



**iRMX™ 86 DEVICE DRIVER
CHANGE PACKAGE: UPDATE 3**

**iRMX™
86
OPERATING
SYSTEM**

**iRMX™ DEVICE DRIVER
CHANGE PACKAGE: UPDATE 3**

Order Number: 147721-001

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REV.	REVISION HISTORY	DATE
-001	Contains information on new device drivers for Update 3. Also includes device driver (iSBC 188/48) released in Update 2.	3/85

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iRMX™ 86 DEVICE DRIVER CHANGE PACKAGE: UPDATE 3
147721-001
=====

Purpose

The change pages in this package update the iRMX™ 86 documentation to support the inclusion of the following new device drivers:

- the iSBC® 226 SMD Device Driver
- the iSBX® 217 Tape Controller

Scope

The following manuals are affected by this change package:

iRMX™ 86 Installation and Configuration Guide (146197-001)

iRMX™ 86 Update Change Package Description

The iRMX™ 86 DEVICE DRIVER CHANGE PACKAGE: UPDATE 3 consists of a series of pages that must either be added to the current iRMX™ 86 Release 6.0 documentation or that must replace an existing page the documentation. The device drivers described in these change pages are distributed through the quarterly iRMX™ 86 Release 6 Update Package. In addition to the change pages issued for the device drivers in the current update, each device driver change package also contains an accumulation of the change pages for the device drivers in all previous updates.

The change pages in this package are organized into sections according to the update in which they were issued. All change pages for the device drivers in Update 3 are in a section at the front of the package. Change pages for device drivers in previous updates are in the succeeding sections.

Each update section begins with a blue cover and is subdivided into four segments, one for each of the iRMX™ 86 Release 6.0 volumes. Each of these volume segments is identified by a yellow, pink, green, or orange cover sheet. Within each volume segment the change pages are organized in the sequence in which they occur in the volume.

Installation Instructions

Change pages supporting device drivers in the Update Package are accumulated from quarter to quarter. The change pages for each successive update are separated in this package by a blue cover page (similar to the sheet you are now reading). Within each Update section, yellow, pink, green, and orange cover sheets segregate the change pages according to volume.

The change pages in this package are installed as follows:

- If the bottom left-hand corner of the change page contains the word "REPLACE", then remove the corresponding page from your documentation and replace it with the change page.
- If the bottom left-hand corner of the change page contains the word "INSERT", then insert the page in the appropriate location. INSERT pages are numbered as a fractional part of the preceding page number. Thus, for example an INSERT page numbered "10-1.1" would be inserted between page 10-1 and page 10-2 in the documentation.

If this is the first iRMX™ 86 Release 6.0 Update to be installed in your documentation:

1. Install all of the change pages in the package. Begin with the change pages issued for Update 2. (The Update 2 change pages are located in the bottom half of the package, behind the second blue cover sheet.) After installing the Update 2 change package, install the change pages for Update 3. (The Update 3 change pages are located immediately behind the sheet you are now reading.) You must install the Update 2 change package before installing the Update 3 change package. If you were to install Update 2 last, you would risk replacing a current (Update 3) version of a page with an Update 2 version of the same page.
2. Fill out the Reader Comment Card--located at the bottom of the package--and mail it to Intel Corporation.

If you have installed previous iRMX™ 86 Release 6.0 Updates in your documentation:

1. Install only the change pages for Update 3. These change pages are in the first section at the top of the package.
2. Discard the remainder of the change pages in the change package. (These pages should already be in your documentaion if you installed the previous update.)
3. Fill out the Reader Comment Card--located at the bottom of the package--and mail it to Intel Corporation.

iRMX™ 86 Release 6.0 Change Package: Update 3

Change Pages for:

iRMX™ 86 Installation and Configuration Guide (146197-001)

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APPENDIX E INSTALLING AND CONFIGURING THE iSBC[®] 226 SMD DEVICE DRIVER

This appendix documents the installation and configuration of Intel's iSBC 226 Storage Module Device (SMD) Disk Controller Board into an iRMX 86 Operating System environment. It documents the hardware changes that should be made to the controller board. A detailed explanation of the procedures which must be followed to integrate the device driver software into the operating system is also given. These instructions may be altered to fit any unique application system.

A basic understanding of Device-Unit Information Blocks (DUIBs), Unit Information Tables, and Device Information Tables is required to use this appendix.

HARDWARE OVERVIEW

The iSBC 226 Storage Module Device (SMD) Disk Controller Board is a high performance disk controller for Standard SMD Interface compatible storage devices. The iSBC 226 SMD controller board resides on one, single-height MULTIBUS printed circuit board. The iSBC 226 SMD controller board can access up to 16M bytes of memory and can control one or two SMD disk drives at data transfer rates of up to 2.0M bytes/second (device dependent).

SOFTWARE OVERVIEW

The iRMX 86 device driver for the iSBC 226 SMD controller does the following:

- Supports Storage Module Device disks.
- Supports the READ, WRITE, SEEK, SPECIAL, ATTACH\$DEVICE, and DETACH\$DEVICE functions.
- Supports FORMAT TRACK and GET DEVICE CHARACTERISTICS subfunctions of the SPECIAL function.
- Accepts the OPEN and CLOSE functions but performs no operations for them.

iSBC® 226 SMD DEVICE DRIVER

The iSBC 226 device driver appears to the iRMX 86 Operating System as a user-written device driver that functions with the operating system's random access support code. (Refer to the GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS for more information on device drivers.)

A special screen, called the USER DEVICES screen, in the Interactive Configuration Utility (ICU), must be called up and used to provide the device driver with pathnames for the files that define the configuration parameters and object code.

Intel has supplied files that contain examples of Device-Unit Information Blocks (DUiB's), Device Information Tables, and Unit Information Tables. The iRMX 86 Update package from Intel includes a diskette containing the object code for the device driver and the example files described above.

HARDWARE AND SOFTWARE PARTS LIST

The hardware and software shown in Table E-1 is required to integrate the iSBC 226 SMD controller board into an iRMX 86 Operating System environment.

Table E-1. Parts List

Hardware	Software
iSBC 226 Storage Module Device (SMD) Disk Controller Board	Update 3 Device Driver Diskette
SMD Disk Drive	226DB.A86 226IT.A86 226DD.LIB

The hardware is not included as part of the iRMX 86 update service.

