbytes of space on your hard disk is required to install the iRMX III software. A minimum of 4 Mbytes of RAM is required to boot the iRMX III OS.

## Multibus II Boards

See also: *MSA for the iRMX Operating System* for additional information on configuring multiple processor boards

The iRMX III OS supports these Multibus II boards:

<b>CPU Boards</b>	<b>CPU + I/O Server Boards</b>
SBC 386/120	SBC 386/258
SBC 386/133	SBC 386/258D
SBC 386/258	SBC 486/133SE
SBC 386/258D	SBC 486/166SE
SBC 486/125	SBC P5090
SBC 486/150	SBC P5120
SBC 486/133SE	SBC P5090ISE
SBC 486/166SE	SBC P5120ISE
MIX 386/020	
MIX 386/020A	
MIX 486/020A	
MIX 486SX33	
MIX 486DX33	
MIX 486DX66	
MIX 486/DX4	
SBC 486DX33	
SBC 486DX66	

See also: Hardware Modifications, Appendix F

## Preparing for the Installation

1. If you are not installing the OS on a new Multibus II system, back up all current files on tape. In a later step you will format the Multibus II system's hard disk. At that point you choose whether to do a complete or partial format. Choose the partial format to retain all current files on your disk. However, first back up the files to protect these files.
2. If you are using an Intel Multibus II system, write down the type of the hard disk in your system. This information should be listed on documents delivered with the hardware. If there are two hard disks, choose the device type of the disk on which you want to make the installation. If you are building a custom system, the supported device types are listed in Table 5-1.
3. Determine the type of the I/O Server board in your system. If you do not know what type of I/O Server board is in your system, refer to the back panel.
4. Read your Multibus II system's hardware installation manual to be sure that the equipment is set up correctly and that the terminal is connected with the correct cable.
5. See Appendix F, Hardware Modifications, to determine if you need to make any changes to your hardware so that it can run the iRMX III OS.

6. Choose which diskette(s) your system requires from this list, based on the I/O Server board in your Multibus II system:
  - SBC 386/258 Start-up Boot Diskette (for SBC 386/258 and 386/258D boards)
  - SBC 486/166SE Start-up Boot Diskette (for SBC 486/166SE and 486/133SE boards)
  - SBC P5120ISE Start-up Boot Diskette (SBC P5120ISE, SBC P5090ISE, SBC P5120, and SBC P5090 boards)

You will also need these tapes or diskettes:

- Operating system tape
- Tapes or diskettes for products to be installed that are not included in the iRMX III software package

If you are missing an item for a product you have purchased, contact your sales representative.

7. Check that all the diskettes and tapes are write-protected. (Boot diskettes for the SBC P5\* boards are write-enabled.)

The installation process described in this chapter can take two hours or more, depending on the type of disk formatting performed and the amount of software being installed.

## Step 1. Testing the System Hardware

1. If you are using the SBX 279A module for your system console, make sure the SBX scan bit in your I/O Server board's firmware is enabled.

See also: SBX scan, *Firmware User's Guide for MSA Firmware*

2. Turn on the system console and the Multibus II system.
3. When you see asterisks or other characters displayed on the screen, enter:

```
u
```

The u will not show on the screen.

4. The system prompts you for a selection from this menu. Select Run System Diagnostics by typing 1 at the Enter number ? prompt:

```
1 Run System Diagnostics
2 Go to Operator Interface
3 Go to Bootphase
```

```
Enter number ? 1
```

The 1 will not show on the screen. If you do not make a choice in 9 seconds, the system defaults to running the diagnostics (selection 1).

5. Test results look like Figure 5-1. Make a note of which Multibus II system slots hold the I/O Server board and the optional processor board. You need this information for later steps.
6. At this prompt, type a y to invoke the MTH:

```
Do you want to enter additional commands? Enter y or n [n]?
y <CR>
```

If the hardware is working correctly, the status column displays PASS for all the tests, and the display is similar to Figure 5-1. If one of the tests fails, invoke the MTH to choose further tests by pressing <Ctrl-C>. To display the MTH help menu, enter h. If you cannot find and fix the problem, call Intel's Customer Support.

See also: Using the MTH Commands, *Firmware User's Guide for MSA Firmware*

This display is only an example. If your system hardware configuration differs, so will the display.

```

System Configuration and BIST Status
  Slot  Product Code  Vendor  Rev  Class  SSR  SLR  Test  Status
    0   386/258       Intel   01H  F2H   00H  A3H   18   PASS
    2   386/120       Intel   01H  F1H   00H  23H   21   PASS
    6   186/410       Intel   03H  E4H   00H  23H   14   PASS
    7   186/530       Intel   03H  E5H   00H  23H   14   PASS
SYSTEM CONFIGURATION AND BIST STATUS.....PASS

iPSB Tests
  Slot  2 Test 128  Unsolicited Message Receive          PASS
  Slot  2 Test 129  Unsolicited Message Send             PASS
  Slot  2 Test 130  Solicited Message Receive 2-C        PASS
  Slot  2 Test 131  Solicited Message Send 2-C          PASS
  -
  -
iPSB TESTS..... PASS

Pre-configured Systems Tests
  Slot  0 Test  1  Init Routine                          PASS
  Slot  0 Test 12  Data & Parity Dynamic RAMs            PASS
  Slot  0 Test 20  RAM, Refresh                          PASS
  Slot  0 Test 22  Display On-Board RAM Size
On-Board RAM Size is      4 Megabytes
                                     PASS
  Slot  0 Test 24  PSB Interconnect Access              PASS
  Slot  2 Test  1  Init Routine                          PASS
  Slot  2 Test 12  Data & Parity Dynamic RAMs            PASS
  Slot  2 Test 22  Display On-Board RAM Size
On-Board RAM Size is      4 Megabytes
                                     PASS
PRE-CONFIGURED SYSTEMS TESTS..... PASS

Do you want to enter additional commands?  Enter y or n [n] ?

```

**Figure 5-1. Sample Board and System Test Report**

## Step 2. Booting From the Start-up Boot Diskette

In this step, you instruct the MTH to change a boot parameter that makes the system boot from software on diskette (in the drive with SCSI ID 0). The instructions show the prompt as MTH [0], but the number in brackets might not be zero for your system. The number indicates which system slot holds the I/O Server board.

1. Insert the Start-up Boot Diskette for your I/O Server board into the diskette drive.
2. Enter the **mp** command to change a bootstrap parameter:

```
MTH [0] mp <CR>
```

3. At this display, set the `bl_unit` parameter. (The parameter value is zero, not the letter O.):

```
Modify Boot Parameters for slot 0:
Modify parameters: "#" deletes, "." quits, <CR> advances
new parameter
```

```
bl_unit = 0 <CR>
```

4. Enter the device name for the boot device (diskette drive):

If you are using the TEAC 5.25 inch drive with the embedded SCSI controller, enter:

```
rq_sd = t55_0 <CR>
```

For the TEAC 3.5 inch drive with the embedded SCSI controller, enter:

```
rq_sd = t235_0 <CR>
```

5. If your I/O server board is an SBC 386/258, SBC 486/166SE, or SBC P5120ISE proceed to item 6.

If you are using an SBC 486/133SE, you must set the `bl_config_file` parameter.

For an SBC 486/133SE, enter:

```
bl_config_file = /msa/config/bps.133 <CR>
```

For an SBC P5090ISE, enter:

```
bl_config_file = /msa/config/bpsise.90 <CR>
```

For an SBC P5120, enter:

```
bl_config_file = /msa/config/bps.120 <CR>
```

For an SBC P5090, enter:

```
bl_config_file = /msa/config/bps.90 <CR>
```

For an SBC 386/258D, enter:

```
bl_config_file = /msa/config/bps.d <CR>
```

6. Press the <CR> key in response to each of the next two prompts:

```
new parameter
<CR>
save changes ([y] or n)
<CR>
```

7. Enter the **b** (Bphase) command. This tells the MTH to invoke the boot phase:

```
MTH [0] b <CR>
```

The screen clears, messages indicating boot status are displayed, and then the OS signs on. The boot diskette portion of the OS is loaded onto the I/O Server board.

⇒ **Note**

A logon banner should appear within two minutes after you invoke the boot phase. If after several minutes nothing appears on the screen, you may not have shut the diskette drive door, or you entered the `bl_unit` parameter wrong. Reset the Multibus II system and start over with Step 1.



## Step 3. Logging On and Setting the Date and Time

The console displays this bannerhead:

```
*-----*
                iRMX* Ver.# Operating System
* iRMX is a Registered Trademark of Intel Corporation
*-----*

Logon:
```

Log on as the system manager, Super. The system manager has access to all files used during the installation process, and can change access rights to all iRMX files.

1. Enter the Super logon at the prompt:

```
Logon: super <CR>
```

2. The system prompts you for a password. For now, enter the default password for Super, `passme`. The password must be in lower-case letters. It is not shown on the screen.

```
Password: passme <CR>
```

The OS signs on with this message:

```
iRMX HI CLI, Vx.y: USER = 0
Copyright years Intel Corporation
All rights reserved
-
```

3. When you see a prompt for the date, enter the date in one of these formats. (If the displayed date is already correct, enter `e` instead.)

```
month/day/year (for example, 01/15/1994)
day month year (for example, 15 JAN 1994)
day month year (for example, 15 JANUARY 1994)
```

Example:

```
DATE: 01/15/1994 <CR>
```

If your system does not include a global clock, you will see the message:

```
E$EXIST, Global Clock not present - will query for local
date
```

4. The system prompts you for the time, which is based on a 24-hour clock. Enter the time in hours:minutes:seconds format, using either one or two digits for each field. If you omit the minutes and seconds, the system sets them to zero. (If the displayed time is already correct, enter e instead.)

For example, at 7:36 AM and 40 seconds, enter 07:36:40 or at 2:00 PM, enter 14:00.

Example:

```
TIME: 7:36:40 <CR>
```

If you enter either the date or the time in the wrong format, you get a message to re-enter it.

If your system does not include a global clock, you will see the message:

```
E$EXIST, Global Clock not present - will query for local time
```

Two **submit** files named *:prog:alias.csd* and *:config:alias.csd* are executed. These files define aliases for command names. Use the **alias** command to see the complete list of aliases. Do not modify the aliases in *:config:alias.csd* because the iRMX software uses them as defined.

The OS defines one logical name, *:tape:*. In these steps, the command that formats the hard disk requires this logical name when you are installing the OS from tape.

## Step 4. Determining Disk Parameters

The **submit** commands in these steps require parameters specific to the hardware in your system. In this step, you determine the parameters based on your peripheral controller board and hard disk. For an installation over a previous release, you need only the device name parameter, described in Item 2.

1. The **submit** commands in the next steps include parameters that are specific to the type of hard disk. Use Table 5-1, to determine the parameters for your disk drive. You will need the device name, number of files, and interleave factor. The interleave factor is 1.
2. Refer to Table 5-1 to locate the type of hard disk on which you will install the software. When you locate the type of hard disk, make a note of the device names and number of files for that disk type. If your system includes multiple hard disks, choose the appropriate device name based on which disk you will use. Device names for the first hard disk (or for systems with only one hard disk) end in 2. Device names for a second hard disk end in 3.



### Note

The `files` parameter used in the **submit** commands is the total number of files that can be created on the hard disk. If the number of files needs to be changed later, you will have to back up your files and reformat the hard disk. The recommended numbers listed in Table 5-1 are based on 125 files per Mbyte of disk capacity. You may choose a different number. The maximum number of files that the OS can handle is 65,528.

**Table 5-1. Device Names and Numbers of Files for SCSI Hard Disks**

Hard Disk Model Number	Device Name	SCSI ID Number ( <i>n</i> )	Recommended Number of Files
Maxtor XT-3170S	M3170_ <i>n</i>	2, 3	22000
Maxtor XT-4170S	M4170_ <i>n</i>	2, 3	22000
Maxtor XT-4380S	M4380_ <i>n</i>	2, 3	48000
Maxtor XT-8380S	M8380_ <i>n</i>	2, 3	48000
Maxtor XT-8760S	M8760_ <i>n</i>	2, 3	65528
Hewlett-Packard 97536	HP97536_ <i>n</i>	2, 3	40000
Siemens Megafile 2300	S2300_ <i>n</i>	2, 3	48000
Micropolis 1578	MP1578_ <i>n</i>	2, 3	39000
Quantum Pro 80S	Q280_ <i>n</i>	2, 3	11000
Quantum Pro 40S	Q280_ <i>n</i>	2, 3	5500
Generic SCSI 512 byte granularity	GSCW5_ <i>n</i>	2, 3	depends on drive size
Generic SCSI 1024-byte granularity	GSCW_ <i>n</i>	2, 3	depends on drive size
Generic SCSI <sup>1</sup> partitioned with a 512-byte granularity	GSCW5_ <i>n</i> MxEy	2, 3	depends on drive size

<sup>1</sup> Generic SCSI partitioned with a 512-byte granularity are supported by the SBC 486/133, 486/166, and P5\* family boards only.

3. Replace the *n* in the device name in the second column in Table 5-1 with the appropriate SCSI ID Number from the third column. For example, the device name for the Maxtor XT-4380S drive with SCSI ID 2 is M4380\_2. Use the Generic SCSI DUIDs for hard disks not listed in the table.

See also: Your hard disk drive reference manual for the appropriate SCSI ID number;  
Appendix F, *Command Reference* for information on partitioned SCSI hard disk drives

4. If you wish to create multiple partitions on your hard disk, you must take the following action:



### CAUTION

Do not perform this option if you want to keep the files on your hard disk. The Full format option deletes all files. Proceed to the Partial format option if you want to save existing files.

- a. Enter the following **submit** command:

```
submit :tape:part_form (device)
```

where *device* is the device name for the SCSI hard drive you want to partition.

If the device has a granularity of 512 bytes per sector, you may use the **quick** parameter as well:

```
submit :tape:part_form (device, quick)
```

- b. Use the **rdisk** command to partition the SCSI device.

```
rdisk device
```

See also: Partitioning Example for the iRMX III OS, *Command Reference*, Appendix F

## Step 5. Formatting the Disk and Installing Software From Tape

There are two options to format the hard disk: a Full format or a Partial format (track 0 only).

**Full format**                      Formats the entire hard disk.

Choose this option if you have a new Multibus II system with nothing on the hard disk. (All Intel microcomputers are shipped with unformatted hard disks.) You may also choose this option for a system whose software you want to completely erase.

**Partial format**                      Formats only track 0 of the hard disk with the second stage of the iRMX bootstrap loader.

Choose this option if your disk was formatted with any earlier release of the iRMX OS. This option does not delete any current files, but it does rename some of them.

Either option also installs the OS, along with any included support software.

Enter your commands after the hyphen (-) prompt.

### Full Format Option



#### **CAUTION**

Do not perform this option if you want to keep the files on your hard disk. The Full format option deletes all files. Proceed to the Partial format option if you want to save existing files.

1. Insert the OS tape.
2. To format the hard disk, invoke a **submit** command with the proper parameters for the disk you want to format. Substitute a device name, the interleave factor, and the number of files:

```
submit :tape:form_disk(device, interleave, files) <CR>
```

### ⇒ Note

If you performed partitioning in Step 4, make sure you specify the appropriate partitioned DUID name from Table 5-1.

This command is valid for a Maxtor XT-4380S disk that has a SCSI ID of 2:

```
submit :tape:form_disk(m4380_2, 1, 48000) <CR>
```

The OS formats the hard disk. Then it displays a summary of alternate tracks assigned for bad tracks found during the format.

The following tracks have been assigned an alternate:

```
{disk information}
```

Following formatting, the **submit** file sets up a directory structure on the hard disk. It invokes the **restore** command and copies all the files from the tape to the hard disk. Enter **YES** <CR> when switching tapes. It establishes World permission rights for files. Then it switches the system device from the diskette drive to the hard disk, so that the OS reads future commands from the hard disk. The process can take up to 45 minutes.

3. When you receive the logon prompt, remove the Start-up Commands diskette and OS tape from their drives.

## Partial Format Option

If you performed the Full format option, skip these instructions and go to Step 6.



### CAUTION

If you have performed this installation once, and want to repeat the Partial format option on a disk, read the instructions for saving current files before a Partial format. If you do not follow those instructions, repeating the Partial format option can overwrite files you want to save.

## What Happens to Current Files When Installing Over a Previous Release

Some directories from previous releases of the OS are used in the iRMX III OS. The current iRMX directories and files are renamed so that you may choose what to do with them. Any files you have created will not be deleted during an installation over a previous release.

To save the current iRMX files in those directories, the **submit** file renames directories as shown in Table 5-2. Following an installation over a previous release, current iRMX files reside in the \*\_old directories specified in Table 5-2.

**Table 5-2. Directories Renamed in a Multibus II Installation**

Previous Directory/File	Renamed To
/user	/user_old
/bsl	/bsl_old
/msa32	/msa32_old
/boot32	/boot32_old
/rboot32	/rboot32_old
/net	/net_old
/system/rmx86	/system/rmx86_old
/system/rmx86.386	/system/rmx86_old.386
/msa/config/bps	/msa/config/bps_old
/rmx386/config/terminals	/rmx386/config/terminals_old
/rmx386/config/udf	/rmx/config/udf_old
/rmx386/config/user/super	/rmx386/config/user/super_old
/rmx386/config/user/world	/rmx386/config/user/world_old

### Renaming Files With Existing \_old Extensions

If your hard disk has any of the target files listed in the Renamed To column in Table 4-6, the **submit** file renames the current files from the Previous Directory/File column in Table 5-2 to have an extension of *\_dd.#* where # is the lowest number that doesn't overwrite an existing file.



## Performing a Partial Format

1. Using the device (hard disk) name you selected in Step 4, enter a **submit** command to format track 0 of the hard disk:

```
submit :tape:form_trk0(device_name) <CR>
```

For example, use this command for a Maxtor Model XT-8760S hard disk with a SCSI ID of 2:

```
submit :tape:form_trk0(m8760_2) <CR>
```

The **submit** file formats track 0 of the hard disk. It renames directories/files to preserve current files.

After formatting, the **submit** file sets up a directory structure on the hard disk. It invokes the **restore** command and copies all the files from the tape to the hard disk. It establishes World permission rights for files. Then it switches the system device from the diskette drive to the hard disk, so that the OS reads future commands from the hard disk.

2. When you receive the logon prompt, remove the Start-up Commands diskette and OS tapes from their drives. Store them in their covers.

## Step 6. Logging onto the System

Enter the Super logon and the default password (in lower case) as follows:

```
Logon: super <CR>
Password: passme <CR>
```

## Step 7. Setting Up Your Terminal

1. Two sample versions of `:config:terminals` are supplied. Both are installed in the `:config:default` directory. The one you select depends on what device is used for the system console. If your system uses an SBX 279A board, select the `terminals.279` file. If your system uses a serial terminal, select the `terminals.arc` file. For example, to select the `terminals.arc` file, enter:

```
copy :config:default/terminals.arc over :config:terminals <CR>
```

Use the **skim** command to examine both of these files. In general, the physical device name `t279_x` is used to communicate with the SBX 279A driver and the physical device name `atcs_con_0` is used to communicate with the serial terminal.

See also: *Configuring Users and Terminals and ATCS Driver, System Configuration and Administration*

2. Select the `terminals` file for your system. The command described below selects terminal attributes, so you can use your terminal with the Aedit text editor and the CLI. You should put this command in your `:prog:r?logon` file. Until you do so, you must enter the command each time you log on.

Select the appropriate terminal name from Table 5-3.

**Table 5-3. Terminal Names Defined in the *termcap* File**

<b>Terminal Type</b>	<b>Description</b>
ANY	Default ANSI terminal for terminals not listed
1510E	Hazeltine 1510 with escape lead-in
1510T	Hazeltine 1510 with tilde lead-in
ADM3A	Lear Seigler ADM-3A
AT386	PC system console
RMXPC or PC	PC system console
QVT102	Qume QVT102, in QVT102 mode
RGI	SBX 279 Graphic Subsystem
S120	PC system console
TV910P	Televideo 910 Plus
TV950	Televideo 950
VT100	DEC VT100, VT101 (also for Wyse 75 and Wyse 85)
VT102	DEC VT102
VT52	DEC VT52
WYSE50 or WY50	Wyse 30, Wyse 50
XTERM	X-Windows terminal
ZENTEC	Zentec Zephyr and Cobra

Enter this command using the terminal name:

```
- set terminal = terminal_name <CR>
```

## Step 8. Modifying BPS Files for Non-default I/O Server Boards and Devices

If your I/O server board in slot 0 is an SBC 486/133SE, P5090ISE, P5120, or P5090; or your system device is anything other than GSCW5\_2 you need to perform some modifications to the BPS files. If none of these conditions apply to you, skip this step and proceed to Step 9.

### Modifications for 486/133SE Board

If your I/O server board in slot 0 or 1 is a 486/133SE, edit the file */msa/config/bps*.