HARDWARE CONFIGURATION OF THE iSBC® 226 SMD CONTROLLER BOARD

Use of the iSBC 226 SMD controller board with the Intel-supplied device driver requires no jumper changes to the board.

Although the original jumper configuration, supplied by Intel, should work with the device driver, you should check for the proper default jumper configuration. Consult the iSBC 226 STORAGE MODULE DEVICE (SMD) DISK CONTROLLER BOARD HARDWARE REFERENCE MANUAL for the list of factory default jumpers.

OVERVIEW OF INTEGRATION AND INSTALLATION STEPS

Normally, all device drivers supported by Intel can be configured into an application system using the Interactive Configuration Utility (ICU). To integrate the device driver, you invoke the ICU which creates tables that you use to define the driver. For example, if you want to integrate a device driver for an iSBC 208 floppy disk controller into an application system, the ICU displays several screens of tables that you change to install the device driver. When you use the "g" (generate) command the ICU generates the file IDEVCF.A86 which defines all the drivers.

With the software for the iSBC 226 SMD controller board, a different method is used: Intel provides files that define the new driver to your system and you must tell the Interactive Configuration Utility that the device driver is a "user device". The USER DEVICES screen prompts you to give the names of the files that hold the configuration information and the object code needed to control the device. These files are supplied by Intel on the iRMX 86 Update diskette.

INSTALLATION STEPS

The integration of the iSBC 226 SMD device driver software into your iRMX 86 application system is relatively straightforward. Table E-2 is an outline of the steps that you should follow to integrate the device driver into your system. Following Table E-2 is a detailed explanation of each of the steps in the outline.

Table E-2. Steps to Integrate Device Driver Software

Step	Action
1	<p><u>Copy Update 3 Files to the Development System</u></p> <p>Copy the files that reside on the Update diskette onto the development system. The names of these files are 226DB.A86, 226IT.A86, and 226DD.LIB. These files contain configuration information and the object code for the device driver.</p>
2	<p><u>Determine Available Device and Device-Unit Numbers</u></p> <p>To properly install the iSBC 226 device driver, you must determine what device and device-unit numbers are available for the device driver. You determine what numbers are available by inspecting the file IDEVCF.A86 generated by the Interactive Configuration Utility (ICU) for your original application system.</p>
3	<p><u>Use the Resident Editor to Alter Configuration Files</u></p> <p>The Update files 226DB.A86 and 226IT.A86 that Intel has supplied contain configuration information for the iSBC 226 SMD controller board. You must change the 226DB.A86 file, which contains the source code for the device-unit Information Blocks (DUIB's), to give the device driver the correct device and device-unit numbers. The 226IT.A86 file contains the source code for the Device Info Table and the Unit Info Table. You should change both the 226DB.A86 and the 226IT.A86 files to reflect your specific drive installation.</p>
4	<p><u>Invoke the Interactive Configuration Utility (ICU)</u></p> <p>After you change the configuration files, which you copied from the Update diskette, invoke the Interactive Configuration Utility (ICU) to begin the process of integrating the software into the application system.</p>

-----continued-----

Table E-2. Steps to Integrate Device Driver Software (continued)

Step	Action
5	<p><u>Change the Appropriate Configuration Parameters</u></p> <p>Once you have invoked the Interactive Configuration Utility, enter any configuration parameters that relate to the new hardware. In particular, you must enter parameters into the USER DEVICE screen.</p>
6	<p><u>Regenerate the Operating System</u></p> <p>Once you have made all the necessary changes to the ICU definition file, generate the new version of the Operating System.</p>

STEPS TO INTEGRATE THE iSBC® 226 DEVICE DRIVER INTO YOUR OPERATING SYSTEM

This section explains in detail the steps that you must take to incorporate the iRMX 86 device driver for the iSBC 226 Storage Module Device (SMD) Disk Controller Board into your application system.

STEP 1: Copy Update Files to Development System

1. Unpack the Update diskettes.
 2. DIR the diskettes to verify contents.
 3. Copy 266DB.A86 and 266IT.A86, and 226DD.LIB to your system.
-
-

The files that you need to configure the iSBC 226 SMD device driver are on the Update diskette for the device driver. Open the Update package and find the diskette with the correct name for your system.

The contents of the diskette are listed in Table E-3.

Table E-3. File Names and Contents

File Name	File Contents
226DB.A86 226IT.A86 226DD.LIB	DUIB source code Device and Unit Info. Tables Object code of device driver

These files contain configuration information tables and the object code for the device driver. To confirm that these files are on the diskette, perform a DIR command.

Once you have confirmed that the files exist on the correct diskette, copy them over to another diskette for a backup copy or copy them to a directory that contains all of your device driver related information (if you have one).

STEP 2: Determine the Available Device and Device-Unit Numbers

1. Invoke the ICU and generate the original application system. (This step is not necessary if you have previously generated a system.)
 2. Open the file IDEVCF.A86.
 3. Locate the line containing the macro %DEVICE_TABLES.
 4. Determine the next available device number and device-unit number from DEVICE_TABLES.
-
-

To properly install the iSBC 226 device driver into your system, you must determine the next device and device-unit numbers the operating system has available. If you do not determine this, you might give the iSBC 226 device driver controller a device number already assigned to another device.

To determine the next available device number and device-unit number, you invoke the Interactive Configuration Utility (ICU) using the definition file of the system that you want to contain the iSBC 226 device driver. Next, generate the system by using the "g" command. (This step is not necessary if you have previously generated a system.) When the ICU finishes generating the system, use the resident text editor to examine the file IDEVCF.A86.

In the file IDEVCF.A86 locate the line containing the macro %DEVICE_TABLES. This macro contains the next available device and device-unit numbers. The second parameter within the macro is the next available device-unit number and the third parameter within the macro is the next available device number. Record the value of these parameters.

For more information on binding a device driver to the I/O system, consult the GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS.