1. Invoke the Aedit editor:

```
aedit /msa/config/bps
```

2. In the *bnam* parameters of *rq\_pci\_a* and *rq\_atcs\_con*, replace the string 486/166SE with 486/133SE.
3. Quit the Aedit editor while saving the file using these commands:

```
<ESC>  
q  
e
```

See also: Boot Scenarios, SPS Parameters, *MSA for the iRMX Operating System*

## Modifications for SBC P5090ISE, P5120, and P5090 Boards

If your I/O server board in slot 0 or 1 is an SBC P5090ISE, P5120, or P5090, edit the file `/msa/config/bps`.

1. Invoke the Aedit editor:

```
aedit /msa/config/bps
```

2. In the `bnam` parameters of `rq_pci_a` and `rq_atcs_con`, replace the string `P5120ISE` with the appropriate string: `P5090ISE`, `SBCP5120`, or `SBCP5090`.
3. Quit the Aedit editor while saving the file using these commands:

```
<ESC>  
q  
e
```

See also: Boot Scenarios, SPS Parameters, *MSA for the iRMX Operating System*

## Modifications for Hard Drive Type

If your system device is anything other than `GSCW5_2` (generic SCSI with a 512-byte granularity) replace the string `GSCW5_2` with the device name. For example, if you have a SCSI drive with 1024-byte granularity, replace the string `GSCW5_n` with `GSCW_n`.

## Step 9. Updating Your Software

For information on updating your iRMX III software, please refer to the Release Notes.

Updating the software and generating a new version may cause the size of the OS to exceed the amount of memory allocated for it in the ICU definition file. If you get an error message, you will need to increase the amount of memory.

See also: Changing the Memory Size, Appendix E

## Step 10. Generating a Default Operating System for the I/O Server Board

In this step, you make a new version of the OS using the **mksys** command. This version will independently boot the I/O Server board in your Multibus system, so it will act also as a processor board.



### CAUTION

For any one definition file, do not invoke the **mksys** command again after you have successfully used it once to generate the OS. Because **mksys** does not use your modified file for input, it will overwrite the local copy of your definition file. You will lose any modifications that you have made to the file. Instead of using **mksys**, invoke the ICU using the definition file as the input parameter.

1. Table 5-4 shows the files used and generated by the **mksys** command for different processor boards. It also shows the board name to use for your processor board in these commands.

Find the board name that corresponds to the processor board in your Multibus system. For instance, the SBC 386/258 board has the board name 386258.

See also: Multibus II Standard Definition Files, *ICU User's Guide and Quick Reference*

**Table 5-4. Files Generated by mksys for I/O Server Boards as CPU Boards**

<b>I/O Server Board</b>	<b>Board Name</b>	<b>ICU Definition File</b>	<b>Generation Directory</b>	<b>Boot File Pathname</b>	<b>OS Name</b>
SBC 386/258	386258	258s.bck	:home:258s	/msa32/boot/258s	258s
SBC 386/258D	386258	258s.bck	:home:258s	/msa32/boot/258s	258s
SBC 486/133SE	486133	433s.bck	:home:433s	/msa32/boot/433s	433s
SBC 486/166SE	486133	433s.bck	:home:433s	/msa32/boot/433s	433s
SBC P5120ISE	P5120ISE	p90s.bck	:home:p90s	/msa32/boot/p90s	p90s
SBC P5090ISE	P5090ISE	p90s.bck	:home:p90s	/msa32/boot/p90s	p90s
SBC P5120	SBCP5120	p90s.bck	:home:p90s	/msa32/boot/p90s	p90s
SBC P5090	SBCP5090	p90s.bck	:home:p90s	/msa32/boot/p90s	p90s

2. This command may take as long as 45 minutes to execute. Sometimes the screen scrolls faster than you can read it. This is because the **mksys** command rapidly shows the ICU screens as it executes. The scrolling is not a cause for concern.

Enter this command substituting the appropriate OS name for your processor board:

```
- mksys os_name <CR>
```

Various ICU prompts are displayed on the screen. These prompts are answered by a **submit** file. Do nothing until you see an END **submit** message.

The **mksys** command creates a directory under your *:home:* directory. It attaches that new directory as your default prefix. It creates a local copy of the appropriate ICU definition file. Then it generates on disk an updated version of the OS suited to the processor board appropriate for the specified OS in the command.

The command ends with a line similar to this:

```
-END submit :config:cmd/mksys.CSD
```

3. Following the END **submit** message, use either the Aedit editor or the following **skim** command to discover if errors occurred in the process.

While the **mksys** command was running, it recorded its progress in an output file. Use the **skim** command to read this output file to find out if any errors occurred during the generation process. Replace `os_name` with the same name you used in the **mksys** command:

```
- skim os_name.out <CR>
```

Press the space bar at the `more?` prompt to page through the file.

If the `os_name.out` file contains any error messages, some problem occurred during the **mksys** generation. Use an example file to identify the errors.

See also: Generation output file, *ICU User's Guide and Quick Reference*

If you find this error message, use the ICU to change the amount of memory reserved for the iRMX III OS, as described in Appendix E.

```
ERROR 192: NO SPACE FOR SEGMENT - BASE NOT SET
```

See also: Changing memory size, Appendix E

If you find a different error, call Intel Customer Support.

See also: Boot Scenarios, *MSA for the iRMX Operating System*



## Step 11. Testing by Booting from the Hard Disk

To test the previous installation, you must shut down the OS, then reset and reboot the Multibus system.

1. Shut down the OS with the **sh** command (an alias for **shutdown w=0**):

```
- sh <CR>
```

2. When you see a Shutdown Completed message, reset the system. Turn the key switch on the front panel of the computer to Reset and then back to Unlock.

3. When the first character appears on the screen, type a u. The power-up tests will run again.

```
u
```

4. The system prompts you for a selection from this menu. Select Go to Operator Interface by typing 2 at the Enter number ? prompt:

```
1 Run system Diagnostics
2 Go to Operator Interface
3 Go to Bootphase
```

```
Enter number ? 2
```

The 2 will not show on the screen. If you do not type a choice in 9 seconds, the system defaults to running the diagnostics (selection 1). The diagnostics can be interrupted by pressing <Ctrl-C>.

5. Enter the **mp** command to change a bootstrap parameter:

```
MTH [0] mp <CR>
```

6. At the following display, enter a new parameter:

```
Modify Boot Parameters for slot 0:
Modify parameters: "#" deletes, "." quits, <CR> advances
new parameter
```

```
bl_target_file = /msa32/boot/os_name <CR>
```

7. Press the <CR> key in response to each of the next two prompts :  
    new parameter  
        <CR>  
    save changes ([y] or n)  
        <CR>
8. Enter the **b** (Bphase) command. This tells the MTH to invoke the boot phase:  
    MTH [0] **b** <CR>  
  
    The OS boots on the I/O Server board.
9. Enter the super logon and the default password:  
    [0] Logon: **super** <CR>  
    Password: **passme** <CR>

See also:    Boot Scenarios, *MSA for the iRMX Operating System*

## Step 12. Copying the New Version Over the Start-up Version

Assuming the new OS is running, use this procedure to copy the new bootable image over the image first used to boot the system. If the OS is not running, call your Intel Customer Support representative.

This step allows you to choose option 3 of the MTH menu to automatically boot the OS, rather than setting boot parameters each time you start the Multibus system.

Use the **copy** command to copy over the *rmx* file:

```
- copy /msa32/boot/os_name over /msa32/boot/rmx <CR>
```

Use an appropriate value for *os\_name* from the right-most column of Table 5-4.

## Step 13. Taking Precautions for System Security

Use this step to protect the security of your OS. By securing the OS, unauthorized people cannot log on as the system manager and make changes to the OS. To prevent unauthorized OS changes, the system manager should implement password protection.

A password can be up to eight characters long. It may consist of any printable ASCII characters, and is case-sensitive.

1. Change the system manager password using the **password** command:

```
- password <CR>
```

2. You are prompted with a series of commands. Enter **c** to change the password:

```
Enter the command: c <CR>
```

3. You receive these prompts. Respond to each. The password entries that you make will not be shown on the screen:

```
Enter your user name - super <CR>
```

```
Enter the old password - passme <CR>
```

```
Enter the new password - new_password <CR>
```

```
Repeat the new password - new_password <CR>
```

4. To exit, enter **e** as follows:

```
Enter the command: e <CR>
```

There is another logon called World that does not have the powers of the system manager. The World default password is <CR> (press <CR> at the password prompt). Do not change the password for World. If you want to remove the ability of the user World to access your system, delete the file `:config:user/world`, and use the **password** command to remove the World user from `:config:udf`.

Do not routinely log on as the system manager. Instead, log on either as World or as some other user that you define.

See also: World user, Super user, *Command Reference*

Log on as Super only when system files need manipulation. This reduces the chance of deleting or modifying a system file by mistake.

See also: Logging On and Off, Chapter 8

When you want to log off as Super, issue the **logoff** command. To become Super while logged on as another user, enter the command **super**, then the Super password. Then to get back to the ordinary user logon, enter the **exit** command.

## Step 14. Merging the User and Configuration Files



### Notes

Perform this step only if you have installed over a previous version of the OS, using the Partial Format option. If you formatted the whole disk, the installation is finished.

If you are configuring multiple processor boards, refer to *MSA for the iRMX Operating System* for additional instructions.



### CAUTION

The default *r?logon* file submits file *:config:alias.csd* in addition to *:prog:alias.csd*. The file *:config:alias.csd* contains aliases used by the OS. Installation instructions and example code use these aliases as defined. Do not modify the existing aliases in *:config:alias.csd*; adding new aliases is acceptable.

## User and Alias Files

The **submit** file for the installation renamed the existing */user* directory to */user\_old*.

1. Invoke these commands to restore user files to their original directory structure as well as put the boot system in Super's *:home:* directory. Replace *os\_name* in the last command below with the same OS name used in previous commands.

```
- rename /user to /user_new <CR>
- rename /user_old to /user <CR>
- rename /user_new/super/os_name
  to /user/super/os_name <CR>
```

You can now delete the */user\_new* directory

2. The structure of the *:prog:r?logon* file changed slightly from previous iRMX II releases (up through release 3.0). In addition to submitting *:prog:alias.csd* as in the past, the default *r?logon* file for each user now also submits *:config:alias.csd*.

To allow users access to the aliases in *:config:alias.csd*, add this line to the *:prog:r?logon* file for each user:

```
submit :config:alias
```

3. Some of the aliases in `:config:alias.csd` are the same as aliases defined in the old `:prog:alias.csd` file. An alias defined in `:config:alias.csd` should not also be defined in `:prog:alias.csd`.

From this list, delete duplicate aliases in file `:prog:alias.csd`. The 32-bit languages are invoked using the **run86** utility.

```
alias ad=attachdevice
alias af=attachfile
alias crdir=createdir
alias dd=detachdevice
alias df=detachfile
alias flim=floppyimage
alias install=submit :config:cmd/instal(#0)
alias tinstall=submit :config:cmd/tinstall(#0)
alias mksys=submit :config:cmd/mksys(#0)
alias plm386=run86 -fixplm :lang:plm386
alias asm386=run86 :lang:asm386
alias bnd386=run86 :lang:bnd386
alias bld386=run86 :lang:bld386
alias lib386=run86 :lang:lib386
alias map386=run86 :lang:map386
alias ic386=run86 :lang:ic386
```

## Alias Additions

4. Use the Aedit text editor to add new user aliases to your `:prog:alias.csd` file. These are defined in the file `:config:default/alias.csd`.

```
alias s=submit
alias m=skim
alias trv=traverse
```

5. Aliases specific to Multibus II systems are in the `:config:alias.csd` and `:prog:alias.csd` files. Use the Aedit text editor to add new aliases to this file.

```
alias agents = ic -c agents
alias agentreset = ic -c reset #0 local
alias armfpi = ic -c fpi arm
alias coldreset = ic -c reset 0 cold
alias disarmfpi = ic -c fpi disarm
alias icread = ic -c get #0 #1 #2
alias icwrite = ic -c set #0 #1 #2
alias monitor = ic -c reset -p monitor #0 local
alias myslot = ic -c myslot
alias nmi = ic -c nmi #0 software
alias nmiforce = ic -c nmi -e #0 software
alias offline = ic -c kill #0
alias reboot = ic -c reset -p bootstrap #0 local
alias warmreset = ic -c reset 0 warm
```

## Configuration Files

These instructions help you decide how to merge your old iRMX II or iRMX III configuration files with the newly installed files in the `:config:` directory. After you have merged these files to your satisfaction, you may remove the old versions of the files.

The new system configuration files in the `:config:` directory are compatible with previous releases of the OS. This release can boot and use the old versions with no problems. For some of the files, however, if you simply overwrite the new version with your previous version, some important enhancements are lost.

6. The `:config:termcap` file is the iRMX HI CLI terminal attribute file. The information in this file provides terminal attribute definitions for the CLI and for Aedit. Issuing the CLI's `set` command allows Aedit to operate without creating a specific `aedit.mac` file, as was necessary in the past.

Compare the new `termcap` file with changes you made to your previous version. Decide which file provides a better starting point for merging your changes; adding your changes to the new file may be easier. If `:lang:aedit.mac` or `:home:aedit.mac` exist, they need to contain only utility macros, not terminal attributes. Also, `:lang:useful:mac` contains some valuable macros. If you are using the SBX 279A board, try the file `/rmx386/rgi/rgi.mac`.

7. The `:config:terminals` file is the HI user terminal configuration file. The format of this file allows a Network Server system to provide remote system device services to a diskless remote file consumer. The `terminals` file allows multiple remote consumers to use one copy of the file for each of their unique terminal definitions.

Read the description of `:config:terminals` in the *System Configuration and Administration* manual for more information. The original form of the file should work fine for the local system. To restore the original iRMX II version, enter:

```
- copy /rmx286/config/terminals over /rmx386/config <CR>
```

To restore the old iRMX III version, enter:

```
- copy /rmx386/config/terminals_old over /rmx386/config/terminals <CR>
```

The physical device names of terminals controlled by the Multibus II ATCS driver have been expanded.

See also: ATCS Driver in *System Configuration and Administration* for the list of new device names

8. The `:config:udf` file is the user definition file. No changes have been made to this file's format.

If you defined users in a previous version of the iRMX II UDF file, restore it with the command:

```
- copy /rmx286/config/udf over /rmx386/config <CR>
```

For a previous version of the iRMX III UDF file:

```
- copy /rmx386/config/udf_old over /rmx386/config/udf <CR>
```

9. The `:config:cdf` file is the Administration Unit definition file for network consumer systems. No changes have been made to this file's format.

If you defined any networking Administration Units (subnets) in a previous version of the iRMX II CDF file, restore it with the command:

```
- copy /rmx286/config/cdf over /rmx386/config <CR>
```

For a previous version of the iRMX III CDF file:

```
- copy /rmx386/config/cdf_old over /rmx386/config/cdf <CR>
```



10. All users that you created in an iRMX II system are still valid in your iRMX III system. The process of adding and configuring users has not changed. To add all of your iRMX II users to your iRMX III system, enter this command:

```
- copy /rmx286/config/user/* to /rmx386/config/user <CR>
```

For a previous version of the iRMX III users, enter:

```
- copy /rmx386/config/user/*_old to /rmx386/config/user/* <CR>
```

11. Modify the `:config:r?init` file. The `:config:r?init` file is the iRMX System Initialization file. This submit file is executed when the HI is initialized. Its output goes to the first entry in `:config:terminals`. No CLI commands, such as **background** or **alias**, can be used, because no CLI job is created when the file is executed.

A default version of the file is provided. It contains a description of how to set it up to load one of the SBX 279(A) menus. To select the default version, enter:

```
copy :config:default/rinit over :config:r?'init
```

Modify the file as needed.

12. Modify the `logon.msg` file as needed. The `:config:logon.msg` file is the logon message file.

## Where to Go Next

If you want to turn off the Multibus system, first issue the **sh** command (as Super). You may leave the system running, but you should first log off as Super by issuing the **logoff** command.

To learn more about your new OS, refer to these manuals:

<b>Topic</b>	<b>Manual</b>
Basic operations, such as logging on, entering commands, etc.	Chapter 8 of this manual
Features of the iRMX Operating Systems	<i>Introducing the iRMX Operating Systems</i>



### **Note**

Chapter 8 describes the installation process for online iRMX manuals and the Windows Help file for the iRMX system calls supplied with this release. Installation of both these features is performed separately from the installation procedure in this chapter.



# **iRMX GETTING STARTED CHAPTERS**

---

This section contains information that lets you get started with your iRMX OS. These are the chapters in this section:

- Chapter 6.           iRMX for Windows Specifics**
- Chapter 7.           iRMX for PCs Specifics**
- Chapter 8.           Getting Acquainted with the Operating System**
- Chapter 9.           Where To Go From Here**



## Configuring DOS for Extended Memory

iRMX for Windows provides support for DOS extended memory, the area above the 1 MB boundary. However, there are some restrictions on what you can load into extended memory, due to the order of loading DOS drivers and loading the iRMX extended memory manager.

See also: Memory types, *MS-DOS User's Guide and Reference* and *Microsoft Windows User's Guide*

The iRMX for Windows extended memory manager is *himem.job*, which is similar to the *himem.sys* driver supplied with Windows and DOS. It provides support for extended memory and for the *high memory area* (HMA). HMA is the 64 Kbytes of memory immediately above the 1 MB boundary which the processor can access in real mode.



### CAUTION

Although *himem.sys* can provide access to the HMA under DOS, no program can be running in extended memory outside the HMA when iRMX for Windows starts. If a program is running, this message is displayed:

```
ERROR -->Protected mode software already loaded
```

*Himem.job* provides DOS extended memory in the free space allocated by iRMX for Windows. *Himem.job* loads under the iRMX OS, not under DOS, when you use the **sysload** command. You may have to configure DOS differently than you would without iRMX for Windows. *Himem.job* does not support loading programs into *upper memory blocks* (UMBs). UMBs are memory areas between 640K and 1 MB that are not used by system ROM, video display cards, or other I/O devices.

See also: **sysload**, *Command Reference*;  
*himem.job*, *System Configuration and Administration*

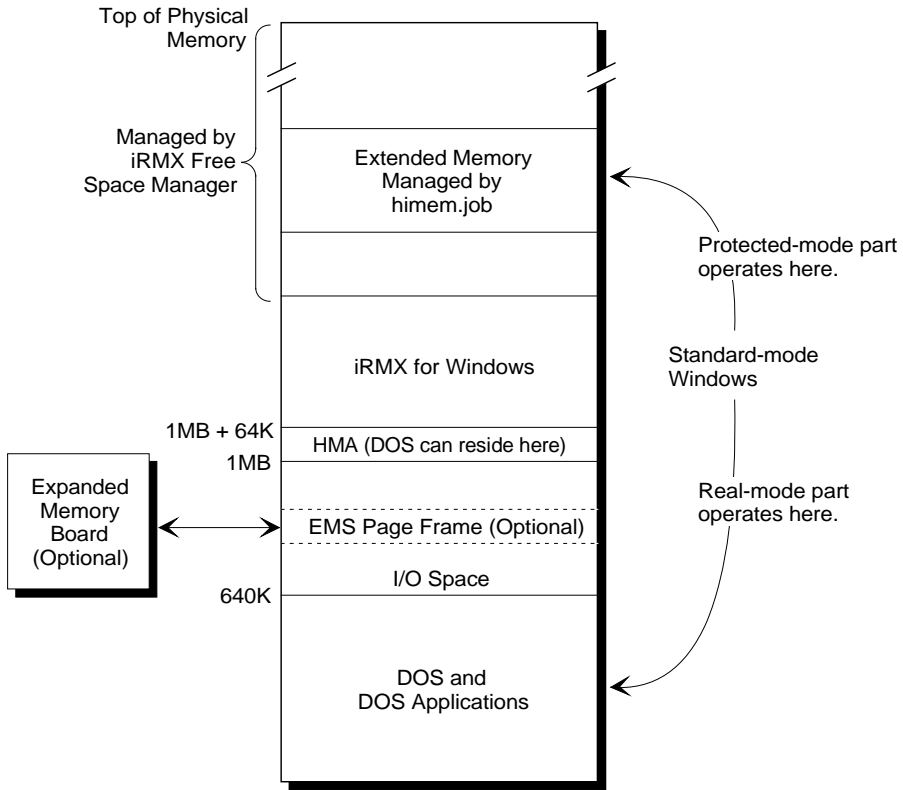
The iRMX OS loads into physical memory beginning at the 1 MB + 64K boundary. The OS manages all memory above that in protected mode. When it loads, any extended memory provided by *himem.sys* is gone, except for the HMA. (The **loadrmx** command detects whether a program is loaded in the HMA, and saves this information.) At this point, DOS has available the real-mode space below 1 MB and the HMA if it was loaded before starting iRMX for Windows. Without loading *himem.job*, you could run Windows in real mode, but no extended memory would be available to DOS or to Windows.

After you load *himem.job* in the iRMX OS, DOS applications and Windows can access extended memory, using the XMS services of *himem.job*.

You must also use **sysload** to load a Windows-encapsulator job called *smw.job*, before you can start Windows in standard mode. If a program was in the HMA before iRMX for Windows loaded, it is still there. If the HMA was not occupied when iRMX for Windows loaded, *himem.job* provides HMA access to any program that requests it.