STEP 3: Use the Resident Editor to Alter Configuration Files

1. Invoke the Resident Editor.
 2. Inspect the configuration files 226DB.A86 and 226IT.A86.
 3. Edit 226DB.A86 and 226IT.A86 to include the necessary changes.
 4. Save the edited files.
-
-

Change the configuration parameters for the iSBC 226 SMD device driver by altering the files 226DB.A86 and 226IT.A86. The Interactive Configuration Utility (ICU) uses these files to configure the device driver for iSBC 226 controller board. (You input the pathname of these files into the USER DEVICES screen of the ICU to perform this function.)

Before you change the files 226DB.A86 or 226IT.A86, consult the GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS for the definition of the data structures within the files. The data structure in the file 226DB.A86 is a Device Unit Information Block (DUIB) and its structure is defined in the GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS. The data structures in the file 226IT.A86 are a Device Information Table and a Unit Information Table. The meaning and structure of these tables are shown in the GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS.

To help you integrate the iSBC 226 SMD controller board into your application system, Intel supplies example values with the Device Unit Information Block (DUIB), Device Information Table, and the Unit Information Table. You will only need to change a few of these example values to get the controller board functioning.

The first file that you can edit is the file 226DB.A86. This file contains Device Unit Information Blocks for various types of SMD devices. The type of SMD device is listed in the second line. (However, only one DUIB is shown in Figure E-1.) When the editor opens this file, you will see the display shown in Figure E-1. Again, the GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS for the exact definition of the data structure. The values shown after the ampersand sign ("&") are Intel-supplied default or example values to help you configure and run the board.

The five parameters most likely to change in this file are the device number, the device-unit number, unit number, low device size, and high device size. The device and device unit numbers should equal the values obtained in the previous step. If the values in the file 226DB.A86 for the device and device-unit numbers do not match those found in the previous step, then change the file 226DB.A86 to using the values you found in IDEVCF.A86.

STEP 3: Use the Resident Editor to Alter Configuration Files (Cont'd)

```

DEFINE_DUIB
& 'hsmd0',           ;name DEVICE iSBC 226/CDS 571, 590MB
& 00009H,           ;file drivers
& 0FFH,             ;functions
& 00000H,           ;flags
& 0400H,            ;dev gran
& 01000H,           ;low dev size (512.6MB)
& 01E8EH,           ;high dev size
& 00006H,           ;device number
& 00000H,           ;unit number
& 0000DH,           ;device-unit number
& INITIO,
& FINISHIO,
& QUEUEIO,
& CANCELIO,
& DINFO_226,        ;device info pointer
& UINFO_226cds,     ;unit info pointer
& 00064H,           ;update timeout
& 00004H,           ;number of buffers
& 130H,             ;priority
& TRUE,             ;fixed update
& 000FFH,           ;maximum buffers
& 0                 ;reserved
& >

```

Figure E-1. Contents of the File 226DB.A86

To understand the meaning and values assigned to each line of the Device-Unit Information Block (DUIB) shown above, do the following:

- Consult the GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS for more information on the structure of a Device Unit Information Table (DUIB).
- Consult the manuals for the SMD hardware that you are going to integrate into your application system and the hardware manual for the iSBC 226 Storage Module Device disk controller.

STEP 3: Use the Resident Editor to Alter Configuration Files (Cont'd)

When you examine file 226IT.A86, you will see what is shown in Figure E-2 of this document. (Only one device information table and unit information table is shown in Figure E-2.) To understand the meaning and values assigned to each line of the file, do the following:

- Consult the GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS for more information on the structure of Device Information and Unit Information Tables.
- Consult the manuals for the SMD hardware that you will be integrating into your application system, and the hardware manual for the iSBC 226 Storage Module Device disk controller.

The file 226IT.A86 contains some parameters that are not defined in the GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS. (For example, at the end of the DINFO_226 data structure is the line "&DW 00100H ...;controller base port".) These extra lines give the Operating System more configuration information. Change the values shown in the file to conform to your specific drive installation. Consult the manuals on your SMD device for information on what changes may be appropriate. Each line that is not defined in the GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS is explained below.

controller base port	Defines the base port address of the controller. This should match the switch settings on the iSBC 226 SMD controller.
cylinders	The total number of cylinders on the disk drive, including the diagnostic cylinder (highest cylinder) and the bad sector information (highest cylinder -1) if they exist. A value of 01H (indicating a generic SMD disk drive) causes the device driver to read the device characteristics from the volume label.
heads	Defines the number of data heads for either fixed or removable media.
sectors	The number of data sectors per track (maximum sectors per track - alternate sectors.)

STEP 3: Use the Resident Editor to Alter Configuration Files (Cont'd)

```

EXTRN I226INIT:NEAR
EXTRN I226START:NEAR
EXTRN I226INTERRUPT:NEAR

DINFO_226 RADEV_DEV_INFO <
& 058H,          ;level (INT 5)
& 082H,          ;priority
& 512,           ;stack size
& 1122,         ;data$size
& 004H,         ;num$units (FIXED=2, REMOVABLE=2)
& I226INIT,     ;device$init
& DEFAULTFINISH, ;device$finish
& I226START,    ;device$start
& DEFAULTSTOP,  ;device$stop
& I226INTERRUPT ;device$interrupt
& >
DW 00100H       ;controller base port

; ** UNIT INFO FOR THE CDS 571/590 MB DRIVE
UINFO_226cads radev_unit_info <
& 00000H,       ;track size
& 00009H,       ;max retry
& 00000H        ;cylinder size
& >
DW 0941         ;cylinders
DB 19           ;heads
DB 028         ;sectors
DB 001         ;alternate sectors (0-4)
DD 0000        ;device start
DB 00          ;head offset
DB 00          ;drive type (0-3)
DB FALSE       ;head seek (true or false)

```

Figure E-2. Contents of the File 226IT.A86

Unit Numbers

The iSBC 226 device driver recognizes four basic units, but each controller supports only two physical devices. Units zero and two are, respectively, fixed and removable disks on drive zero. Units one and three are, respectively, fixed and removable disks on drive one. It is possible to have more than one "logical" disk on a "physical" disk by partitioning it. To do this you use bits two and three of the unit number to differentiate the units, and specify different dev\$size and dev\$start parameters for each.

STEP 3: Use the Resident Editor to Alter Configuration Files (Cont'd)

alternate sectors	Defines the number of sectors that the device driver allocates as spare sectors (the acceptable range of values is 0 to 4). If you specify a value which is too low or high it will cause the FORMAT command to abort.
device start	The starting sector for the device. More than one unit may share a single drive if the areas defined by device size and device start do not overlap.
bad sector info	This byte (TRUE or FALSE) defines whether bad sector information is available for use during FORMAT.
head offset	Defines the offset required to access a fixed or removable section of the drive.
drive type	Defines the drive type. The value of drive type must be 0, 1, 2, or 3. Each drive type is user-defined to be the physical device characteristics (heads, sectors, and cylinders) of a given media type (fixed or removable) on a disk drive. The drive type is written onto the header of each sector on the disk to prevent addressing a disk drive with the wrong device characteristics.
head seek	Defines (TRUE or FALSE) whether or not the disk drive requires a seek after every head change. This is required on an embedded servo disk drive to lock onto a new track after a head change. (For more information consult your vendor's disk drive manual.)

Again, for further information on configuring your SMD device, consult the following manuals:

- the vendor's hardware reference manual on your SMD device
- the iRMX 86 CONFIGURATION GUIDE
- the GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS

STEP 4: Invoke the Interactive Configuration Utility (ICU)

1. Determine any ICU changes needed to incorporate the iSBC 226.
 2. Invoke ICU using the appropriate definition file.
-
-

Once you have changed the files 226DB.A86 and 226IT.A86, you can invoke the Interactive Configuration Utility (ICU). After you have invoked the ICU you should change the definition file that applies to the application that will incorporate the iSBC 226 SMD controller board and device driver. The changes that you make depend on your particular application. You should check the definition file that you will be changing to determine if adding the iSBC 226 SMD device driver will alter any current values in the definition file.

STEP 5: Make the Appropriate Changes to Your Definition File

1. Find and change the appropriate definition file tables.
 2. Ensure that parameters in the USER DEVICES screen have been entered.
-

After listing what configuration parameters the iSBC 226 SMD controller might change in your definition file, you should make the changes to the correct Interactive Configuration Utility screens. Regardless of which screens you change, you must call up and modify the USER DEVICES screen to integrate the device driver for the controller board into your application system. Figure E-3 shows the USER DEVICES screen.

```

User Devices
(OPN) Object Code Path Name [1-45 characters]
      NONE
(DPN) Duib Source Code Path Name [1-45]
(DUP) Device and Unit Source Code Path Name [1-45 chars]
(ND)  Number of User Defined Devices [0-0FF]
(NDU) Number of User Defined Device-Units [0-0FF]

ENTER CHANGES [Abbreviation ?/=new_value]:

```

Figure E-3. USER DEVICES screen

Specify the values that are correct for your application system. It is important that the pathnames which you input reflect the connections listed below:

OPN must refer to 226DD.LIB
 DPN must refer to 226DB.A86
 DUP must refer to 226IT.A86
 ND must be 1 if your system contains only one iSBC 226 controller.
 NDU must be the number of DUIB's in the file 226DB.A86 which have unique UNIT numbers.

iSBC® 226 SMD DEVICE DRIVER

In the example given in Figure E-4, the three iSBC 226 Device Driver files from the Update diskette were placed in the directory "/drivers" and modified to specify two device-units associated with the iSBC 226 SMD Controller Board. The application system ICU definition file's "USER DEVICES" screen was changed to reflect the pathnames for these iSBC 226 Device Driver configuration and object files. The number of user defined devices and device-units referred to by these files has also been changed.

```

User Devices
(OPN) Object Code Path Name [1-45 characters]
      /DRIVERS/226DD.LIB
(DPN) Duib Source Code Path Name [1-45]
      /Drivers/226DB.A86
(DUP) Device and Unit Source Code Path Name [1-45 chars]
      /Drivers/226IT.A86
(ND)  Number of User Defined Devices [0-0FF]    0001H
(NDU) Number of User Defined Device-Units [0-0FF] 0002H

ENTER CHANGES [Abbreviation ?/=new_value]:

```

Figure E-4. Example User Devices Screen

For more information on the parameters for the USER DEVICES screen of the Interactive Configuration Utility (ICU), consult Chapter 10 of this manual.

STEP 6: Regenerate the Operating System/Application

1. Exit the ICU and save all changes made to the definition file.
 2. Go through the Operating System generation process to generate the new application system.
-
-

Once you make all the appropriate changes to your definition file, you should save the file. Consult Chapter 2 of this manual on how to save your definition file. After you have saved your definition file, you can generate a new version of the application system that uses the iSBC 226 SMD controller board. Consult Chapter 18 of this manual on generating an iRMX 86 Operating System.

REMOVABLE MEDIA

Before exchanging a disk pack in an SMD disk drive it is necessary to execute a DETACHDEVICE command before removing the disk pack, and an ATTACHDEVICE command after inserting the new disk pack. This is necessary to prevent the corruption of the file structure on the new disk pack.

FORMATTING A STORAGE MODULE DEVICE (SMD)

You can format your SMD device using the iRMX 86 FORMAT command. When using a large SMD device the user should be aware of the following important points:

- The FORMAT command allows a maximum of 32,761 files on the storage device.
- The iRMX 86 Operating System allows a single file to have a maximum size of 67M bytes.

You may encounter problems when formatting an SMD device due to defective sectors found on the disk by the iSBC 226 controller board. This will cause FORMAT to abort and return an "unknown exception code" 0057H.

When the FORMAT command sends the RQ\$SPECIAL call requesting that the device driver format a specific track, and it encounters a defective sector, the device driver attempts to allocate an alternate sector for the defective sector. When using bad sector information during formatting, the device driver reads the bad sector information block into an internal buffer. This internal buffer is inspected for specific cylinder, head, and sector numbers. The device driver uses this information to allocate alternate sectors for the defective ones listed in the bad sector information block. If there are not enough alternate sectors available for allocation, the device driver returns an IO\$NO\$SPARES error code to the FORMAT command. By returning IO\$NO\$SPARES to the FORMAT command, the device driver for the iSBC 226 controller board causes the FORMAT command to abort and return the "unknown exception code" 0057H.