See also: Loadable jobs, *smw.job*, *System Configuration and Administration*

Figure 6-1 on page 127 shows the memory map of the system after loading iRMX for Windows and *himem.job*.



W3317

**Figure 6-1. Memory Map of the System**

## Customizing the OS

You can specify which parts of the OS are loadable using the **sysload** command from the command line or modifying the `:config:loadinfo` file. Additionally, by modifying parameters in the `rmx.ini` file, you can enhance the performance of your application system.

After you install the OS, you may want to modify the default configuration to match your application. Some of the defaults you can change are:

- System memory configuration
- User IDs and memory requirements
- Terminal configuration
- Loadable jobs (including network jobs)
- Loadable device drivers
- Interrupt response

See also: `Loadinfo` file and `rmx.ini` parameters, *System Configuration and Administration*

## Starting iRMX for Windows

There are three scenarios for starting iRMX for Windows depending on which partition it is installed.

- From a DOS partition
- From an iRMX partition
- From `config.sys` on a DOS partition (DOS 5.0 only)



## Starting iRMX for Windows from a DOS Partition

After you install iRMX for Windows, you can boot it from DOS using these steps:

1. To load iRMX for Windows, use the *rmx.bat* file, followed by the drive letter where the software is installed. Do not follow the drive letter with a colon. If the iRMX OS is installed on drive C:, enter:

```
C:\> \dosrmx\rmx c <CR>
```

A number of messages will be displayed. When these messages appear, the OS is running.

```
DOS is now running as a VM86 iRMX Task
Use Alt-SysRq key combination to switch to the iRMX console

C:\>
```

### ⇒ Note

If you receive one of the messages below, you have not removed all the lines in your *autoexec.bat* or *config.sys* file that consume extended memory or switch the processor to Protected Mode.

```
No extended memory present
Protected mode program already loaded
```

## Starting iRMX for Windows from an iRMX Partition

To run iRMX for Windows if you have installed it on an iRMX partition, use these steps.

1. Start the system or press <Ctrl-Alt-Del> to warm boot the system.
2. Invoke the **rmxtsr** command at the DOS prompt to load the iRMX interface.
3. Invoke the **loadrmx** command. This example assumes that the boot file is *dosrmx* and that partition 2 on fixed disk 1 is the iRMX partition (c\_rmx2).

```
C:\> loadrmx -n c:\dosrmx\dosrmx -s c_rmx2 -f n <CR>
```

See also: **loadrmx**, *Command Reference*

4. Press <Alt-SysRq> to invoke iRMX for Windows from the iRMX partition.

5. Log on to iRMX for Windows. Enter `world` at the Logon: prompt and <CR> at the Password: prompt.

After iRMX for Windows is installed on an iRMX hard disk, you have two options for backing up the system:

- You can use iRMX-NET and the iRMX network redirector to map the iRMX partition, then continue to use your existing DOS/Windows tools to back up the system.
- See also: Using iRMX-NET in a DOS Environment, *System Configuration and Administration, Network User's Guide and Reference*
- You can add an Adaptec 1542 SCSI controller as a secondary (not primary) disk controller, then use the Intel-supplied tape driver and the iRMX **backup** command to back up the system.

See also: **backup**, *Command Reference*

## Starting iRMX for Windows from Config.sys

You can load iRMX for Windows from the *config.sys* file provided the system is using DOS 5.0.

See also: Booting iRMX for Windows and iRMX for PCs Automatically, *System Configuration and Administration*

Loading from *config.sys* has these advantages:

- Automatically invoking iRMX for Windows upon boot-up.
- Loading iRMX for Windows before DOS utilities, allowing *himem.job* to provide all XMS memory. This eliminates using the HIMEM.SYS driver, thereby saving conventional memory.
- With iRMX for Windows loaded first, you can load consumers of XMS services, such as DOS=HIGH and SMARTDRV, which use the XMS memory provided by the iRMX OS. This improves disk performance noticeably.

To load iRMX for Windows from the *config.sys* file, use these steps:

1. Modify your *config.sys* file to begin with these lines.

```
buffers=40
files=64
lastdrive=Z
install=C:\dosrmx\rmxtsr.exe
install=C:\dosrmx\loadrmx.exe -n C:\dosrmx\dosrmx -s c_dos -f d -w
dos=high
install=C:\windows\smartdrv.exe /e: 2048 256 256 c
.
.
```

These values for *buffers*, *files*, and *lastdrive* are recommended; you can change them to match the requirements of other software applications.

2. Reset (warm boot) your system. iRMX for Windows should be automatically invoked upon reboot.

If the OS has not booted, check for:

- Not enough system memory. When defining the amount of memory to give SMARTDRV, be sure that Windows is left at least 1 Mbyte of XMS memory.



### CAUTION

With write cache enabled, SMARTDRV buffers up data in the write cache and only updates the disk when needed. This can cause disk corruption if the write cache is not flushed to disk before turning off the system.

See also: **smartdrv** command, cache flushing, *Microsoft Windows Users Guide*

- Syntax errors in the *config.sys* file
- Driver conflicts

# Logging On

Refer to Chapter 8 for instructions on how to log on the iRMX operating systems.

## Using the Hot Keys

A number of Hot Keys control the mode of operation of the console.

Invoke the Hot Keys by entering an <Alt-*appropriate key*> sequence. Table 6-1 provides a summary of the Hot Keys and their function.

**Table 6-1. Hot Keys**

Hot Keys	Function
<Alt-SysRq>	Toggle between DOS and iRMX prompts
<Alt +>*	Change iRMX console foreground color
<Alt ->*	Change iRMX console background color
<Ctrl-Alt-Del>	Restart system (DOS and iRMX OSs)
<Ctrl-Alt-Break>	Break to system debug monitor (SDM) from the iRMX prompt

\* Use the '+' and '-' keys on the numeric keypad.

## Toggling the Console Between DOS and iRMX Operation

You can toggle between the DOS and the iRMX prompts whenever the console is in text mode, but not when it is in graphics mode. Graphics mode is incompatible with the iRMX command line. To toggle the console, press <Alt-SysRq>.

The current display is saved before the change is made, unless the console has been in graphics mode or a DOS application has reset the video card. When you toggle back, the displayed data is the same as when you left.

If the console has been in graphics mode or if a DOS application has reset the video card, you can restore the iRMX prompt by changing to text mode and then pressing <Alt-SysRq> followed by <Enter>. This sets the console display to 80 columns by 25 lines.

At the DOS prompt, you may enter DOS commands at the keyboard; at the iRMX prompt, you may enter iRMX commands at the keyboard. When DOS owns the console, iRMX output to the console is saved in a buffer and is displayed when you switch back to iRMX. When the iRMX OS owns the console, DOS output to the console is discarded.

## Changing the Console Colors

You can change the foreground and background colors of the iRMX console. On an EGA, VGA, or Super VGA display, the selectable colors are: white, black, blue, green, cyan, red, magenta and yellow, at both normal and high intensity. The default colors are normal intensity, white foreground on a black background.

You cannot select the same color for the foreground and the background.

To change the foreground color press

<Alt +>

using the plus key on the numeric keypad. Each time you press this key sequence, the foreground color changes to the next available color, eventually wrapping around to the initial color.

To change the background color press:

<Alt ->

using the minus key on the numeric keypad.

You can change colors by changing the *x* and *y* parameters in this line from the *:config:loadinfo* file.

```
sysload /rmx386/jobs/keybd.job(x,y,7a55)
```

See also: the *loadinfo* file for the line `sysload keybd.job(f,1,7a55)`

## Breaking to the SDM Debug Monitor

You can invoke the system debug monitor from the iRMX prompt (not the DOS prompt) by pressing <Ctrl-Alt-Break>.

If you want to use SDM to debug an iRMX application while the console is in graphics mode, install an auxiliary MDA monochrome card attached to a monochrome monitor. Then, SDM will always use this monitor for its console output. (The iRMX OS, however, does not support the MDA monochrome card and the HI will not use it.) Use the **console** command to direct output and input for the terminal.

You can resume normal operation by entering the system debugger **g** command at the system console. This command exits SDM.

⇒ **Note**

A General Protection error will also cause a break to SDM, even if the DOS prompt is displayed. In this case, entering `g 284:1c` will exit SDM and return to the iRMX prompt. To reboot the system from SDM, enter `o64, fe` at the system console. Alternatively, you can use a power OFF-then-ON cycle.

Both the DOS and the iRMX OS are effectively suspended when control passes to SDM on the system console. You will know that you are in SDM when the system prompt changes to `..` (two dots).

## Restarting the System

You can initiate a cold reset of the entire system by pressing `<Ctrl-Alt-Del>`. This resets the processor and should not be done unless necessary.

## Networking Capabilities

iRMX for Windows gives DOS and the iRMX OS simultaneous access to network services. This support for both DOS and the iRMX OS provides a variety of capabilities:

- DOS and iRMX applications that communicate on the network run unchanged when they run on the same processor.
- DOS files can be accessed from a remote file consumer without a dedicated file server.
- DOS and iRMX OSs running on the same processor can share a single network controller.
- OpenNET networking support provides connections to computers running the DOS and UNIX operating systems.

- DOS networking applications can use the network controller in a Multibus I or Multibus II system.
- TCP/IP networking support provides access to other operating systems through TCP/IP, FTP, or TELNET.
- NFS networking support provides access to remote files on other operating systems.

## Network Software Choices

PCs running iRMX for Windows can run this network software used by DOS:

- MS-Net client or server
- IBM PC LAN client or server
- Novell NetWare client
- Combinations of iRMX-NET client, MS-Net client, and NetWare on one computer
- DOS Virtual Terminal consumer



### CAUTION

A system error may occur if MS-Net is active when iRMX for Windows is loaded with a network system job specified in `\rmx386\config\loadinfo` and both use the same network controller.

See also:     Using iRMX-NET in a DOS Environment, *System Configuration and Administration*

## Using iRMX-NET

After you have installed iRMX for Windows, you can connect your system to a network. Before you attempt to establish connection to a network, ensure that:

- The appropriate supported Intel network interface controller board for your system has been installed.
- The Ethernet cable is connected.
- iRMX for Windows is running.
- The appropriate iNA 960 job for your network interface controller (NIC) is loaded and running.
- For ISO networking, the iRMX-NET LAN is set up and ready to accept nodes.
- Additionally for TCP/IP networking:
  - The TCP/IP Kernel jobs and optionally POSIX and NFS jobs are loaded and running
  - The TCP/IP LAN configuration files are set up

See also: Network jobs, *System Configuration and Administration*;  
Using the Network, Supported Hardware, *Network User's Guide and Reference*;  
Installing and Starting TCP/IP, *TCP/IP and NFS for the iRMX Operating System*



# Accessing DOS-formatted Diskettes from the iRMX Prompt

## ⇒ **Note**

You can access iRMX formatted diskettes only from the iRMX prompt.

Toggle to the iRMX prompt from DOS.

Before any diskette may be used by the iRMX OS, you must attach the diskette drive to the OS and assign it a logical name. Logical names are surrounded with colons to differentiate them from other device or file names.

See also: Creating and Using Logical Names, *Command Reference*

To attach DOS diskette drive A:, enter:

```
- ad A_DOS as :f: <CR>
```

See also: **attachdevice**, *Command Reference*

Drive A: has now been attached with the iRMX logical name :f:. Obtain a directory listing of the DOS-formatted diskette in drive A: by entering:

```
- dir :f: <CR>
```

The directory listing is displayed in regular iRMX fashion.

See also: **dir**, *Command Reference*

Toggle the console back to DOS operation and compare the DOS and iRMX directory listings of the DOS diskette.

Before proceeding to the next section you must detach the diskette drive.

1. Toggle to the iRMX prompt.
2. Detach the diskette drive by entering:

```
- dd :f: <CR>
```

See also: **detachdevice**, *Command Reference*



## **CAUTION**

Always detach and reattach diskette drives when changing iRMX-formatted diskettes; otherwise data may be corrupted.

See also: Switching Diskettes, *Command Reference*

## Using a DOS-formatted Hard Drive from the iRMX Prompt

If you booted with DOS as the system device, toggle to the iRMX prompt from DOS and enter:

```
- dir :sd: <CR>
```

If your primary DOS partition is not being used by the iRMX OS as the system device, toggle to the iRMX prompt from DOS and enter:

```
- ad c_dos as :w: <CR>
```

The DOS partition on Drive C: is now attached and you can access it as :w: from the iRMX OS. Use the logical name :w: just as any other iRMX logical name.

See also: Logical names, *Command Reference*

## Using an iRMX-formatted Hard Drive from the DOS Prompt

If your system contains an iRMX-formatted drive or an iRMX-formatted partition, toggle to the iRMX prompt from DOS and attach that iRMX-formatted partition (or drive) as :x:. For example, if you have an iRMX partition on your first physical drive and that partition has not been attached, enter:

```
- ad c_rmx as :x: <CR>
```

If you receive the error:

```
c_rmx, device already attached
```

c\_rmx is being used as your system device :sd:.

After establishing the iRMX logical name and loading the appropriate networking job, use the **offer** command to set :x: as a network public directory.

```
- offer :x: as w <CR>
```

See also: **offer** command, *Command Reference*

Once the partition has been offered by the iRMX OS, DOS can access it. If you are running MS-NET on DOS, toggle to DOS from the iRMX prompt and enter:

```
C:\> net use f: \\sysname\world <CR>
```

where *sysname* is the iRMX-NET network name of your system.

See also: Network names, *Network User's Guide and Reference*;  
**loadname**, **setname** commands, *Command Reference*

You can now access the iRMX logical name *:x:* (or *:sd:*, if the device is your system device) from DOS as DOS logical drive F:. For example, enter:

```
C:\> dir f:<CR>
```

The directory listing of the iRMX partition is displayed in regular DOS fashion.

## Using the WTERM Sample Application

Since you are running Windows under DOS as the display, and DOS is the lowest priority iRMX task, you may see a delay when using iRMX commands that perform screen I/O.

### ⇒ **Note**

While you are running the WTERM sample application, you will not be able to toggle to the iRMX OS. Windows uses graphics mode which is not compatible with the iRMX command line or the SDM monitor.

Executable code for the example is located in the `\dosrmx\` directory. Example source code is located in the `\rmx386\demo\wterm` directory.

Use these steps to install WTERM on your system:

1. Install Windows, if you have not done so.
2. Create a Windows icon to invoke `\dosrmx\wterm.exe`.

## Running WTERM

Use these steps to run the WTERM demonstration program:

1. Toggle to DOS and enter:

```
C:\WINDOWS> win /s <CR>
```

to start Standard Mode Windows.

2. Double click on the WTERM icon.
3. Activate the WTERM item from the menu and click on the Connect option.  
If you have not logged on to the iRMX OS, do so now.
4. You can now enter iRMX OS commands at the iRMX prompt.

To exit WTERM, click on `Exit` under File in the menu bar.

## Initializing iRMX for Windows for Shutdown

Before turning the system power off, initialize iRMX for Windows for system shutdown. This initialization, which you can do if you are logged on as a Super user, flushes data to the disk and not to internal buffers.

1. Toggle to the iRMX prompt from DOS.
2. Execute the **shutdown** command as follows:

```
- shutdown wait=0 <CR>
```

3. After this message appears, turn the system power off.

```
*** SHUTDOWN COMPLETED ***
```

4. Toggle to the DOS prompt. You can turn your system power off now if desired.

See also: **shutdown**, *Command Reference*



# iRMX for PCs Specifics **7**

---

## Switching Between DOS and iRMX for PCs

You must first perform the following steps if iRMX for PCs is installed on an iRMX partition and you want to change between the iRMX OS and DOS on a regular basis. If iRMX for PCs is installed on a DOS partition, *do not* perform these steps.

1. At the iRMX prompt, change to the iRMX directory *dosrmx*.

```
- cd /dosrmx <CR>
```

2. Attach the DOS partition.

```
- ad c_dos as :c: <CR>
```

3. Create a DOS *dosrmx* directory.

```
- createdir :c:dosrmx <CR>
```

4. Copy iRMX files as listed below:

```
- copy rdisk.exe to :c:/dosrmx <CR>
```

```
- copy bootrmx.exe to :c:/dosrmx <CR>
```

5. Append *c:\dosrmx* to the PATH line in your *autoexec.bat* file.

# Customizing the OS

You can specify some custom configurations of the OS. You can load certain parts of the OS with the **sysload** command from the command line or by modifying the `:config:loadinfo` file. Additionally, by modifying parameters in the `rmx.ini` file, you can enhance the performance of your application system.

After you install the OS, you may want to modify the default configuration to match your application. Some of the defaults you can change are:

- System memory configuration
- User IDs and memory requirements
- Terminal configuration
- Loadable jobs (including network jobs)
- Loadable device and file drivers
- Interrupt response

See also: Loadinfo file and `rmx.ini` parameters, *System Configuration and Administration*;  
Interrupt response, `\rmx386\readme.txt` file

# Starting iRMX for PCs

There are four scenarios for starting iRMX for PCs, depending on the partition in which it is installed.

Table 7-1 is a matrix for selecting commands to boot DOS or iRMX for PCs.

**Table 7-1. Boot Command Selection**

Partition iRMX for Pcs is Installed On	OS to Boot	
	DOS OS	iRMX for PCs OS
DOS partition	<i>rundos</i>	<i>runrmx</i>
iRMX partition	<i>bootdos</i>	<i>bootrmx</i>

Note: The *rundos* file undoes the changes of the *runrmx* file and vice-versa.

## Files Used for Booting iRMX for PCs

**RUNRMX** iRMX for PCs is installed on an DOS Partition

Invoke the *runrmx.bat* file to change the *config.sys* and *autoexec.bat* files to boot iRMX for PCs. Also invoke this file to undo the changes of *rundos.bat*.

```
C:\> \dosrmx\runrmx <drive with no colon> <CR>
```

<drive with no colon> is the DOS partition (drive) on which iRMX for PCs is installed. For example, if iRMX for PCs is installed on drive D:, the invocation is:

```
C:\> \dosrmx\runrmx d <CR>
```

If you have run the *runrmx.bat* file and need to undo the change, invoke *\dosrmx\rundos.bat*.

```
C:\> \dosrmx\rundos <CR>
```

Reset your system using <Ctrl-Alt-Del> for the change to take effect.

**BOOTRMX** iRMX for PCs is installed on an iRMX Partition

The *bootrmx* file activates the first iRMX partition and resets the system.

```
C:\> \dosrmx\bootrmx <CR>
```

## Files Used for Booting DOS

**RUNDOS** iRMX for PCs installed on a DOS Partition

The *rundos* file copies *c:\config.dos* over *c:\config.sys* and *autoexec.dos* over *autoexec.bat*.

```
- rundos <:logical drive:> <CR>
```

<:logical drive:> is the iRMX logical name used to attach the drive. For example, if iRMX is installed on the C: drive, the invocation would be:

```
- rundos :sd: <CR>
```

If iRMX is installed on any drive but C:, you must attach the C: drive before invoking *rundos*, like this:

```
- ad c_dos as :c: <CR>  
- rundos :c: <CR>
```

Reset your system using <Ctrl-Alt-Del> for the change to take effect.

See also: **attachdevice** command, *Command Reference*

**BOOTDOS** iRMX for PCs installed on an iRMX Partition

The *bootdos* file activates the primary DOS partition and resets the system.

```
- bootdos <CR>
```



# Logging On

Refer to Chapter 8 for instructions on how to log on the iRMX operating systems.

## Using the Hot Keys

A number of Hot Keys control the mode of operation of the console.

Invoke the Hot Keys by entering an <Alt-*appropriate key*> sequence. Table 7-2 provides a summary of the Hot Keys and their function.

**Table 7-2. Hot Keys**

Hot Keys	Function
<Alt +>*	Change iRMX console foreground color.
<Alt ->*	Change iRMX console background color.
<Ctrl-Alt-Break>	Break to system debug monitor from the iRMX prompt.
<Ctrl-Alt-Del>	Restart system. An error message is displayed if the shutdown command has not been used.

\* Use the '+' and '-' keys on the numeric keypad.

## Changing the Console Colors

Colors are selectable on EGA, VGA, or Super VGA displays. The default colors are normal intensity, white foreground on a black background. You cannot select the same color for the foreground and the background.

To change the foreground color press:

<Alt +>

using the plus key on the numeric keypad. Each time you press this key sequence, the foreground color changes to the next available color, eventually wrapping around to the initial color.

To change the background color press:

<Alt ->

using the minus key on the numeric keypad.

You can change colors by changing the *x* and *y* parameters in this line in the *:config:loadinfo* file.

```
sysload /rmx386/jobs/keybd.job(x,y,7a55)
```

See also: the *loadinfo* file for the line `sysload keybd.job(f,1,7a55)`

## Breaking to the SDM Debug Monitor

You can invoke the system debug monitor (SDM) from the iRMX prompt (not the DOS prompt) by pressing <Ctrl-Alt-Break>.

If you want to use SDM to debug an iRMX application while the console is in graphics mode, install an auxiliary MDA monochrome card attached to a monochrome monitor. Then, SDM will always use this monitor for its console output. (The iRMX OS, however, does not support the MDA monochrome card and the HI will not use it.) Use the **console** command to direct output and input for the terminal.

You can resume normal operation by entering the system debugger **g** command at the system console. This command exits SDM.

### ⇒ **Note**

A General Protection error will also cause a break to SDM, even if the DOS prompt is displayed. In this case, entering `g 284:1c` will exit SDM and return to the iRMX prompt. To reboot the system from SDM, enter `o64, fe` at the system console. Alternatively, you can use a power OFF-then-ON cycle.

The iRMX OS is effectively suspended when control passes to the SDM monitor on the system console. You will know that you that you are in SDM when the system prompt changes to `..` (two dots).

## Restarting the System

You can initiate a cold reset of the entire system by pressing <Ctrl-Alt-Del>. This resets the processor and should not be done unless necessary.

# Networking Capabilities

iRMX for PCs enables access to OpenNET and TCP/IP network services. These networks provide connections to computers running the DOS, UNIX, and iRMX operating systems.



## CAUTION

If you are booting iRMX for PCs from a DOS partition, ensure that DOS networking has not been loaded prior to the loading of iRMX for PCs.

PCs running iRMX for PCs can also run the iRMX network software listed below.

- ISO-based Protocols:

- iNA 960 jobs for a programmatic interface
- iRMX-NET consumer and server for remote file access

See also: i\*.job, *System Configuration and Administration*

- TCP/IP-based Protocols:

- NFS client and server for remote file access
- FTP client and server for remote file access
- TELNET client and server for remote login
- Socket library programmatic interface for user networking applications

See also: Overview of TCP/IP, *TCP/IP and NFS for the iRMX Operating System*

## Using iRMX-NET

After you have installed iRMX for PCs, you can connect your system to a network. Before you attempt to establish a connection to a network, ensure that:

- The appropriate supported Intel network interface controller board for your system has been installed.
- The Ethernet cable is connected.
- iRMX for PCs is running.
- The appropriate iNA 960 job for your network controller is loaded and running.
- For ISO networking, the iRMX-NET LAN is set up and ready to accept nodes.
- Additionally for TCP/IP networking:
  - The TCP/IP Kernel jobs and optionally POSIX and NFS jobs are loaded and running.
  - The TCP/IP LAN configuration files are set up.

See also: Network jobs, *System Configuration and Administration*;  
Installing and Starting TCP/IP, *TCP/IP and NFS for the iRMX  
Operating System*

## Configuring the Screen Saver

iRMX for PCs comes with a configurable screen saver. As with changing screen colors, the parameters for the screen saver are listed in the *loadinfo* file:

```
sysload /rmx386/jobs/keybd.job(x,y,FFFF)
```

where *x* and *y* configure screen colors and the value *FFFFH*, in units of 10 ms, configures the screen saver. The first of its two functions is the amount of time in which there is no output to the console. The screen saver activates after this time span. The second function serves as the blinking rate for the screen saver icon.

The screen saver is activated and similarly, de-activated based on output to the terminal console. If your program captures keystrokes and processes them, it should send them to the terminal console.

### ⇒ **Note**

The default value is *FFFFH*. This sets the screen saver never to be activated. If the screen saver will be activated, ensure that the time delay value is greater than *1770H* (60 seconds).

# Initializing iRMX for PCs for Shutdown

Before turning the system power off, initialize iRMX for PCs for system shutdown. This initialization, which you can do if you are logged on as a Super user, flushes data to the disk and not to internal buffers.

1. Execute the **shutdown** command as follows:

```
- shutdown wait=0 <CR>
```

2. After this message appears, turn the system power off.

```
*** SHUTDOWN COMPLETED ***
```

See also: **shutdown**, *Command Reference*





# Getting Acquainted with the Operating System **8**

---

This chapter tells you how to perform some basic operations with the iRMX OS. It covers these topics:

- Logging on and off
- Moving the cursor
- Managing files
- Using devices
- Using the on-line help facility

See also: The Human Interface (HI), The Command Line Interpreter (CLI), and Understanding the File System, *System Concepts*; Chapter 1, *Command Reference*

# Logging On and Off

## Logging On to the Operating System

If your terminal is configured as a static terminal, you do not need to log on to the system. The system prompt is displayed and you may begin entering commands. If you use a dynamic terminal, you must log on to the system.

When the HI initializes a dynamic terminal, it displays a prompt for the user logon name, which is not case-sensitive. When you enter a name, the HI prompts for a password. The password is case-sensitive, and is not displayed when you enter it. The prompts look like this:

```
Logon:  
Password:
```

If you have been assigned a user name and password by a system manager, enter these at the prompts. Otherwise, there are two user names defined for all iRMX systems. One is Super, the system manager, with user ID 0. The default password for Super is *passme*. Super has special privileges with regard to file access and command usage. The other user is World, with user ID 65535. World is the default user on iRMX systems, and requires no password. Simply press <CR> at the password prompt.

When you enter a valid user name and the correct password, the HI places you in a home working directory: for example, */user/world*. Then it displays the CLI sign-on message. This is the default message:

```
iRMX HI CLI Vx.y: user = <ID>  
Copyright years Intel Corporation  
All Rights Reserved  
-submit commands  
-
```

The sign-on message displays your user ID. When you log on to the system, the HI creates your interactive job and starts the CLI. The CLI executes the logon file, *:prog:r?logon*, which contains a set of **submit** commands. These commands are automatically invoked whenever you log on.



The `:prog:r?logon` file, and any file with a name that contains `r?`, is a hidden file. It does not show up in a normal directory listing. The `:prog:r?logon` file is unique for each user, though many user files can be very similar. You can customize your file by adding commands to it. After processing all the commands in the logon file, the CLI issues a dash (-) prompt. You can now enter commands or invoke application programs.

See also: Hidden files, *Command Reference*;  
**submit** and **logoff** commands, *Command Reference*;  
Logon, static, and dynamic terminals, *System Configuration and Administration*

## Logging Off

Logging off of a dynamic terminal frees the terminal for other users, and frees the memory pool used by your interactive job.

Enter the **logoff** command to log off. Whenever you log off, the CLI searches for the logoff file, `:prog:r?logoff`, and invokes the commands in it. You can customize this file by adding commands to it.

## Moving the Cursor

Table 8-1 lists the line-editing and cursor-movement keys supported by the CLI, along with other characters that have meaning for the CLI and HI.

## Bell Warning

On some systems, when you attempt an invalid action the CLI line-editor beeps the terminal bell. For example, it beeps if you:

- Type <Up-Arrow> to move the cursor up when you have not previously entered commands (there is no history buffer).
- Type <Down-Arrow> to move the cursor down when you are on the last line of the history buffer.
- Type <Right-Arrow> to move the cursor right beyond the line limit.

## Terminal Characteristics

The CLI executes on a wide variety of terminals. It uses the `:config:termcap` file to identify terminals and define keys used for special functions, such as cursor movement and line-editing. Each terminal is assigned a terminal name in the file. To change terminal types, use the **set** command and specify a terminal name from

the file. To add a terminal or change terminal characteristics, edit the `:config:termcap` file.

See also: Terminal definition file, *System Configuration and Administration*; `set` command, *Command Reference*

**Table 8-1. Function Keys and Special Characters**

Key	Function
<Right-Arrow>	Moves the cursor one place to the right.
<Left-Arrow>	Moves the cursor one place to the left.
<Up-Arrow>	Replaces the current command line with the previous command line.
<Down-Arrow>	Replaces the current command line with the next command line.
<Home>	Moves the cursor in the direction of the last arrow key used. After <Right-Arrow> or <Left-Arrow>, <Home> moves to the end or beginning of the line. After <Up-Arrow> or <Down-Arrow>, <Home> moves to the first or last command in the history buffer.
<Del> or <Backspace>	Deletes one character to the left of the cursor.
<DelCh> (<Ctrl-F>)	Deletes the character on which the cursor is positioned; usually configured to <Ctrl-F>.
<DelR> (<Ctrl-A>)	Deletes all characters to the right of and including the cursor location; usually configured to <Ctrl-A>.
<DelL> (<Ctrl-X>)	Deletes all characters to the left of the cursor; usually configured to <Ctrl-X>.
<Esc>	Executes the entire command line, regardless of the cursor position.
<CR>	Executes from the beginning of the command to the cursor. Everything to the right of the cursor is ignored.
<Ctrl-C>	Aborts the current foreground command and returns control to the CLI.
&	An ampersand designates the next line as a command continuation line.
;	A semicolon designates a comment in HI commands. Everything to the right of the semicolon is considered a comment.
' or "	Single or double quotes around a character remove the special meaning of the character. For example, to use an ampersand or semicolon in a command for any other purpose than line continuation or a comment, surround the character with quotes. The only special characters not affected by the quotes are slashes (/), which are pathname separators, and dollar signs (\$). The second quote must match the first. To include a quote character inside a quoted string, specify the character twice or use the opposite type of character (single or double).

# Managing Files

One of the main commands to manage files is the **copy** command. Use it for:

- Creating a new file
- Displaying the contents of files at the console screen
- Copying one or more files to new files
- Copying data from one file and overwriting data in another file
- Appending data from one or more files to the end of data in another file
- Concatenating multiple files into a single file

The examples that follow show you how to use these techniques. They also illustrate the general use of the `to`, `over`, and `after` parameters common to many iRMX commands. The syntax for the commands used in these sections is typically:

```
command infile [to|over|after] outfile options
```

## Creating a Simple Data File

Use the **copy** command to create data files. You do this by redirecting keyboard input to a file. To create a file called *alpha* under your `:$`: working directory and write two lines of data into the file, enter:

```
-copy :ci: to alpha <CR>
aaaaa <CR>
bbbbbb <CR>
<Ctrl-Z>
```

The HI responds:

```
:ci: copied to alpha
-
```

The command does not prompt you for the data lines; you simply begin entering data after you press `<CR>` at the end of the command line. The `<Ctrl-Z>` entry writes an end-of-file mark at the end of your input (but not into the file you are copying), to inform the **copy** command that there is no more data to be copied.

After you enter the last line of data, you must press `<CR>` before you enter `<Ctrl-Z>` to insert an end-of-file. Otherwise, the `<Ctrl-Z>` will be ignored.

If the file already exists, this message and query appear:

```
alpha, already exists, OVERWRITE?
```

Enter `y` to overwrite the file, or `n` to cancel the command.

## Displaying the Contents of Files

To display a file's contents on the screen, enter:

```
-copy alpha <CR>
```

The HI responds:

```
aaaaa  
bbbbb  
alpha copied to :co:  
-
```

This example uses the default preposition `to` and default output file `:co:`, which means that the command copies the output to the console screen.

To halt the scrolling of a displayed list, press these control keys:

- <Ctrl-S> Stops the data from scrolling off the screen until you press <Ctrl-Q>.
- <Ctrl-W> Puts the terminal into scrolling mode. In this mode, output stops after a single screen of data appears. Entering another <Ctrl-W> displays the next screen of data. <Ctrl-Q> exits this mode.
- <Ctrl-T> Similar to <Ctrl-W> except output stops after each line.
- <Ctrl-Q> Resumes scrolling of listed data until the end-of-file is reached or you enter <Ctrl-C>.
- <Ctrl-C> Cancels listing of the data and returns control to the HI, which prompts for a new command.

## Copying to New Files

You can copy multiple files with one **copy** command. The files are copied in the same sequence you specify in the input list and output list on the command line.

To copy files *a1*, *a2*, and *a3* to files *b1*, *b2*, and *b3* respectively, enter this command:

```
-copy a1, a2, a3 to b1, b2, b3 <CR>
```

The HI responds:

```
a1 copied to b1
a2 copied to b2
a3 copied to b3
-
```

You can also use wildcards when copying files. If the files *a1*, *a2*, and *a3* are the only files in the directory that begin with the character *a*, you can use this command to perform the same operation:

```
-copy a* to b* <CR>
```

The HI responds:

```
a1 copied to b1
a2 copied to b2
a3 copied to b3
-
```

## Replacing Existing Files

Use either the **rename** command or the **copy** command's *over* preposition to update existing files.

To copy new data over an existing file, first create a file named *temp*, then enter:

```
-copy temp over alpha <CR>
```

The HI responds:

```
temp copied over alpha
```

You can also use the *to* preposition, but you get a warning message:

```
-copy temp to alpha <CR>
```

The HI responds like this, and you reply with *y*:

```
alpha, already exists, OVERWRITE? y <CR>
temp copied to alpha
-
```

You now have two copies of the same new data; one in the *temp* file and one in the *alpha* file. If you use the *over* preposition in a **rename** command instead of the **copy** command, the *temp* file is deleted automatically when **rename** is executed.

## Concatenating Files

Concatenation is combining a number of files by appending them in sequence into a single file. Use the **copy** command to concatenate files by specifying the *after* preposition or by specifying multiple input pathnames and a single output pathname. (If the output pathname is a directory, concatenation does not occur).

Use the *after* preposition as follows:

```
-copy b,c,d after a <CR>
```

The HI responds:

```
b copied after a
c copied after a
d copied after a
-
```

To concatenate all four files into a new file called *all*, enter:

```
-copy a,b,c,d to all <CR>
```

The HI responds:

```
a copied to all
b copied after all
c copied after all
d copied after all
-
```

In this last example, file *a* is copied to *all* and the remaining input files are automatically appended to the end of *all*.

You can also concatenate files displayed on the screen. To list files named *alpha*, *beta*, and *gamma* to the default file *:co:* (the output device, or screen), enter:

```
-copy alpha,beta,gamma <CR>
```

The HI responds:

```
aaaaa
aaaaa
alpha copied to :co:
bbbbbb
bbbbbb
beta copied after :co:
ggggg
gamma copied after :co:
-
```

## Renaming Files

To change the name of file *alpha* to the new name *omega*, where *omega* does not already exist, enter:

```
-rename alpha to omega <CR>
```

The HI responds:

```
alpha renamed to omega  
-
```

The *alpha* pathname is automatically deleted from the system when the **rename** command executes.

You can rename lists of files to new pathnames. When using the **rename** command, you must always have a one-for-one match of pathnames between the old file list and the new list of names.

You can also use the *over* preposition with **rename**. The primary purpose of *over* is to move data from one named file and overwrite the data in another existing file. This use of the *over* preposition matches the action of the *over* preposition in the **copy** command, with one important distinction: **rename** automatically deletes the input file when the command is executed.

## Deleting Files

To delete files *alpha*, *beta*, and *key* from the system, enter this command:

```
-delete alpha,beta,key <CR>
```

The HI responds:

```
alpha, deleted  
beta, deleted  
key, does not exist  
-
```

The error message for the *key* file tells you one of three things:

- There is a spelling error in the name of the file.
- The file does not exist.
- The file exists in a different directory than where you are currently working.

## Using Devices

The list below shows which kinds of devices you can communicate with and the types of files supported on those devices.

- Terminals** Use terminals to communicate with the HI. You can also write programs that read from and write to terminals. Terminals are accessed as physical files.
- Disks** Disks provide permanent storage for programs and data. You can communicate with hard disks and diskette drives. During **format**, **backup**, **restore**, and **diskverify** operations, disks are treated as physical files. Other operations can access named files.
- RAM disk** A RAM disk provides an area of memory that acts like a secondary storage device in the system. The RAM disk creates a disk image within your memory and provides faster access to your files than a physical disk. It is similar to a physical disk in all aspects except that it does not provide permanent storage. If there is a power failure, the system fails for some reason, or you turn the power off, the data on the RAM disk is lost.
- Tapes** Tapes provide a quick and convenient method of backing up hard disks. You can use tape drives only for backing up and restoring files using the **backup** and **restore** commands. The OS does not support tape drives for any other uses.

See also: File types, *Introducing the iRMX Operating Systems*

## Device Names

Except for devices attached by the system as a result of the system configuration, you must attach a device with the **attachdevice** command before using it. In the **attachdevice** command, you specify a physical device name that defines device characteristics. Device names are provided for standard configurations. In a custom configuration you may define new device types (and names) or remove standard ones. You can also use the **sysload** command with a loadable device driver to add new device types.

For terminal devices, you also specify physical device names in the **lock**, **unlock**, and **connect** commands.

See also: **sysload**, **attachdevice**, *Command Reference*



## Switching Diskettes

When you remove an iRMX-formatted diskette from the drive and then access the drive device, any connections to files on that device are deleted. Any logical names that represent files on the volume are no longer valid. The names remain cataloged in the directories, but they do not represent valid connections.

See also: Creating Logical Names for Devices, *Command Reference*

To maintain your data in usable form, detach a diskette before you remove it, and then attach a new diskette before you use it. Use this procedure:

1. Before removing the first diskette, invoke the **detachfile** command to detach the files, or use the `force` parameter in the **detachdevice** command.
2. Remove the first diskette and insert the replacement diskette.
3. Invoke the **attachdevice** command (or the alias **ad**) to gain access to the new diskette.



### CAUTION

If you do not follow this procedure, the OS assumes that the first diskette is still in the drive. The volume directory is written only during the **detachdevice** command and directory changes made to the volume are not written if you remove the diskette before the **detachdevice**. Furthermore, if you change diskettes without a **detachdevice**, access the new diskette (using **dir**, for example), then detach the device, the directory from the former diskette is written to the current volume, destroying the file system on it.

This also applies to remote diskette volumes managed by the iRMX named file driver.

## Uniform and Standard Granularity Diskettes

Modern diskette formats use *uniform granularity*. This means the diskette has a consistent number of bytes per sector on every track. *Standard granularity* is an older iRMX diskette format that uses 128 bytes per sector (single density) on track 0, regardless of the sector density used on the rest of the volume. Older releases of the OS were distributed on this format diskette, and you may still use standard granularity diskettes.

On a standard granularity device, the iRMX BIOS can recognize the type of physical device from information written on track 0 during the format operation. If the diskette does not match the physical device type specified in the **attachdevice** command, the BIOS attaches an appropriate device unit information block (DUIB) for the device. The BIOS cannot do this, however, when you switch diskettes in a 5.25-inch or 3.5-inch drive without detaching the device. If you use a Multibus I system with 8-inch drives, you can switch diskettes without a **detachdevice**, because the 8-inch drive interrupts the OS when the diskette is changed.

Because the device characteristics recognition feature does not apply to physical-file operations, the **format**, **backup**, and **restore** commands do not use this feature.

## Using the Online Command Help

Use the command help at the iRMX prompt to obtain information about most iRMX commands. You can get help by typing:

```
help command_list [to|over|after outpath_list] [q] [p = num]
```

Where:

`command_list`

One or more command names for which you want help. Separate command names with commas. Wildcards are permitted.

`to|over|after outpath_list`

Writes the help file to the specified file(s) rather than to the screen. If you specify multiple help files and one output file, the output is appended.

`q(uey)` Prompts for permission to display each help file.

`p(age)length) = num`

The maximum number of lines in the output page.

See also: **help** command, *Command Reference*

## Using Online iRMX System Call Help

A Windows Help file is available for all system calls, **cq\_** calls from the *Network User's Guide and Reference*, and all exception codes. The help program runs only under Windows, not the iRMX OS.

After installing the iRMX OS, the *rmxcall.hlp* file is located in the `\dosrmx` directory on the hard disk.

To install *rmxcall.hlp* on any PC running DOS/Windows without performing an iRMX installation procedure, copy the file from the iRMX installation CD to your hard disk. The file is in the `\install\common\dosrmx` directory on the CD.

Once you have the Help file on your hard disk, you can set up an icon for it in Windows by choosing **New.../Program Item** from the **Files** menu in the Program Manager. Or, double-click on *rmxcall.hlp* from the File Manager to start the Help file.

## Using Online iRMX Manuals

This release of the OS provides a complete set of iRMX manuals online in Adobe Acrobat format. The manuals are on the installation CD in the `\manuals` directory. Also on the CD is a special version of the Acrobat Reader that allows full-text search across the iRMX manual set. After you install the Reader you can access the files (Portable Document Format files) directly from the CD or from a location on your hard disk, if you choose to copy them to the hard disk.

You can view the manuals online, search for text in them, and print any part (or all) of the manuals from the Reader.

## Installing the Reader

The Acrobat Reader shipped with the iRMX CD supports the Acrobat Reader Search command. With this command you can perform full-text searches of collections of the iRMX documents. Even if you have already installed a version of the Acrobat Reader, you must install this new version to support full-text search.

Unlike the Find command of a word-processing program, which searches for words by reading every word on every page, the Search command searches full-text indexes included with the electronic manuals. The full-text indexes represent the entire iRMX online documentation set. The Search command uses the index to find words and terms quickly in the iRMX manual set without having to open the documents.

To install the Reader, perform these steps:

1. Insert the iRMX 2.2 CD into the CD drive.
2. From Windows, run *setup.exe* from the `\acrosrch\disk1` directory on the CD. For example, if the CD is drive E:, in the Program Manager, choose **Run...** from the **File** menu, and enter this command:  

```
e:\acrosrch\disk1\setup
```
3. Read the agreement that appears in the Electronic End User License Agreement Screen and press the Accept button.
4. From the Acrobat Installer screen:
  - Be sure the Acrobat Search check box is selected to get the full-search capability within the iRMX manual set. You will need approximately 4.7 Mbytes on your hard disk to perform the installation with the search capability activated.
  - Enter the path on your hard disk where you want the Reader to be installed, for example, `c:\userbob\acrosrch`.
5. Accept the Windows information displayed for Name, Organization, and Serial Number.
6. Wait for the installation to complete.