You may resolve this situation by editing the file 226IT.A86 and increasing the parameter line for "alternate sectors" and decreasing the parameter line for "sectors". (The value for alternate sectors may be increased to a maximum of 04H. If more than 04H alternate sectors are needed, it will be impossible to format your SMD device.) By increasing the value of the parameter line for "alternate sectors", you allow the device driver to allocate more alternate sectors during the FORMAT command. However, by decreasing the number of sectors, you are decreasing the usable space on the disk (device size). Therefore, it is necessary to decrease the values for the low device size and high device size parameters. Once you have changed these parameter lines you must regenerate your operating system.

iSBC@ 226 SMD DEVICE DRIVER

If you still have problems formatting your storage device because of the IO\$NO\$SPARES error condition, you must again edit the configuration file 226IT.A86 and again change the alternate sectors, low device size, and high device size parameter lines. Through a process of trial and error you can discover the values most appropriate for your system.

INSTALLING AN UNFORMATTED SMD DISK DRIVE INTO AN iRMX™ 86 SYSTEM

When installing an unformatted SMD disk drive into an iRMX 86 Operating System using an iSBC 226 controller, the system will 'hang' unless you take the following steps:

1. When creating the iRMX 86 Operating system, include a minimum of two Device Unit Information Blocks (DUIB's) and two Unit Information Tables for the SMD drive. Assuming that the DUIB names are 'hsmdØ' and 'hsmdtØ' and the Unit Information Table names are 'uinfo_226' and 'uinfo_226t':
 - a. In uinfo_226t, specify "NO" for Bad Sector Information and a value of 1 for the Number of Alternate Sectors (A value other than 1 may be appropriate for your system, follow the procedure described in the previous section to determine this value.)
 - b. In uinfo_226, specify "YES" for Bad Sector Information and a value of 1 for the Number of Alternate Sectors (or the value which is most appropriate for your system.)
 - c. You must specify the correct Number of Cylinders, Number of Heads, and Number of Sectors per Track for both uinfo_226 and uinfo_226t.
 - d. Calculate and enter the Device Size in hsmdtØ's Duib using the following formula:
$$\text{Device Size} = \text{device gran} * (\text{max sectors} - \text{alternate sectors}) * \text{heads} * (\text{cylinders} - 2)$$
 - e. Calculate and enter the Device Size in hsmdtØ's and hsmdtØ's DUIBs using the following formula:
$$\text{Device Size} = \text{device gran} * (\text{max sectors} - \text{alternate sectors}) * \text{heads} * \text{cylinders}$$
2. Place the system created in step 1 on the boot disk or diskette.
3. Boot the system from the disk or diskette created in step 2.
4. Attach physically to hsmdtØ (ATTACHDEVICE hsmdtØ as sØ phys).
5. FORMAT :sØ:

iSBC® 226 SMD DEVICE DRIVER

6. Using DISKVERIFY, write the Bad Sector Information provided by the SMD Drive manufacturer onto the SMD disk as follows:

- a. DISKVERIFY :sØ: ;
- b. Calculate the Block (sector) Number on which to write the Bad Sector Information using the following formula:

$$\text{Block \#} = ((\text{number of cylinders} - 1) * (\text{number of heads}) * (\text{sectors per track})) - (i * (\text{sectors per track}))$$

where $i = 4$ for Device Granularity of 1Ø24 bytes per sector,
sectors per track = (max sectors - alternate sectors)

- c. Read the Block Number calculated in step 6b;
- d. Write the manufacturer-supplied Bad Sector Information into the block using the following format:

```
* SW
  xxxx:yyyy- (ABCD)
  xxxx:yyyy- (number of bad sectors)
  xxxx:yyyy- (cylinder number of the first bad sector)
  xxxx:yyyy- .

* SB 6
  xxxx:zz- (head number of the first bad sector)
  xxxx:zz- (sector number of the first bad sector)
  xxxx:zz- .

* SW 8
  xxxx:yyyy- (cylinder number of the second bad sector)
  xxxx:yyyy- .

* SB 1Ø
  xxxx:zz- (head number of the second bad sector)
  xxxx:zz- (sector number of the second bad sector)
  xxxx:zz- .
  •
  •
  •

* SW (number of bad sectors * 4)
  xxxx:yyyy- (cylinder number of the last bad sector)
  xxxx:yyyy- .

* SB (number of bad sectors * 4) + 2
  xxxx:zz- (head number of the last bad sector)
  xxxx:zz- (sector number of the last bad sector)
  xxxx:zz- .

* SW (number of bad sectors * 4) + 4
  xxxx:yyyy- (Ø)
  xxxx:yyyy- (Ø)
  xxxx:yyyy- (Ø)
  xxxx:yyyy- (Ø)
  xxxx:yyyy- .
```

iSBC® 226 SMD DEVICE DRIVER

where:

number = <0 to maxnumber - 1>,
xxxx is the location in the block to be changed,
yyyy is the current value of the WORD,
zz is the current value of the BYTE,
() is the new value the operator places into the WORD.

- e. Write the new Block Information onto the disk;
 - f. Read and Display the Block Number again to be sure all the information has been added in the proper format. Repeat steps 6d and 6e if necessary.
 - g. Exit.
- 7. DETACHDEVICE :s0:
 - 8. ATTACHDEVICE hsm0 as :s0:

The system will respond with a "Volume is Not a Named Volume" message.

- 9. FORMAT :s0: Files = ()

where:

() is the user-specified maximum number of files that can reside on the drive.

iRMX™ 86 Release 6.0 Documentation Change Package: Update 3

Change Pages for:

iRMX™ 86 Installation and Configuration Guide (Order No. 146548-001)

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BASIC I/O SYSTEM PARAMETERS

You should answer "Yes" to this parameter if you require the ability to write programs that are independent of individual terminals. If you answer "No" to the "Control-Sequence Translation" parameter, some of your programs might run on only one kind of terminal, depending on the kinds of I/O your programs perform.

If you answer "Yes" to the "Control-Sequence Translation" parameter, you should also specify the Operating System Command (OSC) control sequences in the unit information screen for your terminal driver (your response to the "OSC Controls" parameter on the terminal driver unit information screen must be "Both", "Input", or "Output"). Refer to Chapter 10 for additional information on how to respond to terminal driver unit information screens. Refer to the iRMX 86 BASIC I/O REFERENCE MANUAL for additional information on OSC controls.