After the installation completes, you will have an Adobe Acrobat program group with two items: the Reader and a “readme” file.

Start the Reader and view the *help\_r.pdf* and *help\_s.pdf* files in the *help* subdirectory under the directory where you installed the Acrobat Reader. These files describe how to use the Reader and the search facility, respectively.

You can use this version of the Reader to view Acrobat-format documents (.PDF files) for any product, not just for the iRMX OS.

## Accessing the Online Manuals

You can view the iRMX manuals directly from the CD or you can copy the files from CD to a directory of your choice on the hard drive.

By accessing the manuals directly off the CD you save hard disk space but can sacrifice access time.

By installing the files to your hard disk you can gain better performance when viewing manuals. To copy the files to your hard disk enter this command:

```
xcopy e:\manuals\*. * \d:\<new_directory> /s/e
```

where e: is the CD-ROM drive, d: is your hard disk, and <new\_directory> is the destination path.

The \manuals directory contains \*.pdf files and a .pdx file. There is also a *readme.txt* file with the latest information about using and installing this tool. The subdirectories under \manuals contain parts of the index tool used by the search engine in the Acrobat Reader.



### Note

Read the *readme.txt* file to make sure you have the latest information. To start viewing iRMX manuals, start the Reader and open *Welcome.PDF*.





# Where To Go From Here 9

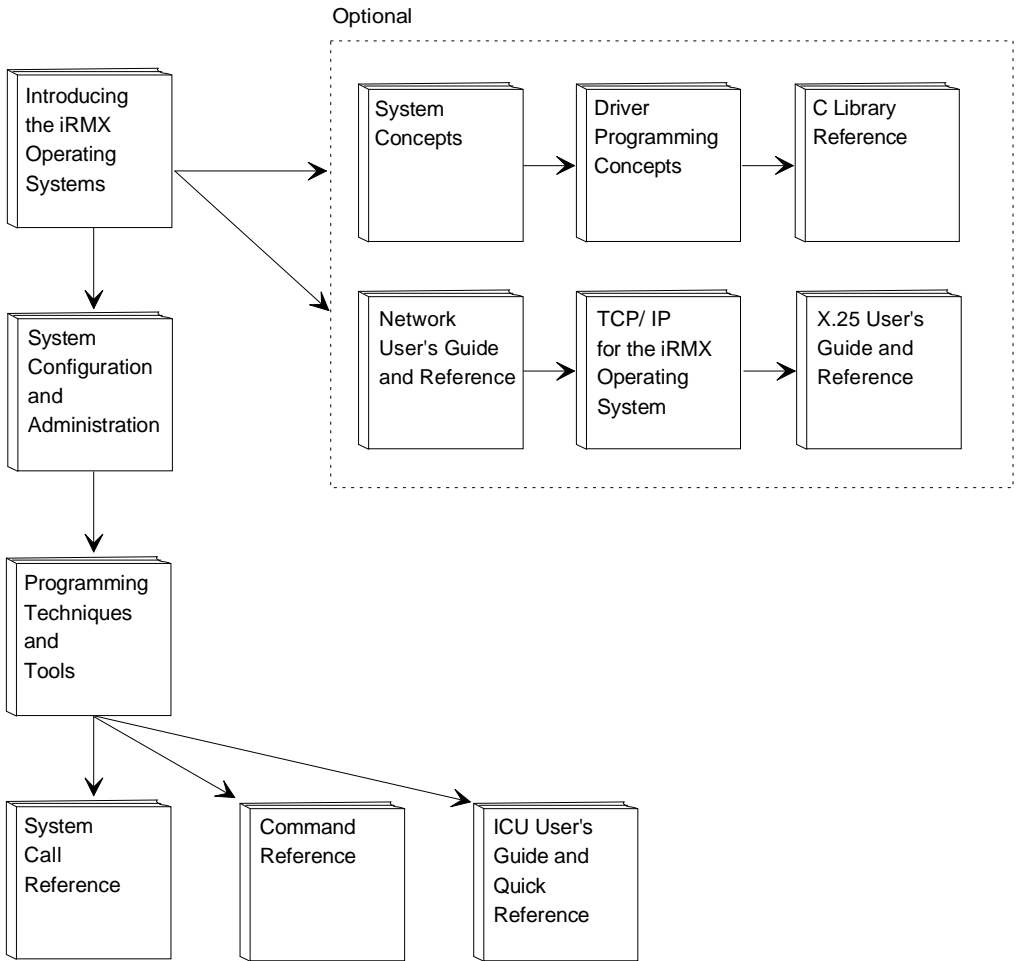
---

You can take several paths through the documentation. The figures that follow offer suggestions.

Figure 9-1 on page 168 displays the recommended order for new users. New users means that you're new to the iRMX OS.

If you've developed application programs with the iRMX OS, browse through *Introducing the iRMX Operating Systems*. Figure 9-2 on page 169 displays the recommended order for experienced users.

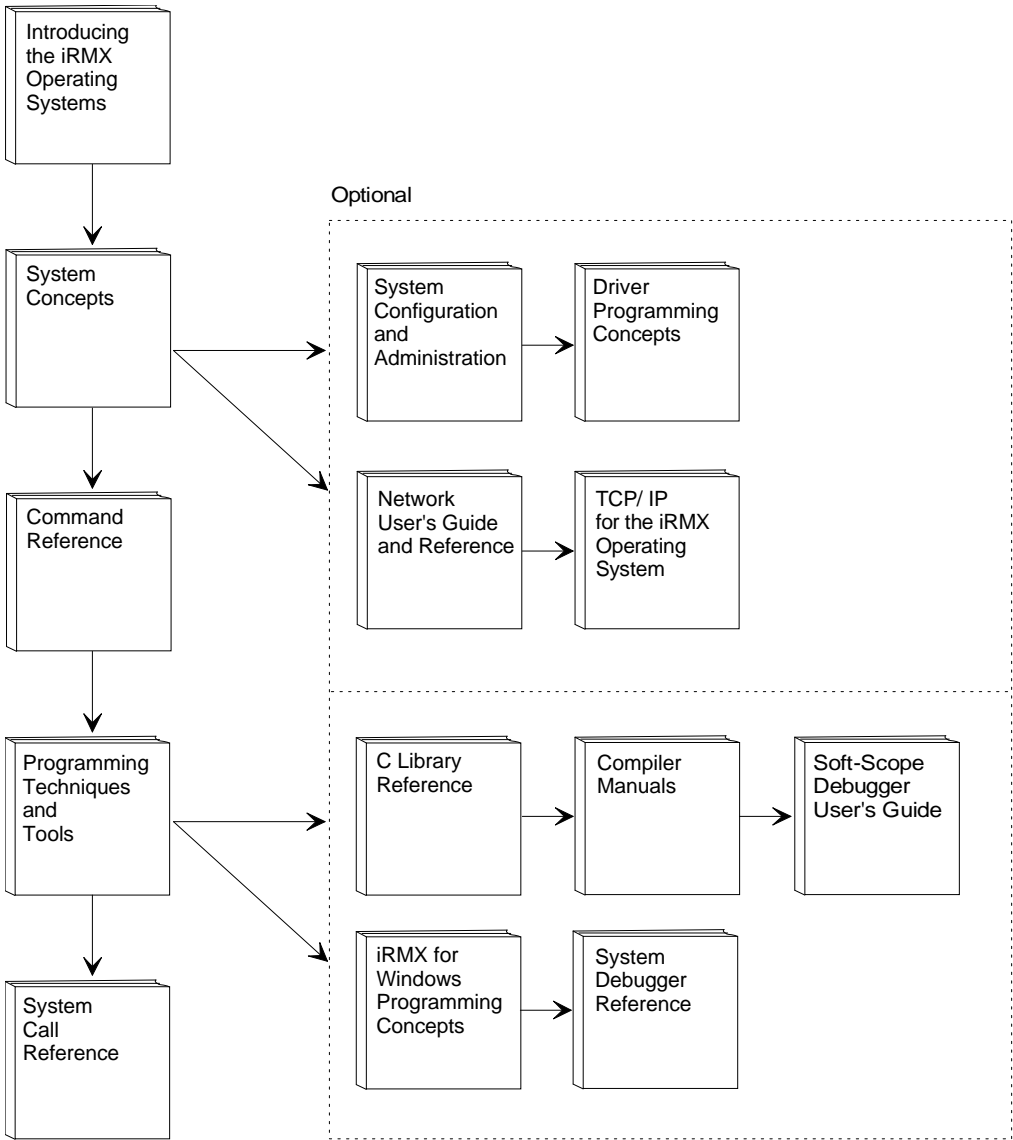
See also: Appendix B for a list of manuals where new features are documented



OM02576

**Figure 9-1. Recommended Documentation Roadmap for New Users**





OM02515

**Figure 9-2. Recommended Documentation Roadmap for Experienced Users**





# **iRMX INSTALLATION APPENDICES**

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This section contains information that lets you get started with your iRMX OS. These are the chapters in this section:

- Appendix A.      Installed Directories**
- Appendix B      Changes and New Features in Manuals for this Release**
- Appendix C      Limitations**
- Appendix D      Configuration Requirements for PC Platforms**
- Appendix E      Changing Memory Size During the iRMX III OS Installation**
- Appendix F      Hardware Modifications for the iRMX III OS Installation**
- Appendix G      Error Messages**



# Installed Directories

# A

This appendix shows the installed directory structure for all versions of the OS: iRMX for Windows, iRMX for PCs, and the iRMX III OS.

## Directory Structure

Following are key directories resulting from the installation of iRMX OS. The column to the left gives the name of the directory (shown hierarchically) and the column to the right provides a brief description of the directory's contents.

Directories	Comments
:sd:	
bin	TCP/IP binaries
boot32	Multibus I boot images
bsl	Multibus I boot generation and configuration files
dev	TCP/IP device definitions
dosrnx	DOS-specific files including Windows Help
etc	TCP/IP commands and configuration files
ins_sys	iRMX MBI Installation system commands
intel	
bin	AEDIT, Intel386 utilities
include	C header files (include files)
arpa	C include files specific to TCP/IP protocols, e.g., FTP
net	C include files for networking not specific to TCP/IP
netinet	C include files specific to TCP/IP protocols, e.g., TCP
sys	System-related C include files
pse	C include files for Unix Streams Emulator (iRMX)
lib	C-start objects, C-library interface libraries
ndp387	Math coprocessor utilities
gen	Generation files
src	C-start objects for ASM
lang286	Compiler and utility executable files
msa	Default MSA files
boot	Default MSA boot image file
config	Default MSA BPS file
msa32	iRMX III MSA boot files
386258	BPS files for 386/258 and 386/258D
486133	BPS files for 486/133SE and 486/166SE
p5090	BPS files for P5xxx family of boards
boot	MSA boot images

:sd:	
net	iNA 960 load files
rboot32	Multibus I remote boot files
rmx386	Readme text files
clib	C run-time system libraries
config	iRMX configuration files
demo	Example files (includes source files)
altsys	
asm	
c	
dde	
plm	
rgi	
rom	
rte	
wterm	
drivers	Loadable device driver files
early	New but unintegrated software
eios	EIOS library files (used in generating boot images)
help	Help files for iRMX commands
hi	Human Interface (HI) library files
icu	ICU files (screen master, template, registration, and .bck)
inc	P/LM 32-bit external declaration and literal files
inc16	P/LM 16-bit external declaration and literal files
ios	I/O system library files (used in generating boot images)
jobs	Loadable system jobs
lib	Interface libraries for OS
loader	Application Loader library files (used in generating boot images)
nucleus	Nucleus library files (used in generating boot images)
network	iNA 960 network library files (used in generating boot images)
sdb	SDB library files (used in generating boot images)
sdm	SDM library files (used in generating boot images)
udi	UDI library files (used in generating boot images)
unsupprt	Unsupported software features
vm86	VM86 library files (used in generating boot images)
sys386	Commonly used Intel-provided command files
system	Default Multibus I boot image file
tmp	TCP/IP temporary files directory
user	User directory
super	Super user :home:directory
prog	Super user :prog: directory
world	World user :home:directory
prog	World user :prog: directory
util286	HI utility commands (16-bit)
util386	HI utility commands (32-bit)
work	Temporary work files

# Multibus I Minimum File Structure Needed

This directory structure is the minimum needed to boot the iRMX III OS from a Multibus I system.

## Directories and *Files*

:sd:

- etc
- . sys386
- . system
- . . *rmx86*
- . . *rmx86.386*
- . rmx386
- . . config
- . . . *udf*
- . . . *terminals*
- . . . *logon.msg*
- . . . *termcap*
- . . . user
- . . . . *super*
- . user
- . . super
- . . . prog
- . . . . *r?logon*
- . work
- . util286
- . util386
- . lang286

# Multibus II Minimum File Structure Needed

This directory structure is the minimum needed to boot the iRMX III OS from a Multibus II system.

## Directories and *Files*

:sd:

```
    etc
.   msa
.   .   stage2.rmx
.   .   boot
.   .   .   rmx
.   .   .   rmxio
.   .   config
.   .   .   bps
.   sys386
.   util286
.   util386
.   lang286
.   rmx386
.   .   config
.   .   .   user
.   .   .   .   super
.   .   .   .   udf
.   .   .   .   terminals
.   .   .   .   logon.msg
.   .   .   .   termcap
.   user
.   .   super
.   .   .   prog
.   .   .   .   r?logon
.   work
```





# Changes and New Features in Manuals for this Release

# B

## New Features

The features listed in this appendix were added or changed in this release of the OS. To read about the details of each feature, refer to the indicated entries in the manual set.

## Commands, New and Changed

See the descriptions of the following commands in *Command Reference*, Chapter 2. All TCP/IP-related commands moved to the *Command Reference* manual.

### New Commands

domain  
netinfo  
rpcinfo  
share  
showmount  
touch  
unshare  
r\* TCP/IP (Berkeley) commands

### Changed Commands

attachdevice (for NFS)  
attachfile  
detachfile  
esubmit  
keyb (now documented)  
make (used to be mk)  
rdisk  
setname  
sysinfo  
sysload

## Compilers and Data Types

Include files use standardized Kernel data types (e.g., UINT\_16 instead of unsigned short)  
*System Call Reference*, Chapter 1

Support for non-Intel (third party) C compilers Borland/Microsoft/Watcom  
*Programming Techniques*, Chapters 4 and 8  
*System Call Reference*, Chapter 1, Interface Libraries

First-level job support in ICU for applications created with third-party compilers  
*Programming Techniques*, Chapter 4  
*ICU User's Guide and Quick Reference*, TPUJ screen

## Configuration

Aedit Undo key configuration

*Aedit Text Editor*, Chapter 3

ICU definition file (\*.bck) master list

*ICU User's Guide and Quick Reference*, Appendix D

New BPS parameters for partitioning, terminal file, system configuration file, iRMX-NET  
*MSA for the iRMX OS*, Chapter 2 (bl\_master\_boot\_part, bl\_logical\_boot\_part,  
rq\_hterm, rq\_hscf, rq\_rnet\_s, rq\_rnet\_c)

New parameters in *rmx.ini* file

*System Configuration and Administration*, Chapter 5, [HI] block (see SCF, TCF)  
and [PCIAD1], [RNETS] and [RNETC] blocks

New/changed BPS files and directories

*MSA for the iRMX OS*, Chapter 3

Remote Boot changes

*Network User's Guide and Reference*, Chapter 15

*System Configuration and Administration*, Chapter 4 (*rbootsrv.job*)

ROMming method and examples

*Programming Techniques*, Chapter 9

## Debugging

Soft-Scope operates locally or on a remote host

*Soft-Scope Debugger User's Guide*

SDM new commands for breakpoints and page tables

*System Debugger Reference*, Chapter 3 (**bc**, **bs**, **p\*** commands)

## First-level Jobs

See *System Configuration and Administration*, Chapter 6, and screens in the  
*ICU User's Guide and Quick Reference* for a description of new first-level jobs:

iNA 960 jobs, including jobs for routing and Multibus II subnet

Soft-Scope kernel

TCP/IP

X.25 Client and Server

## Loadable Jobs and Drivers

See *System Configuration and Administration*, Chapter 4, for a description of these new loadable jobs and drivers:

82530 terminal driver (*drv82530*)

ARC server (*atcs279.job*)

DDE support over a TCP/IP network (*tcpdde.job*)

iNA 960 jobs for routing and Multibus II subnet (*i\*.job*)

iRMX-NET client, server, and remote bootserver (*remotefd.job*, *rnetssrv.job*, *rbootsrv.job*)

NFS jobs (*nfsfd.job*, *nfsd.job*, *mountd.job*, *pmapd.job*)

Paging subsystem and flat model support (*flat.job*, *paging.job*)

Soft-Scope support for remote debug host (*sskernel*, *ssload*)

X.25 Client (*x25cli.job*)

## Networking, iNA 960 and iRMX-NET

*/net/data* file change

*Network User's Guide and Reference*, Chapter 11

*Command Reference*, **setname** command

iRMX-NET loadable Client and Server

*System Configuration and Administration*, Chapter 4 (*remotefd.job*, *rnetssrv.job*)

MIP configuration now performed in ICU

*ICU User's Guide and Quick Reference*

Name Server new commands

*Network User's Guide and Reference*, Chapter 11 (ADD\_SEARCH\_DOMAIN, DELETE\_SEARCH\_DOMAIN, and GET\_SEARCH\_DOMAIN)

Remote boot client on remote systems waits for cataloged values from the boot server

*Network User's Guide and Reference*, Chapter 11 (NSDONE, RNETSRV)

*System Configuration and Administration*, Chapter 4 (*rnetssrv.job*)

Remote boot loadable server job

*System Configuration and Administration*, Chapter 4 (*rbootsrv.job*)

Routing support, multiple subnets, and Multibus II subnet

*Network User's Guide and Reference*, Chapter 9

*System Configuration and Administration*, Chapter 4 (*i\*.job*)

## Networking, TCP/IP and NFS

Berkeley R-series commands added

*TCP/IP and NFS for the iRMX OS*, Chapter 6

*Command Reference*, Chapter 2

Configure TCP/IP as first-level job

*System Configuration and Administration*, Chapter 6

*ICU User's Guide and Quick Reference*, NET screen

NFS capability added

*TCP/IP and NFS for the iRMX OS*, Chapter 3

*Command Reference*, (**attachdevice**, **share**, **showmount**, **unshare** commands)

*System Configuration and Administration*, Chapter 4 (*nfsd.job*, *mountd.job*,  
*nfsd.job*, *pmapd.job*)

TCP/IP configuration changes

*TCP/IP and NFS for the iRMX OS*, Chapter 2

## Paging Subsystem

New system calls for flat model applications (non-segmented) applications

*System Call Reference*, Chapter 10, all

Chapter 6, (*rq\_move\_data*, *rq\_get\_buffer\_limit*, *rq\_validate\_buffer*)

Chapter 3 (*rq\_wait\_iors*)

SDM debug display for page tables and directories

*System Debugger Reference*, Chapter 3 (**p\*** commands)

Support for flat model applications

*Programming Techniques*, Chapter 8

## System Calls

See the chapters listed below in the *System Call Reference* for a description of these new calls:

Paging Subsystem, Chapter 10 (rqv\_ calls), and support for flat model applications:  
Chapter 2 (Application Loader calls rqe\_a\_load\_io\_job, rqe\_s\_load\_io\_job)  
Chapter 3 (BIOS call rq\_wait\_iors)  
Chapter 6 (Nucleus calls rqe\_exit\_interrupt, rq\_get\_buffer\_limit, rq\_move\_data, rq\_validate\_buffer)

Condition code master list, Appendix D

Kernel time calls, Chapter 9 (KNE\_get\_time, KNE\_set\_time)

Nucleus time calls, Chapter 6 (rq\_get\_time and rq\_set\_time moved from BIOS to Nucleus)

Exception handling, Chapter 6 (rqe\_set\_exception\_handler, rqe\_get\_exception\_handler)  
See also *System Concepts*, Chapter 9

Task and system accounting, Chapter 6 (rq\_get\_task\_accounting, rq\_get\_task\_info, rq\_get\_task\_state, rq\_system\_accounting)  
See also *System Concepts*, Chapter 9

Watchdog timer for live insertion support, Chapter 6 (rq\_attach\_reconfig\_mailbox)  
See also *System Concepts*, Chapter 3

## Others

C Library functions added

*C Library Reference*, Chapter 3 (`_get_cs`, `_get_ds`, `_get_ss`)

DDE support enhanced

*Programming Concepts for DOS and Windows*, Chapter 7

Exception handling

*System Concepts*, Chapter 9

Include files master list

*System Call Reference*, Chapter 1

Interface Libraries master list

*System Call Reference*, Chapter 1

Multibus II Live Insertion support; watchdog timer

*System Concepts*, Chapter 12

*System Call Reference*, Chapter 6 (`rq_add_reconfig_mailbox`)

Partitioning support for SCSI hard drives with PCI driver

*Command Reference*, Chapter 2 (**rdisk**) and Appendix F

*System Configuration and Administration*, Chapter 4 (`pcidrv`)

*MSA for the iRMX OS*, Chapter 2 (`bl_boot_master_part`, `bl_boot_logical_part`)

Task and System Accounting

*System Concepts*, Chapter 9

X.25 applications

*X.25 User's Guide and Reference*

*System Configuration and Administration*, Chapter 4 (`x25cli.job`) and 6 (X.25 jobs)

## New Documentation of Existing Features

Console output codes documented

*System Configuration and Administration*, Appendix A

Known limitations of the OS documented

*Installation and Startup*, Appendix F

Using iRMX-NET with MS-NET and PCNET in a DOS environment

*System Configuration and Administration*, Chapter 3

Windows Help version of *System Call Reference* and Acrobat online versions of all manuals

*Installation and Startup*, Chapter 6







This appendix presents general and area-specific limitations for the iRMX for Windows version of the OS as well as other limitations that are common to all versions of the OS. Review this appendix to make sure your application and software configuration is compatible.

## **iRMX for Windows General Limitations**

- The OS does not work with Windows for Workgroups, Windows 95, or Windows NT.
- The OS does not work with enhanced-mode Windows. Use Windows 3.1 in standard mode only.
- The OS does not support DPMI (DOS protected-mode interface) applications, such as those built with Phar Lap's DOS Extender. You cannot start iRMX for Windows with such an application running, nor can you start a DPMI application after starting iRMX for Windows.
- DOS or Windows applications that remotely control another PC or that manage the system timer are incompatible with the OS, and are not supported.

## **iRMX for Windows-specific Limitations**

iRMX for Windows has limitations in these specific areas:

- Extended memory usage
- Expanded memory usage
- Ill-behaved DOS applications
- DOS application installation
- Real-time performance issues
- Networking and Communication
- DOS debuggers
- Software interrupts

- Hardware sharing
- Priority level
- Invisible files
- Last cylinder usage
- Printing
- EDOS File Driver
- RTE Calls

These limitations are described in the subsections that follow.

## Extended Memory Usage

iRMX for Windows provides support for DOS extended memory; however, there are restrictions on what you can load into extended memory. These restrictions are due to the order of loading DOS drivers and loading the iRMX extended memory manager.

See also: Chapter 6 for more details

## Expanded Memory Usage

If an application requires expanded memory, provide hardware expanded memory, such as an Intel Above Board, not expanded memory emulated in extended memory.

## III-Behaved DOS Applications

DOS application programs which use or do the following are not supported:

- Reprogramming the Programmable Interrupt Controller (PIC)
- Accessing the timer in ways other than trying to re-program it to a different clock rate, or trying to calibrate programs by using the timer to measure elapsed time. Both of these attempts are handled by the operating system. Other access attempts will cause unpredictable results, such as breaking to the SDM monitor.
- Calling software interrupt handlers directly instead of using the INT instruction
- Relying on 64 Kbyte wrap-around for Code and Data segments
- For TSR's, not following DOS reentry protocols or chaining improperly to interrupt vectors

## DOS Application Installation

Any DOS application that requires resetting the system, such as Windows *setup.exe*, must be run prior to loading iRMX for Windows. Even if you have shut down the OS, reset the system before running such software.

## Real-time Performance Issues

DOS applications and Windows programs are prevented from disabling iRMX interrupts indefinitely. Virtual interrupts are used to provide correct behavior for DOS and Windows without impacting the iRMX OS.

The DOS clock interrupt handler can take an indefinite amount of time, especially if there are many TSR's chained to it. The DOS handler needs to do the end-of-interrupt to the PIC within a millisecond, even if the call does not return for a longer duration.

## Networking and Communication

DOS applications performing disk I/O or communication I/O, such as XMODEM data transfers or disk testing software, can fail if the applications are sensitive to timing and are competing with the iRMX OS for processor time.

Since the EDOS file driver removes *r?* from the beginning of filenames before sending them across the network, you may need to duplicate invisible iRMX named files that reside on an iRMX partition (that is, have one file named *r?logon* and another named *logon*) before you can access them via DOS networks.

iRMX filenames sent across DOS networks are truncated to eight characters and a three character extension even if the remote host is an iRMX partition and the named file driver is used.

You cannot start the DOS version of MS-NET software with the normal `net start rdr` command and then start iRMX for Windows with its network software. Instead, use the *pcnet* version of MS-NET software, with the iRMX *netdr* job. You can start Novell software before starting iRMX for Windows.

See also: Using iRMX-NET in a DOS Environment, *System Configuration and Administration*

Booting the OS from files on a Novell server is not supported. If you start DOS and Novell networking, then attach to the Novell server as drive E:, for example, do not boot iRMX for Windows from drive E:. The length of filenames under iRMX is incompatible with filename length as managed on the Novell server.

## DOS Debuggers

Some DOS debuggers support both Real Mode and Protected Mode. Use Real Mode for debugging DOS application programs. However, you can use Standard mode Windows if you are running a Windows-based debugger.

## Software Interrupts

Certain software interrupts are reserved and not available for use by DOS application programs.

## Hardware Sharing

These iRMX-encoded hardware interrupt levels are reserved and not available for any other use:

- For PC compatible networking systems, PIC Slave Level 1 is reserved for a PCLINK2(A) board.
- For Multibus I networking systems, PIC Master Level 5 is reserved for the SBX 586.
- For Multibus II networking systems, PIC Slave Level 1 is reserved for the MPC.

## Accessing Serial Devices

DOS applications can access any serial device not attached by the iRMX OS. However, once a serial device is attached by iRMX, it is not available to DOS. If you use a serial device from DOS, do not enter the device name in the terminal configuration file or attach it with the **attachdevice** command.

See also: *Configuration of Local Terminals, System Configuration and Administration*

## Priority Level

DOS runs at priority 254: an iRMX task running at 255 will not execute. This also implies that if any iRMX task running at a priority higher (numerically lower) than 254 is in a tight polling loop, that task will prevent the DOS task from ever executing. Your iRMX application program must not include tight polling loops.

A low priority iRMX task (for example, priority=200) in a tight loop can indirectly keep a higher priority task (for example, priority=141) from running, if the higher-priority task needs I/O from the EDOS file driver or the ROM BIOS. This is because an I/O task that uses EDOS or the ROM BIOS has to wait for DOS to be safe before initiating I/O. If the low-priority iRMX task preempts DOS while it is in a "DOS-busy" state (during an INT 21 or INT 13), DOS never gets a chance to complete and become "safe" so the high-priority iRMX task can perform its I/O. Therefore, if you must poll in an iRMX task, have the task either periodically release the CPU using an **rq\_sleep** call, or run the task round robin with DOS at priority 254.

When you create users with the Command Line Interface (CLI), set the maximum task priority at one less than the DOS priority (that is, 253) in the `:config:user` file. Then those users will share the processor with DOS. If you use **submit**, set the task priority to one less than DOS. If you use **background**, set the task priority to three less than DOS. If you use all three, set the task priority to five less than DOS.

See also: User attributes files, *System Configuration and Administration*

## Invisible Files

In the iRMX OS, hidden files begin with `r?`. The `?` (question mark) character is not valid in a DOS file name so iRMX filenames containing a `?` are not accessible to DOS. The EDOS file driver uses the following convention:

- Files on the iRMX volume that begin with `r?` are created on the DOS volume without the `r?`, but with the DOS invisible attribute.
- Files on the DOS volume that have their invisible bits set, appear to the iRMX OS as beginning with `r?`.

For example, if you copy the file *r?login* from an iRMX partition to a DOS partition, the file will appear as *login* with the invisible attribute. DOS invisible files such as *msdos.sys* appear as *r?msdos.sys* when you list them from iRMX using the EDOS file driver.

On the iRMX volume, you can have two versions of the same file, one invisible and one visible, with the same name, for example *r?login* and *login*. On DOS, you can have only one version of a file, invisible or visible.

## Last Cylinder Usage and RDISK

**Rdisk** and the iRMX for Windows hard disk device driver are ROM BIOS-based. Certain implementations of the ROM BIOS do not provide access to the last cylinder on the disk. If you have an existing partition table that includes the last cylinder in one of the partitions, and you invoke **rdisk**, it reports:

```
Invalid Partition in Partition Table
```

If the partition table still contains the last cylinder in one of the partitions and you attempt to write the partition table to the disk, **rdisk** reports the same error message and will not perform the write.

If you wish to create an iRMX partition on this disk, perform the following steps to remove the last cylinder and preserve the contents of the partition.

1. Back up the contents of the partition that contains the last cylinder.
2. Resize the partition so it does not contain the last cylinder.
3. Format the resized partition to modify the FAT (for DOS partitions) or bit map table (for iRMX partitions).
4. Restore the files back onto the partition.

## Printing

There is no print spooler. Output sent to the `:lp:` device from one job can interrupt printing from another job or interrupt printing from a DOS/Windows application. The print output is mixed.

The <Print Scrn> key is not supported from the iRMX OS as it is in DOS. You cannot use the <Print Scrn> key to print the display from iRMX.

## EDOS File Driver

These limitations or behaviors exist for the EDOS file driver:

- You cannot open more than 55 EDOS files at a time. Attempting to open more results in an E\_IOMEM exception.
- An application that uses the EDOS file driver or I/O from the ROM BIOS can be blocked by a lower-priority task. Assume that a low priority iRMX task (priority = 200) is in a tight loop. If a higher-priority task (priority = 141) needs I/O from EDOS or the ROM BIOS, the I/O task has to wait for DOS to be safe before initiating I/O. If the low-priority task preempts the DOS task while DOS is in a “DOS-busy” state (i.e., in the middle of an INT 21 or INT 13), the DOS task never gets a chance to complete. Thus the low-priority task can block the high-priority task that needs DOS I/O. If you must poll in an iRMX task, have the task either periodically release the processor (using an **rq\_sleep** call), or run the task round-robin with DOS at priority 254.
- The EDOS file driver treats various file access conditions differently than the named file driver. The following system calls can return unexpected condition codes with the EDOS file driver:
  - **rq\_s\_delete\_file** may return E\_FNEXIST (21H) instead of E\_FACCESS (26H)
  - **rq\_s\_rename\_file** may return E\_FNEXIST (21H) instead of E\_FACCESS (26H)
  - **rq\_s\_rename\_file**, when renaming a data file to which World has read-only access, may return E\_OK instead of E\_FACCESS (26H)
  - **rq\_s\_get\_path\_component**, when a deleted file is specified, may return E\_OK instead of E\_FNEXIST (21H).
- iRMX for PCs/Windows EIOS buffer sizes are configurable in the *rmx.ini* file on a per-file driver basis. The default buffer size is 1K for the Named, EDOS, DOS, and Remote file drivers. Increasing the default size can provide an increase in the performance of sequential I/O, but will not enhance the performance of random I/O. Also, the memory tradeoff must be considered, since buffers are allocated on a per-connection basis system-wide.

Table C-1 below summarizes the results of an I/O benchmark which performs sequential writes to a single disk file. This benchmark sequentially writes out blocks of data (using **fwrite**) of size "Transfer Size" until the "File Size" is reached. The table relates EIOS buffer sizes to the time it takes to write the entire file. Times are in seconds. DOS timings for the same benchmark are included for completeness. Hardware was an Intel SYP403E (33MHz 486) with a Maxtor XT-8760S SCSI drive controlled by an Adaptec 1542B SCSI controller. When comparing the numbers, the lower the number, the better the I/O performance.

**Table C-1. Sequential I/O Performance Benchmark**

<b>Transfer Size</b>	<b>File Size</b>	<b>1K Buffers</b>	<b>2K Buffers</b>	<b>4K Buffers</b>	<b>DOS Plus iRMX</b>	<b>DOS Only</b>
128	256K	4	3	2	9	9
256	512K	9	6	5	17	17
512	1M	19	11	10	35	35
1K	2M	37	21	20	37	36



**Note**

The I/O benchmark was run on the Named, EDOS, and DOS file drivers with essentially the same results. The EDOS file driver is slightly slower due to the overhead of DOS system calls.

- On iRMX for Windows with short circuit iRMX-NET configurations, offering any local EDOS file driver devices as public directories when accessing from the DOS side of the system will result in a system hang.

## RTE Calls

These iRMX system calls do not work properly when invoked as real-time extension (RTE) calls from DOS. They do work properly when called from Windows.

- **rq\_sleep** can hang DOS/Windows.
- Using timeouts with mailbox and semaphore operations (**rq\_receive\_message**, **rq\_receive\_data**, and **rq\_receive\_units**) can also hang DOS/Windows.
- Using regions (**rq\_accept\_control** and **rq\_send\_control**) can temporarily raise the DOS task's priority.



## Message Passing Limitations

The PC-compatible Multibus II processor boards SBC 486DX33 and SBC 486DX66 have the following Nucleus Communication System message passing limitations.

Data chains are not supported as message passing buffers.

The DMA hardware expects solicited message buffers to meet address alignment restrictions: the physical address of the buffer must be DWORD aligned (two LSBs of address are 0). Alignment buffers are used to force alignment of misaligned data, one each for input and output. The size of these buffers is configurable, in the ICU adjust the values of DIB and DOB on the MBII screen, or in the *rmx.ini* file set these parameters to at least the size of the largest unaligned solicited message. Attempts to send/receive from/to unaligned buffers larger than the configured alignment buffer size results in an E\_NUC\_BAD\_BUF exception. The iRMX Free Space Manager guarantees that all segments are created with 16-bit aligned physical addresses (four LSBs are 0), so any iRMX segment used as a buffer will work (e.g., buffers in a buffer pool).

## Low-density Diskette Install Produces Incompatible Shutdown Command

Some diskette installations will load a default boot image that is not compatible with the newest version of **shutdown**. This will cause an error when trying to use the **shutdown** command. An alternative to **shutdown** is the command:

```
detachdevice :sd: force
```

Any boot images created after installation will not exhibit this problem upon **shutdown**.

## Delete\_task or Suspend\_task Deadlock Problem

Deletion or suspension of an iRMX task that has a VM86 interrupt running in its context will cause a deadlock.

A deadlock will occur in the following scenario:

1. The current iRMX task (Task A) is interrupted by a DOS hardware interrupt.
2. An iRMX hardware interrupt (which could be the system clock interrupt) occurs before the DOS interrupt handler completes. This situation causes a task switch to iRMX Task B that leaves Task A ready but not running.
3. Task B deletes or suspends Task A.

To avoid this problem, do not use **suspend\_task** except to suspend the calling task. The preferred method of task synchronization is to use mailboxes, ports, regions, and semaphores.

See also: Mailboxes, Ports, Regions, and Semaphores, *System Concepts*



# Configuration Requirements for PC Platforms

# D

Before you install the iRMX for Windows or iRMX for PCs software on the supported Intel OEM platforms, check this appendix for any configuration requirements.

This appendix lists the hardware configurations for each of the supported Intel-manufactured platforms. It also lists the jumpers and interrupt levels for each platform, and the configuration requirements of the various Multibus I terminal communications controllers supported by iRMX for Windows. Switch settings for the optional HOSTESS 550 Terminal Controller board are also listed.

⇒ **Note**

All jumper changes indicated in this appendix assume that the platform or board is jumpered to factory defaults before the indicated change.

These Intel-manufactured platforms are included:

- Intel OEM PC platforms with a PCL2(A) board or an EtherExpress board
- Multibus platforms including
  - SBC 386SX (Multibus I)
  - SBC 386/PC-16 (Multibus II)
  - SBC 486DX33/486DX66 (Multibus II)

See also: The hardware reference manual for your particular board.

# Intel OEM PC Platforms With a PCL2(A) Board

Table D-1 lists the jumpers for the PCL2(A) board.

**Table D-1. Intel PCL2(A) Network Interface Adapter Board**

Network Interface Adapter	Jumper Changes For Networking
PCL2(A) NIA I/O Port 360H Interrupt IRQ2 (iRMX Int 21H)	Install E2-E3 Install E11-E12
EtherExpress	No jumpers

See also: Interrupt management, *System Concepts*

## SBC 386SX Platform

Table D-2 lists the boards that can be used in an SBC 386SX platform.

**Table D-2. SBC 386SX Platform**

CPU Board	iRMX-encoded Interrupt	Jumper Changes For Networking
SBC 386SX	58H 23H	Install E35-E47 Install E39-E51 Remove E105-E106 Insert SBX 351 into SBX socket J7 Insert SBX 586 into SBX socket J8



### Note

If you are using an SBC 386SX with an SBX 586 networking board and you need to reset the system, always use a cold boot (power down and then power up the system) instead of using the <Ctrl-Alt-Del> sequence.

Serial communication board recommendations for the SBC 386SX platform are shown in Table D-3. Six pairs are listed; each pair consists of an interrupt level and jumpers for a controller board and a corresponding interrupt level and jumpers for the SBC 386SX board. In each pair, the Multibus interrupt on the controller board maps to the iRMX interrupt on the SBC 386SX board.

**Table D-3. Controller Boards for SBC 386SX CPU Board**

<b>Controller</b>	<b>Multibus INT iRMX INT</b>	<b>Jumper Changes Jumper Changes</b>
SBC 546/9	Multibus INT3 maps to iRMX INT21H	E24-E27 Install E49-E60 (wirewrap)
SBC 547/8 (#1)	Multibus INT2 maps to iRMX INT22H	E24-E25 Install E50-E59 (wirewrap)
SBC 547/8 (#2)	Multibus INT4 maps to iRMX INT 27H	E23-E24 Install E54-E61 (wirewrap)
SBC 188/48/56 (#1)	Multibus INT3 maps to iRMX INT21H	E9-E344, E335-E336, E339 open Install E49-E60 (wirewrap)
SBC 188/48/56 (#2)	Multibus INT2 maps to iRMX INT22H	E9-E345, E335-E336, E339 open Install E50-E59 (wirewrap)
SBC 188/48/56 (#3)	Multibus INT4 maps to iRMX INT 27H	E9-E343, E335-E336, E339 open Install E54-E61 (wirewrap)

## SBC 486DX33 and 486DX66 Platforms

Table D-4 lists boards that can be used with SBC 486DX33 and 486DX66 platforms.

**Table D-4. SBC 486DX33/486DX66 Platform**

<b>CPU Board</b>	<b>Jumper Changes</b>
SBC 486DX33/486DX66	None
<b>Peripheral Controller and Network Interface Adaptor Board</b>	
SBC 486/133SE Single Board Computer	None
MIX 386/560	None
MIX n86/020(A) with MIX 560	None
SBC 186/530	None
<b>Serial Controller Board</b>	
Up to four SBC 186/410	None
Up to four SBC 186/450	None
MIX n86/020(A) with up to three MIX 450	None

# HOSTESS 550 Terminal Controller

iRMX for Windows supports 4, 8, and 16 channel HOSTESS 550 terminal controller boards. Table D-5 lists the jumper changes for the HOSTESS 550 eight port terminal controller board in order to have an I/O address of 280H and an interrupt level of 58H.

See also: The board documentation for the 4 and 16 channel switch settings

**Table D-5. HOSTESS 550 Terminal Controller**

HOSTESS 550 Terminal Controller	Switch Settings
Switch 1	5, 3, 1 OFF 8, 7, 6, 4, 2, ON
Switch 2	8, 7, 6, 4, 3, 2, 1 OFF 5 ON

# Digiboard Asynchronous Communications Boards

Table D-6 lists supported Digiboard terminal controllers.

See also: The Digiboard manual for your board

**Table D-6. Digiboard Switch Settings**

Digiboard	Switch Settings
DigiBoard Digichannel PC/4 DigiBoard Digichannel PC/8 DigiBoard Digichannel PC/16	<i>Refer to the Digiboard manual with each Digiboard</i>



# Changing Memory Size During the iRMX III OS Installation

# E

## Changing the Memory Size

When you install over a previous iRMX OS release and you use old definition files, the size of the operating system may increase beyond the amount of memory configured for it. If so, you will receive this error message:

```
ERROR 192: NO SPACE FOR SEGMENT - BASE NOT SET
```

This example shows how to increase the memory size for the operating system by 8000H bytes.

### ⇒ Note

The example in this appendix uses a specific definition file, *p90s.bck*. This example is appropriate for systems whose I/O Server board is an SBC P5090 board. If your system has a different processor board, substitute every reference in the definition file with the appropriate `os_name`. The current directory `:home:os_name` is assumed. (See the Generating a Default Operating System step in either Chapter 4 or 5.)

1. Examine the segment map portion of the builder's map file, */msa32/boot/p90s.mp2*. If a segment's base is not set, it will have a string of dashes instead of a physical address. To determine how much space you require, add up the segment lengths. The example uses 8000H.
2. Invoke the ICU:

```
- icu386 p90s.bck <CR>
```

See also: *ICU User's Guide and Quick Reference* for complete instructions on using the ICU and a list of definition files provided with the OS

3. Display the MEMS screen.
4. Add 8000H to the high address.
5. Display the MEMF screen.
6. Add 8000H to the low address.
7. Generate the system.
8. Save the changes made to the definition file and exit the ICU.