* (OSC) Terminal OSC Controls [Yes/No] Req *

Specify "Yes" if any of your terminals need terminal Operating System Command (OSC) controls. That is, if you want to specify "Both", "Input", or "Output" on a terminal driver unit information screen, you first need to specify "Yes" to this BIOS parameter line. The default value is "Req" if your system includes the Human Interface.

Specify "No" if your system does not include the Human Interface or if you do not have any terminals that require OSC controls.

* (TS) Tape support for iSBC 215G [Yes/No] No *

Specify "Yes" if you intend to to have an iSBX 217 magnetic tape cartridge controller mounted on an iSBC 215G disk controller board. The iSBX 217 controller related configuration screens are grouped with the configuration screens for the iSBC 215G and iSBX 218 controllers.

* (PMI) BIOS Pool Minimum [0-0FFFFH] 0D00H *
* (PMA) BIOS Pool Maximum [0-0FFFFH] 0D00H *

This parameter line lets you specify both the minimum and maximum allowable size of the Basic I/O System's memory pool (in 16-byte paragraphs). The default value 0D00H is equivalent to 3328 decimal.

BASIC I/O SYSTEM PARAMETERS

The "BIOS Pool Minimum" and "BIOS Pool Maximum" parameters define the size of your Basic I/O System memory pool. Intel recommends that you set these prompts to the same value, to prevent the Basic I/O System from attempting to borrow memory later. This approach is particularly important if your application system includes the Human Interface and you set the Human Interface maximum memory pool size to 0FFFFH, allowing it to use all remaining memory after system initialization. If the Basic I/O System does not claim its full memory pool at initialization, the jobs initialized after the Basic I/O System (the Extended I/O System, Application Loader, UDI, first-level jobs, and Human Interface) will claim the memory the Basic I/O System needs later.

The minimum memory pool requirement of the Basic I/O System is 1C0H 16-byte paragraphs of memory. However, the minimum memory pool size is not large enough to include the buffers needed to support terminal or mass storage devices. These buffers (which you specify for each Intel device driver) must be included in the BIOS minimum memory pool size.

To add support for terminals and other device drivers, use the 1C0H value as a starting point and increase the memory pool size using the following guidelines:

- If your system includes the 8251A terminal driver, add 11CH paragraphs to your memory pool.
- If your system includes an iSBC 534 terminal driver, add 260H paragraphs to your memory pool.
- If your system includes an iSBC 544 terminal driver, add 250H paragraphs to the memory pool.
- If your system includes an 8274 or iSBX 354 terminal driver, add 153H paragraphs to the memory pool for each driver.
- If your system includes an 82530 terminal driver, use the following formula to calculate the addition to the memory pool:

$$\text{paragraphs} = 49\text{H} + \text{ceiling}(\text{number of units}/2) \times 10\text{CH}$$

- For each attached terminal, add an additional 40H paragraph.
- For other device drivers, you must calculate the memory pool requirements for each device-unit in your system. To do that, calculate the memory requirements for each DUIB (Device Unit Information Block) in your system. Then compare the numbers for the DUIBs that correspond to the same device-unit (have the same device and unit numbers).

iRMX™ 86 Release 6.0 Documentation Change Package: Update 3

Change Pages for:

iRMX™ 86 Installation and Configuration Guide (Order No. 146548-001)

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APPENDIX F CONFIG. INFORMATION ON THE iSBX[®] 217 TAPE CONTROLLER DEVICE DRIVER

This appendix documents the hardware and software changes that you must perform to integrate the iSBX 217 Magnetic Cartridge Tape Interface Multimodule Board into your iRMX 86-based application system. This appendix assumes that you understand how to configure hardware into the operating system through the use of the Interactive Configuration Utility (ICU).

HARDWARE CONFIGURATION

The iSBX 217 Magnetic Cartridge Tape Interface Board is an 8-bit, single-wide, iSBX Multimodule I/O expansion board for installation on any 8-bit or 16-bit iSBC host board that has an iSBX connector. Its function is to interface industry-standard 1/4 inch magnetic cartridge tape drives to a host MULTIBUS processor board.

BEFORE YOU CONFIGURE THE iSBX 217 TAPE CONTROLLER DEVICE DRIVER, YOU MUST CONSULT THE "READ.ME" FILE CONTAINED WITHIN THE CURRENT UPDATE PACKAGE YOU RECEIVED FROM INTEL. THE "READ.ME" FILE CONTAINS VITAL INFORMATION ON JUMPERS AND VITAL INFORMATION ON HARDWARE LIMITATIONS FOR THE iSBX 217 DEVICE DRIVER.

SOFTWARE CONFIGURATION

The iSBX 217 magnetic cartridge tape controller device driver:

- Supports the READ, WRITE, SPECIAL, ATTACH\$DEVICE, and DETACH\$DEVICE, and CLOSE functions.
- Accepts the OPEN function but performs no operations for it.

The SPECIAL function supports the following subfunctions for the tape controller: format (spec\$func=0), device characteristics (spec\$func=3), rewind (spec\$func=7), read a file mark (spec\$func=8), write a file mark (spec\$func=9), retention tape (spec\$func=10). Refer to the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL for further information about these special subfunctions. Refer to the last section of this appendix for a discussion on using the iSBX 217 device driver under certain specific conditions.

There are two screens within the Interactive Configuration Utility (ICU) that define the interface between the iSBX 217 device driver and the I/O system. These screens relate to the following two device configuration tables: the unit information table, and the device unit information block (DUIB).

APPENDIX F. iSBX® 217 TAPE CONTROLLER DEVICE DRIVER

The iSBX 217 device driver does not have a device information table because the iSBX 217 tape controller board is connected to the iSBC 215G controller board. The device information table, in this case, refers back to the iSBC 215G board.

The ability to configure a tape drive into your system depends on how you answered the following BIOS screen parameter:

(TS) Tape Support for iSBC 215G [Yes/No]

You must enter a "Yes" for this parameter (TS=Yes) to configure a streamer tape drive into your system. As a result of setting TS to "Yes", you will see the configuration screens that relate to the iSBX 217 controller. These have the following titles:

iSBC 215G/iSBX 217/iSBX 218 Unit Information
iSBC 215G/iSBX 217/iSBX 218 Device-Unit Information

This appendix describes how to configure a Unit Information Table and a Device Unit Block for the iSBX 217 device driver.