# Hardware Modifications for the iRMX III OS Installation

# F

This appendix contains tables of jumper configurations for your hardware so it can run the iRMX III OS (as defined by the ICU definition files). Each table lists all the changes you need to make to a particular processor board.

See also: The hardware reference manual for each board;  
standard definition files, *ICU User's Guide and Quick Reference*

## How To Use This Appendix

To use the information in this appendix, follow these steps:

1. Locate the section that describes your board:
  - a. Processor Boards
  - b. Peripheral Controller Boards
  - c. Communications and I/O Controller Boards
  - d. Network Controller Boards
  - e. Non-Intel Controller Boards
2. Remove the jumpers listed in the Remove Jumper column of the jumpering table.
3. Install the jumpers listed in the Install Jumper column.
4. Make the changes to the switch settings listed in the switch table if your board has switches. The changes to switch settings are listed in a separate table for each board.
5. Install any required components.



### Note

The jumpering changes in this appendix describe the modifications that must be made to the factory-installed jumpers; not the default jumper configuration. Refer to the individual board's hardware reference manual for a list of the factory-installed jumpers.

## Multibus I CPU Boards

This section lists the hardware modifications for these Intel Multibus I CPU boards:

SBC 386/12  
SBC 386/12S  
SBC 386/2x/3x  
SBC 486/12S

### SBC 386/12 CPU Board

No jumpering changes are required to run the iRMX III OS. This board supports a range of memory devices.

See also: The board's hardware reference manual for details on how to select memory types

You must use the standard definition files for the SBC 386/12 board as a starting point for building a custom version of the operating system to run on the SBC 386/12 board. These definition files select only the MSC device driver. They do not support SCSI peripherals.

### SBC 386/12S CPU Board

#### ⇒ Note

This release of the OS requires that you install firmware version V1.6, X127 or later on an SBC 386/12S board. A version of firmware that works with these SBCs is included on the Multibus Firmware diskette. Only install this firmware if it is newer than the firmware currently on your SBC.

When you boot the OS, this message may appear:

```
Break at xxxx:yyyyyyyy  
..
```

If this occurs, enter `g <CR>` to boot the system. To avoid this error message, allow the firmware memory tests to complete after a system reset or power-up.

No jumpering changes are required to run the iRMX III OS. This board supports a range of EPROM devices. Refer to the board's hardware reference manual for details on how to select the EPROM type.

You can use the standard definition files *38612S.bck* and *38612Snet.bck* as a starting point for building a custom version of the operating system to run on the

SBC 386/12S board. These definition files select both the SCSI device driver and the MSC device driver (for ST506 and ESDI peripherals).

## SBC 386/2x/3x CPU Boards

There are minimum changes to the default jumpers required to execute the iRMX III OS. After making the changes, you can run the iRMX III Start-up System for System 320 Microcomputers.

See also: The board's hardware reference manual for details on how to select memory types

This release of the iRMX III OS provides preconfigured EPROM images containing board diagnostics, the SDM monitor, and the iRMX Bootstrap Loader for this board.

You can use the standard definition files for the SBC 386/2x/3x boards as a starting point for building a custom version of the operating system.

**Table F-1 SBC 386/2x/3x CPU Boards**

Function	Remove Jumper	Description
Numeric Coprocessor	E11-E12	Remove this jumper when installing the Intel387™ math coprocessor

## SBC 486/12S CPU Board

⇒ **Note**

This release of the OS requires that you install firmware version V1.6, X127 or later on an SBC 386/12S board. A version of firmware that works with these SBCs is included on the Multibus Firmware diskette. Only install this firmware if it is newer than the firmware currently on your SBC.

When you boot the OS, this message may appear:

```
Break at xxxx:yyyyyyyy
..
```

If this occurs, enter `g<CR>` to boot the system. To avoid this error message, allow the firmware memory tests to complete after a system reset or power-up.

No jumpering changes are required. This board supports a range of EPROM devices. Refer to the board's hardware reference manual for details on how to select the EPROM type.

You can use the standard definition files *48612S.bck* and *48612Snet.bck* as a starting point for building a custom version of the operating system to run on the SBC 486/12S board. These definition files select both the SCSI device driver and the MSC device driver (for ST506 and ESDI peripherals).

You can use the standard definition files *48612.bck*, *48612net.bck*, and *48612rsd.bck* as a starting point for building a custom version of the operating system to run on the SBC 486/12S board. These definition files select only the MSC device driver.

# Multibus II CPU Boards

This section lists the hardware modifications for these Intel Multibus II CPU boards:

- MIX 486?X33 (where ? is either S or D)
- MIX 486DX66
- MIX n86/020A (where n is either 3 or 4)
- SBC 486/133SE
- SBC 486/166SE

## MIX 486?X33, MIX 486DX66, and MIX n86/020A CPU Boards

This section describes the minimum changes to the default jumpers. The jumpering is described in Table F-2.

You can use the standard definition files for the MIX486?x33, MIX 486DX66 and MIX n86/020a boards as a starting point for building a custom version of the OS.

**Table F-2. MIX 486?X33, MIX 486DX66, and MIX n86/020A CPU Boards**

Function	Description	MIX Board	
		486?X33 and 486DX66 (Jumper Block 2)	n86/020A
Bus arbitration mode	Explicit		
	Implicit (default)	J13-14	E2-E3
	Enhanced implicit	J14-16	E1-E2

The OS images generated from *486020a\*.bck* files are not bootable on the MIX 386/020(A) processor boards, since *486020a\*.bck* files include support for the numeric-coprocessor.

In the *386020a\*.bck*, *486020a\*.bck*, and *mix4.bck* files provided, the MPC duty cycle parameters (MCO, MCT, and MDC) in the MBII screen are set assuming the default bus arbitration mode of Implicit Mode. This mode is selected as the default arbitration mode for backward compatibility with the MIX 386/020 board. On the MIX 386/020A, MIX 486/020A, MIX 486SX33, MIX 486DX33, and MIX 486DX66 boards, the Enhance Implicit mode provides greater performance.

To select Enhanced Implicit mode on the MIX 386/020A and MIX 486/020A boards, change jumper E2-E3 to E1-E2, and change the MPC duty cycle parameters for the *386020a\*.bck* and the *486020a\*.bck* files to one of the Enhanced Implicit Mode values from Table F-3 (select one of 40% or 80% local bus bandwidth, depending on your application). For completeness, the Implicit Mode values are also provided.

**Table F-3. Bus Arbitration Mode Selection for the MIX 386/020A, and 486/020A Boards**

<b>Bus Arbitration Mode</b>	<b>DMA Mode</b>	<b>Percent Local Bus Bandwidth</b>	<b>Duty Cycle Parameter</b>
Implicit	One Cycle (MCO)	50	4FH
	Two Cycle (MCT)	50	94H
	Burst (MDC)	50	4BH
Implicit	One Cycle (MCO)	25	55H
	Two Cycle (MCT)	25	94H
	Burst (MDC)	25	50H
Enhanced Implicit	One Cycle (MCO)	85	1CH
	Two Cycle (MCT)	85	8AH
	Burst (MDC)	85	17H
Enhanced Implicit	One Cycle (MCO)	40	4CH
	Two Cycle (MCT)	40	8CH
	Burst (MDC)	40	49H

To select Enhanced Implicit mode on the MIX 486SX33, MIX 486DX33, and the MIX 486DX66 boards, change jumper J13-J14 to J14-J16 on jumper block J2, and change the MPC duty cycle parameters for the *mix4.bck* file to one of the Enhanced Implicit Mode values from Table F-4. For completeness, the Implicit Mode values are also provided.

**Table F-4. Bus Arbitration Mode Selection for the MIX 486SX33, 486DX33, and 486DX66 Boards**

<b>Bus Arbitration Mode</b>	<b>DMA Mode</b>	<b>Percent Local Bus Bandwidth</b>	<b>Duty Cycle Parameter</b>
Implicit	One Cycle (MCO)	50	52H
	Two Cycle (MCT)	50	97H
	Burst (MDC)	50	4AH
Enhanced Implicit	One Cycle (MCO)	85	4AH
	Two Cycle (MCT)	85	8CH
	Burst (MDC)	85	12H

See also: *MIX 386/020A and MIX 486/020A Baseboard User's Guide* for further explanation of these bus arbitration modes and duty cycles.

## SBC 486/166SE and 486/133SE CPU Boards

This section describes the minimum changes to the default jumpers. The jumpering is described in Table F-5.

On some Maxtor SCSI hard drives, scanning does not detect SCSI Logical Units (LUNs) on a SCSI bus. Changing jumpers on the SBC 486/133SE and SBC 486/166SE boards overcomes this by scanning for SCSI LUN 0.

**Table F-5. SBC 486/166SE and SBC 486/133SE CPU Boards**

<b>Function</b>	<b>Install Jumper</b>
Detect SCSI logical units on a SCSI bus	E54-E58

## SBC 386/258(D) Boards

This section describes the minimum changes to the default jumpers. The jumpering is described in Table F-6.

On some Maxtor SCSI hard drives, scanning does not detect SCSI Logical Units (LUNs) on a SCSI bus. Changing jumpers on the SBC 386/258 and SBC 386/258D boards overcomes this by scanning for SCSI LUN 0.

**Table F-6. SBC 386/258(D) Boards**

<b>Function</b>	<b>Install Jumpers</b>
Detect SCSI logical units on a SCSI bus	E20-E21 E28-E29

# Peripheral Controller Boards

This section lists the hardware modifications you must make to these Intel Multibus I and SBX bus peripheral controllers:

<b>Multibus I</b>	<b>SBX Bus</b>
SBC 208	SBX 217C
SBC 214	SBX 218A
SBC 215G	
SBC 220	
SBC 221	

## SBC 208 Flexible Diskette Controller

The SBC 208 board can control either 5.25-inch or 8-inch flexible diskette drives. The drives support either single-sided or double-sided diskettes. In its default configuration, the SBC 208 board controls 8-inch diskette drives.

**Table F-7. SBC 208 Board Jumper Changes**

Function	Remove Jumper	Install Jumper	Description
Interrupt Level Selection		E79-E85	SBC 208 to Multibus INT4
I/O Address Size Decoding	E45-E49	E41-E45	Selects 16 bit address decoding
I/O Controller Address Selection	E48-E52 E61-E69	E44-E48 E53-E61	Selects port address 180H
Multibus Priority Selection			Default selects serial priority
	E77-E78		Selects parallel priority
5.25-inch Drive Selection	E18-E19	E4-E5 E6-E11 E17-E19	Selects 5.25-inch diskette drive
	E21-E22	E17-E22	Change these two jumpers if the 5.25-inch drive you are using is single-sided



# SBC 214 Peripheral Controller

The SBC 214 board controls 5.25-inch ST506 style hard disks, diskette, and tape drives. The board does not support 8-inch devices.

**Table F-8. SBC 214 Board Jumper Changes**

<b>Function</b>	<b>Remove Jumper</b>	<b>Install Jumper</b>	<b>Description</b>
Multibus Priority Selection	no change	no change	Default setting selects parallel priority
	E101-E102	E100-E101 E95-E96	Selects serial priority

# SBC 215G Hard Disk Controller

The SBC 215G board controls 5.25-inch or 8-inch ST506 hard disks. You must modify the default configuration to support any type of ST506 hard disks. The jumpering changes for mounting the SBX 217C Tape Controller module on the SBC 215G board assume that the SBX 218A is also mounted on the SBC 215G board.



**Note**

If this is not how you are configuring your SBC 215G board, you must refer to the hardware reference manual for additional jumpering instructions.

**Table F-9. SBC 215G Board Jumper Changes**

<b>Function</b>	<b>Remove Jumper</b>	<b>Install Jumper</b>	<b>Description</b>
Interrupt Level Selection			The default configuration connects the SBC 215G interrupt to Multibus INT5
I/O Address Size Decoding		W30, 2-19	Selects 16-bit addressing
Multibus Priority Selection	W28, 1-2		Selects parallel priority
	W23, 1-2	W23, 2-3	Selects serial priority
5.25-inch Drive Selection	W1, 1-2	W1, 2-3	Selects 5.25-inch hard disk drives
	W2, 1-2		
	W5, 1-2	W5, 2-3	
	W6, 1-2	W6, 2-3	
	W7, 1-2	W7, 2-3	
	W8, 1-2	W8, 2-3	
		W9, 1-2	
	W13, 2-3	W13, 1-2	
	W14, 1-3	W14, 1-2	
	W15, 1-2		
	W16, 1-3	W16, 1-2	
	W22, 1-3	W22, 1-2	
		W27, 1-2	
	W33, 1-3	W33, 1-2	
W34, 1-2	W37, 1-2		
W35, 1-2	W38, 1-2		

continued

**Table F-9. SBC 215G Board Jumper Changes (continued)**

<b>Function</b>	<b>Remove Jumper</b>	<b>Install Jumper</b>	<b>Description</b>
8-inch Drive Selection	W9, 1-2		Selects 8-inch Priam, model 3450-10, hard disk drives
	W10, 1-2		
	W17, 1-2		
	W22, 1-3	W22, 1-2	
	W26, 1-2		
	W27, 1-2		
	W28, 1-2		
	W33, 1-3	W33, 1-2	
	W34, 1-2	W37, 1-2	
	W35, 1-2	W38, 1-2	
SBX 218A Installation		W24, 1-2	Selects an SBX 218A module installed in SBX1 connector J4
		W4, 1-2	Selects an SBX 218A module installed in SBX1 connector J4
SBX 217C Installation	W3, 1-2		Selects an SBX 217C module installed in SBX2 connector J3
		W24, 1-2	Selects modules installed in both SBX1 and SBX2 connectors
Power connect		W20, 1-2	Connects $\pm 12$ volts from the Multibus to the SBC 215G

## SBC 220 SMD Disk Controller

There are two versions of the SBC 220 board. One is configured by changing switch settings. The other is configured by changing jumpers. Both are described below.

**Table F-10. SBC 220 Board Jumper Changes**

Function	Remove Jumper	Install Jumper	Description
Select port address		E15-E16	Selects port address 120H
Select address decoding		E19-E20 E17-E18	Selects a 16-bit bus and 16-bit address decoding
Set Interrupt Level	W4-C - W4-5	W4-C - W4-2	Connect Multibus Interrupt level 2
<b>Switch Settings for the SBC 220 Board</b>			
<b>Switch Setting</b>		<b>Description</b>	
SW1, 1-7	OFF		Selects Port address 120H
8	ON		
S2, 1-2	ON		Selects a 16-bit bus and 16-bit address decoding
3-4	OFF		Selects Port Address 120H
5	ON		
6-10	OFF		

## SBC 221 Peripheral Controller

The SBC 221 board controls 5.25-inch ST506 and ESDI-type hard disks, flexible diskettes (including high density 1.2 MByte diskettes), and tape devices. It does not support 8-inch devices. No jumper changes are required.

## SBX 217C Cartridge Tape Controller

You can mount the SBX 217C module on the SBC 215G board and use it to control 1/4-inch cartridge tapes. The iRMX III OS does not support use of the SBX 217C module in any other mode.

**Table F-11. SBX 217C Module Jumper Changes**

Function	Remove Jumper	Install Jumper	Description
Configure the SBC 217C	E37-E38 E87-E88 E95-E96	E88-E95 E95-E96	Use a wire-wrap wire to connect these jumper posts.

## SBX 218A Flexible Diskette Controller

The SBX 218A module controls either 5.25-inch or 8-inch flexible disk drives. The board can be mounted on an SBC 215G board. The BIOS device driver for the SBC 215G board controls the SBX 218A module in this configuration. The default jumpering for the SBX 218A module allows it to be mounted in the SBX1 connector (J4) of the SBC 215G board. This configuration controls 5.25-inch drives.

**Table F-12. SBX 218A Module Jumper Changes**

Function	Remove Jumper	Install Jumper	Description
8-inch Drive Selection	E5-E8	E1-E2	Make these changes to the jumpers on the SBX 218A when mounting it on the SBC 215G to control 8-inch drives
	E6-E7	E7-E8	
	E9-E10	E11-E12	
	E11-E14	E13-E14	
	E16-E17	E17-E18	
	E21-E23	E21-E22	
	E24-E25	E25-E26	
	E28-E29	E27-E28	
	E31-E32	E30-E31	
	E43-E44	E42-E43	
	E56-E57	E55-E56	
	E58-E59	E59-E60	
	E61-E62	E62-E63	
	E64-E65		
E68-E69	E69-E70		

# Communications and I/O Controller Boards

This section lists the hardware modifications you must make to these Intel Multibus I, Multibus II, and SBX bus communications and I/O controller boards:

<b>Multibus I</b>	<b>SBX Bus</b>	<b>Multibus II</b>
SBC 534	SBX 350	SBC 186/410
SBC/SXM 544A	SBX 351	
SBC 546	SBX 354	
SBC 547	SBX 279A	
SBC 548		
SBC 549		
SBC 188/48 SBC 188/56		

## SBC 186/410 Serial Communications Controller

This SBC 186/410 Multibus II serial communications controller supports up to six serial I/O interfaces simultaneously. The six serial I/O interfaces are configured as two terminal devices and four interfaces that use the IBM implementation of RS-232C. No jumper changes are required.

## SBC 534 Four Channel Communications Expansion Board

The SBC 534 board controls up to four RS-232C serial channels when the iRMX III OS is configured with the SBC 534 device driver. As shipped, the DIP header sockets on the SBC 534 board do not have a header. You must construct a header, using the instructions below, to connect a terminal to a serial channel on the SBC 534 board using a mass-terminated ribbon cable.

**Table F-13. SBC 534 Board Configuration Information**

<b>Function</b>	<b>Remove Jumper</b>	<b>Install Jumper</b>	<b>Description</b>
Interrupt Level Selection	E132-E140 E131-E140	E130-E137 E131-E138	SBC 534 interrupt to Multibus INT3
I/O Controller Address Selection	E118-E125	E123-E126	Selects port address 30H

To construct a header to insert in the serial port's 18 pin header socket (W1, W2, W3, or W4), you must either solder wires on a solder-style header or insert wires into a pin-and-socket-style header. Connect the header pins as follows:

<b>DIP Header pin</b>	<b>Description/Function</b>
4-5	Board DSR to Board DTR
6-7	Board RTS to Board CTS
8-10	Board RxD to Terminal TxD
9-11	Board TxD to Terminal RxD
12-13	Terminal RTS to Terminal CTS
14-15	Terminal DSR to Terminal DTR

## **SBC/SXM 544A Communications Controller**

The SBC 544A board controls up to four RS-232C serial channels when the iRMX III OS is configured with the SBC 544A device driver. The SXM 544A is a preconfigured version of the SBC 544A.

As shipped, the DIP header sockets on the SBC 544A board do not have a header. You must construct a header, using the instructions that follow Table F-14, to connect a terminal to a serial channel on the SBC 544A board using a mass-terminated ribbon cable.

If you use the SXM 544A kit, no changes are required. If you use the SBC 544A board, you must:

1. Program the SBC 544A PROMs with the file */rmx386/proms/xf544*
2. Install the PROMs
3. Jumper the board
4. Install the headers

**Table F-14. SBC 544A Board Jumper Changes**

<b>Function</b>	<b>Remove Jumper</b>	<b>Install Jumper</b>	<b>Description</b>
Interrupt Level Selection	E80-E83	E80-E85	SBC 544A Multibus INT3
I/O Controller Address Selection	E40-E41 E45-E46	E41-E42  E51-E108 E53-E54 E55-E56 E57-E58 E59-E60 E61-E62 E63-E64 E65-E66 E72-E73	Selects 2732A EPROMs  Selects base address 0E000H for dual-port RAM

To construct a header to insert in the serial port's 18 pin header socket (W1, W2, W3, or W4), you must either solder wires on a solder-style header or insert wires into a pin-and-socket-style header. Connect the header pins as follows:

<b>DIP Header pin</b>	<b>Description / Function</b>
2-3	Board DSR to Board DTR
4-5	Board RTS to Board CTS
6-12	Board RxD to Terminal TxD
7-13	Board TxD to Terminal RxD
14-15	Terminal RTS to Terminal CTS
16-17	Terminal DSR to Terminal DTR

If the terminal being used requires a DSR signal but does not provide a DTR signal for loopback purposes, the DIP header connections should be modified as follows:

<b>DIP Header pin</b>	<b>Description / Function</b>
15-16	Board DSR to Board DTR
3-17	Board DSR to Terminal DTR
4-5	Board RTS to Board CTS
6-12	Board RxD to Terminal TxD
7-13	Board TxD to Terminal RxD
14-15	Terminal RTS to Terminal CTS

## **SBC 546 Terminal Controller Board**

The SBC 546 board is a four-channel serial I/O board that controls up to four terminals. It also has a Centronics-compatible line printer port and a clock calendar on it. The line printer is accessed as if it were a serial channel. After



attaching the channel using the **attachdevice** command, use the iRMX **copy** command to copy a text file to the line printer.

The clock calendar is referred to as a Global Clock in iRMX OS documentation. It is battery-powered and, when jumpered correctly, runs regardless of whether power is applied to the system. When the iRMX III OS is configured to use the Global Clock on the SBC 546 board, the BIOS attaches it and the HI reads it (during initialization) to set the local time-of-day clock.

See also: **attachdevice**, *Command Reference*

**Table F-15. SBC 546 Board Jumper Changes**

Function	Install Jumper	Description
Enable Battery	E30-E31	Enables the battery-backup for the Global Clock

## SBC 547 Terminal Controller Board

The SBC 547 board is an eight channel serial I/O board that controls up to eight terminals. The standard definition files for the SBC 386/2x/3x boards support up to three SBC 547 boards, plus one SBC 546 installed at the same time. No jumper changes are required.

## SBC 548 Terminal Controller Board

The SBC 548 board is an eight channel serial I/O board that controls up to eight terminals. No jumper changes are required.

## SBC 549 Terminal Controller Board

The SBC 549 board is a four-channel serial I/O board that controls up to four terminals. It also has a Centronics-compatible line printer port and a clock calendar on it. The line printer is accessed as if it were a serial channel. After attaching the channel using the **attachdevice** command, use the iRMX III **copy** command to copy a text file to the line printer.

The clock calendar is referred to as a Global Clock in the iRMX III OS documentation. It is battery-powered and, when jumpered correctly, runs regardless of whether power is applied to the system. When the iRMX III OS is configured to use the Global Clock on the SBC 549 board, the BIOS attaches it and the HI reads it (during initialization) to set the local time-of-day clock.

See also: **attachdevice**, **copy**, *Command Reference*

**Table F-16. SBC 549 Board Jumper Changes**

Function	Install Jumper	Description
Enable Battery	E30-E31	Enables the battery-backup for the Global Clock

## SBC 188/48 and SBC 188/56 Communications Boards

The SBC 188/48 and SBC 188/56 communications boards control up to eight RS-232C serial channels when the iRMX III OS is configured with the TCC driver. The SBC 188/48 and 188/56 communications boards are configured for data terminal equipment (DTE) operation. This requires a null-modem cable to connect a terminal to the board. A null-modem cable swaps the receive data and transmit data signals (pins 2 and 3). To use a mass terminated ribbon cable to connect the SBX to a terminal, you must jumper the communication boards for data communications equipment (DCE) operation. If you received your SBC 188/48 or SBC 188/56 board as part of a System 300 Series Microcomputer, the conversion from DTE to DCE is already done. The jumpering instructions for both board configurations are described in Table F-17.

**Table F-17. SBC 188/48 and SBC 188/56 Board Jumper Changes**

<b>Function</b>	<b>Remove Jumper</b>	<b>Install Jumper</b>	<b>Description</b>
Interrupt selection	E251-E252		Disconnects PIC level 0 interrupt source.
	E335-E336		Disconnects PIC level 4 interrupt source.
		E259-E274	Connects SBX1 MINT0 to PIC level 0. Make this change if you are installing an SBX 354 module in SBX1.
		E276-E335	Connects SBX2 MINT0 to PIC level 0.
Channel 0 DCE	E202-E204	E190-E191	Configure Channel 0 for DCE operation.
	E203-E205	E192-E193	
	E206-E208	E194-E195	
	E207-E209	E202-E203	
	E210-E212	E204-E205	
	E211-E213	E206-E207	
	E214-E216	E208-E209	
	E217-E219	E210-E211	
		E212-E213	
		E214-E215	
	E218-E219		
Channel 1 DCE	E172-E174	E161-E162	Configure Channel 1 for DCE operation.
	E173-E175	E166-E167	
	E176-E178	E170-E171	
	E177-E179	E172-E173	
	E180-E182	E174-E175	
	E181-E183	E176-E177	
	E184-E186	E178-E179	
	E187-E189	E180-E181	
		E182-E183	
		E184-E185	
	E188-E189		

continued

**Table F-17. SBC 188/48 and SBC 188/56 Board Jumper Changes (continued)**

<b>Function</b>	<b>Remove Jumper</b>	<b>Install Jumper</b>	<b>Description</b>
Channel 2 DCE	E140-E142	E111-E112	Configure Channel 2 for DCE operation.
	E141-E143	E113-E114	
	E144-E146	E140-E141	
	E145-E147	E142-E143	
	E148-E150	E144-E145	
	E149-E151	E146-E147	
	E152-E154	E148-E149	
	E155-E157	E150-E151	
Channel 3 DCE	E119-E121	E115-E116	Configure Channel 3 for DCE operation.
	E120-E122	E117-E118	
	E123-E125	E119-E120	
	E124-E126	E121-E122	
	E127-E129	E123-E124	
	E128-E130	E125-E126	
	E131-E133	E127-E128	
	E134-E136	E129-E130	
Channel 4 DCE	E88-E90	E61-E62	Configure Channel 4 for DCE operation.
	E89-E91	E63-E64	
	E92-E94	E88-E89	
	E93-E95	E90-E91	
	E96-E98	E92-E93	
	E97-E99	E94-E95	
	E100-E102	E96-E97	
	E103-E105	E98-E99	
	E100-E101		
	E104-E105		

continued

**Table F-17. SBC 188/48 and SBC 188/56 Board Jumper Changes (continued)**

<b>Function</b>	<b>Remove Jumper</b>	<b>Install Jumper</b>	<b>Description</b>
Channel 5 DCE	E67-E69	E59-E60	Configure Channel 5 for DCE operation.
	E68-E70	E65-E66	
	E71-E73	E67-E68	
	E72-E74	E69-E70	
	E75-E77	E71-E72	
	E76-E78	E73-E74	
	E79-E81	E75-E76	
	E82-E84	E77-E78	
		E79-E80 E83-E84	
Channel 6 DCE	E38-E40	E1-E2	
	E39-E41	E3-E4	
	E42-E44	E38-E39	
	E43-E45	E40-E41	
	E46-E48	E42-E43	
	E47-E49	E44-E45	
	E50-E52	E46-E47	
	E53-E55	E48-E49	
		E50-E51 E54-E55	
Channel 7 DCE	E17-E19	E5-E6	Configure Channel 7 for DCE operation.
	E18-E20	E7-E8	
	E21-E23	E17-E18	
	E22-E24	E19-E20	
	E25-E27	E21-E22	
	E26-E28	E23-E24	
	E29-E31	E25-E26	
	E32-E34	E27-E28	
		E29-E30 E33-E34	

# SBX 351 Serial I/O Module

The SBX 351 module controls one RS-232C serial channel when the iRMX III OS includes the 8251A device driver. As shipped, the SBX 351 module is configured for DTE operation. This requires a null-modem cable to connect a terminal to the module. A null-modem cable swaps the receive data and transmit data signals (pins 2 and 3). To use a mass-terminated ribbon cable to connect the module to a terminal, you must jumper the module for DCE operation.

To mount the SBX 351 module on a processor board, you must:

- Jumper the processor board to route the interrupt signal from the SBX connector MINTR0 pin (receive interrupt) to the appropriate interrupt of the PIC.
- Jumper the processor board to route the interrupt signal from the SBX connector MINTR1 pin (transmitter interrupt) to the appropriate interrupt of the PIC.

**Table F-18. SBX 351 Module Jumper Changes**

Function	Install Jumper	Description
Interrupt Level Selection	E33-E34	Connects 8251A RXRDY to MINTR0
	E35-E36	Connects 8251A TXRDY to MINTR1

To construct a header to insert in the serial port's 18 pin header socket, U6, you must either solder wires on a solder-style header or insert wires into a pin-and-socket style header. Connect the header pins as follows:

DIP Header pin	Description/Function
3-13	Board RxD to Terminal TxD
4-14	Board TxD to Terminal RxD
5-6	Board RTS to Board CTS
7-8	Board DSR to Board DTR
9-10	Terminal DSR to Terminal DTR
11-12	Terminal RTS to Terminal CTS

# SBX 354 Serial I/O Module

The SBX 354 module controls two RS-232C serial channels when the iRMX III OS includes the 82530 device driver. As shipped, the SBX 354 module is configured for DTE operation. This requires a null-modem cable to connect a terminal to the module. A null-modem cable swaps the receive data and transmit data signals (pins 2 and 3). To use a mass-terminated ribbon cable to connect the module to a terminal, you must jumper the module for DCE operation.

To mount the SBX 354 module on a processor board, you must jumper the processor board to route the interrupt signal from the SBX connector MINTR0 pin (receive interrupt) to the appropriate interrupt of the PIC.

**Table F-19. SBX 354 Module Jumper Changes**

Function	Remove Jumper	Install Jumper	Description
Channel A:		E13-E14	Connects DSR to +5 volts
		E9-E10	Selects DCE configuration
		E19-E20	
	E27-E29	E27-E28	
	E28-E30	E29-E30	
	E31-E33	E31-E32	
	E32-E34	E33-E34	
	E35-E37	E35-E36	
	E36-E38	E37-E38	
	E40-E42	E39-E40	
E41-E43	E43-E44		
Channel B:		E15-E16	Connects DSR to +5 volts
		E11-E12	Selects DCE configuration
		E17-E18	
	E45-E47	E45-E46	
	E46-E48	E47-E48	
	E49-E51	E49-E50	
	E50-E52	E51-E52	
	E53-E55	E53-E54	
	E54-E56	E55-E56	
	E58-E60	E57-E58	
E59-E61	E61-E62		

## SBX 279A Graphics Module

The SBX 279A module controls a color graphics monitor, serial mouse, and an IBM PC/AT-compatible keyboard. To mount the module on a processor board, you must jumper the processor board to route the interrupt signal from the SBX connector MINTR0 pin to the appropriate input of the PIC. The PIC level is ICU-configurable. The submit file `/rmx386/rgi/add279.csd` assists you in configuring the device driver. The device driver is compatible with both the SBX 279 and SBX 279A boards. No changes are required to the standard jumpering. Refer to the module's hardware reference manual for more information.

## SBX 350 Parallel I/O Module

The SBX 350 module controls a Centronics interface line printer. To mount the SBX 350 module on a processor board, jumper the processor board to route the interrupt signal from the SBX connector MINTR0 pin to the appropriate PIC input for the SBX 350 line printer driver.

**Table F-20. SBX 350 Module Jumper Changes**

Function	Remove Jumper	Install Jumper	Description
INTA	E13-E14	E13-E18	Connect INTA (PC3) toMINTR0
PC7	E25-E26		
<b>SBX 350 IC Sockets</b>			
Socket Number	IC Type	Description	
U3	SBC 902	1K Pullup Terminator Pack	
U4	7438	Open Collector Line Driver	
U5	SBC 902	1K Pullup Terminator Pack	
U6	SBC 902	1K Pullup Terminator Pack	

If you use the parallel port for the line printer, configure the printer interface connector to the Centronics interface standard as shown in Table F-21. You can use any line printer that recognizes the Centronics signal/pin standard.



**Table F-21. Line Printer Pin Assignments**

<b>50-Pin Cable Connector<sup>1</sup></b>	<b>50-Pin SBX Edge Connector<sup>2</sup></b>	<b>30-Pin Connector<sup>3</sup></b>	<b>Centronics-Standard Signal</b>
24	23	1	Character strobe to printer
26	25	13	SLCT (Select)
28	27	12	Paper Out
30	29	10	Acknowledge from printer
34	33	9	Data Bit 7
36	35	8	Data Bit 6
38	37	7	Data Bit 5
40	39	6	Data Bit 4
42	41	5	Data Bit 3
44	43	4	Data Bit 2
46	45	3	Data Bit 1
48	47	2	Data Bit 0

<sup>1</sup> All odd-numbered pin numbers are connected to ground.

<sup>2</sup> All even-numbered pins are connected to ground.

<sup>3</sup> On the Centronics LP connector pin 16 is signal ground and pin 17 is chassis ground.

## Networking Controller Boards

This section describes how to jumper these Intel network controller boards:

- SBX 586 network controller
- SXM 552A Ethernet communication engine

### SBX 586 Network Controller

The SBX 586 module provides access to a LAN. No jumpering is required on the module. The iRMX III OS supports the SBX 586 mounted on the SBC 386/12, 386/12S, and 486/12S boards. This configuration is a COMMputer configuration.

See also: `i*.job`, *System Configuration and Administration*

The hardware configuration of the processor board required to use the SBX 586 module is:

- The SBX 586 module must be mounted on the SBX1 (80H) connector.
- The MINTR0 from the SBX 586 is connected to interrupt level 3 of the slave PIC connected to interrupt level 7 of the master PIC (encoded level 73H).
- Timer 2 of the on-board 8254 timer at port address D0H is connected to interrupt level 4 of the slave PIC connected to interrupt level 7 of the master PIC (encoded level 74H).
- 16-bit width of SBX Bus I/O.

See also: The hardware reference manual for your processor board for the specific jumper numbers

## SXM 552A Ethernet Communication Engine

The SXM 552A Ethernet communication engine is a front-end processor for all Multibus systems. The intelligent controller is driven by the 82586 LAN coprocessor and supports an IEEE 802.3 network. The LAN controller executes iNA 960 software, which is in a COMMengine environment.

When you specify a COMMengine configuration, the OS uses these parameters:

- The Multibus interrupt line INT4 is used by the SXM 552A Ethernet communication engine.
- Interrupt level 48H (master level 4) of the 8259A programmable interrupt controller (PIC), on the processor board, is connected to Multibus INT4.
- Port address 8B4H is used for the SXM 552A Ethernet communication engine wakeup port.
- Memory addresses 1040H and 1088H are used for the start of the SXM 552A data queues.
- Multibus parallel priority bus resolution is used.

The IEEE 802.3 transceivers power up and power down without causing noise on the coaxial cable; therefore, the transceiver may be connected to or disconnected from a LAN communications controller board at any time.

See also: The appropriate hardware installation manual for specific directions on removal and replacement of boards in the system;  
i\*.job, *System Configuration and Administration*

# Modifications to Non-Intel Controller Boards

These sections contain tables that you need to jumper some non-Intel controller boards. The jumpering changes cover only the changes that must be made to the factory-installed jumpers. If your board has been used in another application, refer to the controller board's installation guide and jumper your board as it was originally jumpered. Then proceed with the modifications described in the tables.

The controller boards are:

- Adaptec 1542A Intelligent Host Adapter (SCSI)
- Comptrol Hostess 550 Serial Controller
- NCR ADP-20

## Adaptec 1542A Intelligent Host Adapter (SCSI)

The Adaptec 1542A Intelligent Host Adapter (SCSI) can be used on PC bus platforms with the iRMX III OS to control SCSI flexible diskette drives, tape drives, or hard disk drives. The jumper configurations in Table F-22 make this controller compatible with the SCSI devices in these ICU definition files:

Board	Definition File
Adaptec 1542A	pc.bck pcnet.bck pccprsd.bck pccp.bck

**Table F-22. Adaptec 1542A Jumper Connections**

J-1,8	J-1,11	J-6,1	J-7,1
J-11,1	J-14,2	J-15,2	J-16,3

SCSI ID	Used for
0, 1	floppies
2, 3, 4, 5	hard disks
6	tape devices

## Comptrol Hostess 550 Serial Controller

The iRMX III OS supports 4, 8, and 16 channel HOSTESS 550 terminal controller boards. The Comptrol Hostess 550 Serial Controller is an 8 channel serial communications board. To be compatible with the default ICU definition files for PC Bus systems (base I/O address of 280H and an interrupt level of 5 (58H)), change the switch settings on the Comptrol Hostess 550 board.

See also: The board documentation for the 4 and 16 channel switch settings

**Table F-23. HOSTESS 550 Terminal Controller**

<b>HOSTESS 550 Terminal Controller</b>	<b>Switch Settings</b>
Switch 1	5, 3, 1 OFF 8, 7, 6, 4, 2, ON
Switch 2	8, 7, 6, 4, 3, 2, 1 OFF 5 ON

## NCR ADP-20 Flexible Disk Controller

The NCR ADP-20 is a high-performance, general-purpose flexible disk drive controller for 3.5-inch or 5.25-inch drives. The controller provides a high-level interface between the SCSI bus and the SA-400 drive interface. The switch settings on the NCR ADP-20 flexible disk controller need to be changed to the settings in Table F-24. On a high-density TEAC drive, ensure the RY, I, and U1 jumpers are installed.

**Table F-24. NCR ADP-20 Flexible Diskette Switch Settings**

<b>Switch Setting</b>		<b>Switch Setting</b>
8 Position Switch	1-2 OFF	Selects 1 drive present
	3-4 OFF	Power-up diagnostic options
	5 OFF	Selects SCSI ID 0
	6-8 OFF	Ignore SCSI parity
4 Position Switch	1-3 ON	Not user selective
	4 OFF	Must be off

# DigiBoard DigiCHANNEL PC/4, PC/8, and PC/16 Controllers

The DigiBoard PC/4, PC/8, and PC/16 boards are 4-channel, 8-channel, and 16-channel, respectively, serial communications boards. Each PC/X board contains jumpers and/or switches that set the I/O addresses of the board's status register and each asynchronous communication element (ACE). An ACE is one serial channel; if it is a PC/4 board, there will be four serial channels (ACE chips) on it.

See also: *pcxdrv.job, System Configuration and Administration*

In every case except the second PC/16 board, the hardware board number must be set to 0. If you have a second PC/16 board, use the jumpers to set its hardware board number to 1.

**Table F-25. PC/4 I/O Addresses**

Board	Status Port	Port 0	Port 1	Port 2	Port 3
0	188	130	138	140	148
1	288	150	158	160	168
2	208	1B0	1B8	1C0	1C8
3	308	1D0	1D8	1E0	1E8

**Table F-26. PC/8 I/O Addresses**

Board	Status Port	Ports							
		0	1	2	3	4	5	6	7
0	188	130	138	140	148	150	158	160	168
1	288	1B0	1B8	1C0	1C8	1D0	1D8	1E0	1E8
2	208	230	238	240	248	250	258	260	268
3	308	2B0	2B8	2C0	2C8	2D0	2D8	2E0	2E8



**Note**

The PC/16 board uses PAL chips to set addresses instead of address switches. When ordering the PC/16 board, specify a board number of 0 or 1 and if you want the PICK OS PAL chips. These are available from Digiboard. Consult your PC/16 hardware reference manual for more information.





Since the iRMX OS installation procedures cover different situations such as installing the operating system on a newly formatted disk or installing over a previous release, it is possible that you will receive error messages during installation. The error messages might appear in a log file or at the console terminal. This type of error message is generally a non-fatal message.

There are mistakes you might make in the installation that generate a fatal error message, such as attempting to install software while not logged on as Super. This type of error requires that you correct the situation and restart the installation.

## Non-Fatal Error Messages

Many error messages are for information only, and do not reflect an installation failure. Such messages can be ignored. Some typical error messages and their causes are:

`file_name, file does not exist`

This error may appear multiple times in the log file.

`0021: E$FILE_NOT_EXIST, during submit execution`

This error may be displayed on the screen when the **submit** file terminates.

The error messages above can occur because the current installation uses the convention of naming a previous version to `..._old`. The errors listed above are generated if a file to be renamed is not found, because it was not originally installed.

`directory, file already exists`

This error message can occur when installation software attempts to create a directory that already exists.

`file does not exist no files found`

This error message can occur when installation software attempts to assign access rights to a file that does not exist.

# Fatal Error Messages

Some error messages state that the error is fatal, which means you cannot proceed with the operation you are doing. You can easily correct some fatal errors.

## Handling Fatal Error Messages from the Tinstall Command

1. If you receive a fatal error message after issuing a **tinstall** command, stop the **submit** file by pressing;

```
<Ctrl-C>
```

If an error occurs, an error message is displayed, but the **submit** file does not stop. It continues executing the series of commands. The <Ctrl-C> stops the **submit** file so you can investigate the problem. It may be several minutes before you see a prompt on the screen, because the tape completely rewinds before the prompt appears.

2. Detach the tape drive by entering:

```
dd :in_tape: <CR>
```

3. Correct the fault. The most likely problem is that you are not logged on as the system manager, Super. If this is the case, enter:

```
Login: super <CR>
```

```
Password: passme <CR>
```

4. Enter the **tinstall** command again.



## Handling Fatal Error Messages from the Install Command

1. If you receive a fatal error message after issuing an **install** command, stop the execution of the **submit** file by pressing;

```
<Ctrl-C>
```

If an error occurs, an error message is displayed, but the **submit** file does not stop. It continues executing the series of commands. The <Ctrl-C> stops the **submit** file so you can investigate the problem.

2. Detach the diskette drive by entering:

```
dd :f: <CR>
```

3. Correct the fault.

If the error was caused by inserting the diskette incorrectly, re-insert the diskette.

If you are not logged on as the system manager (Super), enter:

```
Login: super <CR>
```

```
Password: passme <CR>
```

4. Enter the **install** command again.





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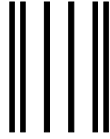
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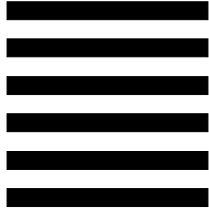
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