The remaining sections of this appendix show in detail the parameters for the tape controller.

iSBX® 217 UNIT INFORMATION SCREEN

The ICU uses the information from the following screen to create a unit information table for the iSBX 217 driver. You begin defining the ICU Unit Information Screen for the iSBX 217 tape device driver when you see the prompt:

Do you have any more units for this device?

This prompt appears after all the previously defined Unit Information screens for the iSBC 215G and iSBX 218 controller boards have been displayed. Enter a "y" to get another "iSBC 215G/iSBX 217/iSBX 218 Unit Information" screen to appear. Now you can start defining the Unit Information Table for the iSBX 217 tape device driver.

```

iSBC 215/iSBX 217/iSBX 218 Unit Information
(NAM) Unit Info Name [1-17 Chars]
(MR) Maximum Retries [0-0FFFFH]          00009H
(CS) Cylinder Size [0-0FFFFH]           00000H
(NC) Number of Cylinders [0-FFFFH]      00011H
(NFH) Number of Heads/Fixed Disk [0-0FFH] 00011H
(NRH) Number of Heads/Removable Disk [0-00FFH] 00000H
(NS) Number of Sectors/Track [0-0FFFFH] 0000CH
(NAC) Number of Alt. Cylinders [0-00FFH] 0000AH
(SSN) Starting Sector Number [0-0FFFFFFFH] 000000000H
(BTI) Bad Track Information [Yes/No]      Yes
(HLT) Head Load Time [0-0FFH]           0028H
(SR) Step Rate [0-0FFH]                  0008H

Enter Changes [Abbreviation ?/= new_value] :
Do you have any more units for this device?
    
```

```

*****
*      (NAM) Unit Info Name [1-17 Chars]      *
*****
    
```

This parameter line lets you specify a unique name for this unit information table. The first character must be an alphabetic character. Refer to the 8086/8087/8088 MACRO ASSEMBLER LANGUAGE REFERENCE MANUAL for rules regarding this name. Intel suggests the use of the name "uinfo_217wta" for this parameter. ("w" indicates that the device relates to the Winchester controller board--the iSBC 215G controller; "t" indicates that the unit on the controller relates to tape storage; and, the "a" indicates that the tape unit is an Archive unit.) You must enter a name (for example uinfo_217wta can be used by entering NAM=uinfo_217wta) because no value for the original parameter appears in the Unit Information Table.

A DUIB uses the "Unit Info Name" to point to this particular unit information table. When developing your initial systems, you can create unit information tables that are never pointed to by a DUIB. There is no harm in this process during the development stages. However, when you configure your final system, eliminate all unused unit information tables to save memory.

APPENDIX F. iSBX® 217 TAPE CONTROLLER DEVICE DRIVER

```
*****
*          (MR) Maximum Retries [0-0FFFFH]          0009H  *
*****
```

This parameter line is not relevant to the iSBX 217 tape controller. Set the parameter to 0000H.

```
*****
*          (CS) Cylinder Size [0-0FFFFH]            0000H  *
*****
```

This parameter line is not relevant to the iSBX 217 tape controller. Set the parameter to 0000H.

```
*****
*          (NC) Number of Cylinders [0-FFFFH]       0001H  *
*****
```

This parameter indicates the type of tape drive you want to use. For the iSBX 217 Intel supported device driver, you must enter a value of zero (NC=0000H). A zero value for this parameter indicates to the operating system that the device is an Archive-compatible streamer tape.

```
*****
*          (NFH) Number of Heads/Fixed Disk [0-0FFH] 0001H  *
*****
```

This parameter line is not relevant to the iSBX 217 tape controller. Set the parameter to 0000H.

```
*****
*          (NRH) Number of Heads/Removable Disk [0-0FFH] 0000H  *
*****
```

For the iSBX 217 tape controller, this value should be one less than the number of tracks on the drive. Since a streaming tape drive has only one logical track, this value must be set to zero.

```
*****
*          (NS) Number of Sectors/Track [0-0FFFFH]   000CH  *
*****
```

This parameter line is not relevant to iSBX 217 tape controller. Set the parameter to 0000H.

APPENDIX F. iSBX® 217 TAPE CONTROLLER DEVICE DRIVER

```
*****
*      (NAC) Number of Alt. Cylinders [0-0FFH]      000AH  *
*****
```

This parameter line is not relevant to the iSBX 217 tape controller. Set the parameter to 0000H.

```
*****
*      (SSN) Starting Sector Number [0-0FFFFFFFH]    00000000H  *
*****
```

This parameter line is not relevant to the iSBX 217 tape controller. Set the parameter to 0000H.

```
*****
*      (BTI) Bad Track Information [Yes/No]          Yes    *
*****
```

This parameter line is not relevant to the iSBX 217 tape controller. You can leave the default value.

```
*****
*      (HLT) Head Load Time [0-0FFH]                0000H  *
*****
```

This parameter line is not relevant to the iSBX 217 tape controller. Set the parameter to 0000H.

```
*****
*      (SR) Step Rate [0-0FFH]                      0000H  *
*****
```

This parameter line is not relevant to the iSBX 217 tape controller. Set the parameter to 0000H.

```
*****
*      Do you have any more units for this device?  *
*****
```

Respond to this prompt with a "Yes" if you need another unit information table for this device. Otherwise, respond to this prompt with a "No".

iSBX® 217 DEVICE-UNIT INFORMATION SCREEN

The ICU uses the information from the following screen to create a device-unit information table for the iSBX 217 driver. You begin defining the device unit information screen for the iSBX 217 tape device driver when you see the prompt:

Do you have any more device-unit information blocks for this device?

This prompt appears after all the previously defined device-unit information screens for the iSBC 215 and iSBX 218 controller boards have been displayed. Enter a "y" to get another "iSBC 215G/iSBX 217/iSBX 218 Device-Unit Information" screen to appear. Now you can start defining the Device-Unit Information Table for the iSBX 217 tape controller device driver.

```

iSBC 215/iSBX 217/iSBX 218 Device-Unit Information
(NAM) Device-Unit Name [1-13 chars]
(PFD) Physical File Driver Required [Yes/No]          Yes
(NFD) Named File Drive Required [Yes/No]            Yes
(SDD) Single/Double Density Disks [Single/Double]   Double
(SDS) Single or Double Sided Disks [Single/Double] Single
(EFI) 8 or 5 Inch Disks [8/5]                      8
(SUF) Standard/Uniform Format [Standard/Uniform]     Standard
(GRA) Granularity [0-0FFFFH]                        0100H
(DSZ) Device Size [0-0FFFFFFFFH]                    0007C500H
(UN) Unit Number on this Device [00FFH]             0000H
(UIN) Unit Info Name [-17 Chars]
(RUT) Request Update Timeout [0-0FFFFH]             0064H
(NB) No. of Buffers [nonrandom = 0/rand = 1-0FFFFH] 0006H
(CUP) Common Update [True/False]                    True
(MB) Max Buffers [0-00FFH]                          00FFH

Enter Changes [Abbreviation ?/= new_value] :
Do you have any more DUIBs for this device?

```

APPENDIX F. iSBX@ 217 TAPE CONTROLLER DEVICE DRIVER

```
*****  
*          (NAM) Device-Unit Name [1-13 chars]          *  
*****
```

This parameter line lets you specify a name that uniquely identifies this device-unit to the I/O System. If you want the Extended I/O System to logically attach this device during initialization, the name you specify for this parameter must also be one of the device names you specified on the Logical Names screen (see Chapter 8). Intel recommends that you use the name "wta0" (NAM=wta0) as the physical device name for the streaming tape device driver for the iSBX 217 controller board.

The ICU allows you to enter from one to thirteen characters. Refer to the 8086/8087/8088 MACRO ASSEMBLER LANGUAGE REFERENCE MANUAL for rules regarding this name.

The name you specify for this parameter is the physical name you specify when invoking the Human Interface ATTACHDEVICE command, the BIOS A\$PHYSICAL\$ATTACH\$DEVICE system call, or the EIOS LOGICAL\$ATTACH\$DEVICE system call.

```
*****  
*          (PFD) Physical File Driver Required [Yes/No]          Yes          *  
*****
```

For the iSBX 217 tape controller specify "Yes" for this parameter.

```
*****  
*          (NFD) Named File Driver Required [Yes/No]          Yes          *  
*****
```

Specify "No" for this parameter.

```
*****  
*          (SDD) Single or Double Density Disks [Single/Double] Double          *  
*****
```

Ignore this parameter. This parameter line is not relevant to the iSBX 217 tape controller.

```
*****  
*          (SDS) Single or Double Sided Disks [Single/Double] Single          *  
*****
```

Ignore this parameter. This parameter line is not relevant to the iSBX 217 tape controller.

APPENDIX F. iSBX@ 217 TAPE CONTROLLER DEVICE DRIVER

```
*****
*          (EFI) 8 or 5 Inch Disks [8/5]                      8      *
*****
```

Ignore this parameter. This parameter line is not relevant to the iSBX 217 tape controller.

```
*****
*          (SUF) Standard/Uniform Format [Standard/Uniform] Standard *
*****
```

Ignore this parameter. This parameter line is not relevant to the iSBX 217 tape controller.

```
*****
*          (GRA) Granularity [0-0FFFFH]                      0400H   *
*****
```

This parameter line lets you specify the minimum number of bytes that the device reads or writes in one operation. This value is also called device granularity. For the case of an Archive tape drive, this parameter must be a multiple of 512 (decimal) bytes. For the iSBX 217 device driver, a value of 2000H is recommended.

```
*****
*          (DSZ) Device Size [0-0FFFFFFFH]                    00000400H *
*****
```

This parameter line lets you specify the device storage capacity in bytes. This value is the maximum amount of data that the tape storage unit can hold according to the manufacturer's specifications. Notice that the default value on the screen represents only 1K bytes of storage. Modify the default value to match the storage capacity of your tape

```
*****
*          (UN) Unit Number on this Device [0-0FFH]           0000H   *
*****
```

This parameter line lets you specify the unit number of this device-unit. This number identifies one of 15 possible units on this device. The unit numbers for the device begin with zero and increase sequentially. The unit number for tape storage modules are from 12 to 15. As a result, this parameter should range from 12 to 15, with unit 12 corresponding to the first tape drive attached to the iSBX 217 Tape Controller..

APPENDIX F. iSBX® 217 TAPE CONTROLLER DEVICE DRIVER

```
*****
*      (UIN) Unit Info Name [1-17 Chars]      *
*****
```

This parameter line lets you specify the "Unit Info Name" of a unit information table that fills the needs of this DUIB. The following rules apply to the name you choose:

- You must create a unit information table with this "unit info name" before you run the second stage of the ICU.
- Each DUIB can point only to one unit information table.
- A particular unit information table can be pointed to by more than one DUIB.

If you used the name "uinfo_217wta" when you defined the unit information screen for the iSBX 217 device driver (NAM=uinfo_217wta), then this parameter must have the same value (UIN=uinfo_217wta).

```
*****
*      (RUT) Request Update Timeout [0-0FFFFH]      0064H      *
*****
```

This parameter line is not relevant to the iSBX 217 tape controller. Set this parameter to the value 0FFFFH.

```
*****
*      (NB) Number of Buffers [nonrandom = 0/rand = 1-0FFFFH]  0008H      *
*****
```

For the iSBX 217 tape controller, specify a value of 0000H.

```
*****
*      (CUP) Common Update [True/False]      True      *
*****
```

This parameter line is not relevant to the iSBX 217 tape controller. Set this parameter to "False".

APPENDIX F. iSBX@ 217 TAPE CONTROLLER DEVICE DRIVER

* (MB) Max Buffers [0-0FFH] 0FFH *

This parameter line lets you specify the maximum number of buffers that the Extended I/O System can allocate for this device's I/O. The default value for this device (0FFH) allows the S\$OPEN system call to specify the actual number of Extended I/O System buffers. The Operating System takes memory required for these buffers from the calling job's memory pool, so by setting this parameter to 0FFH you allow the calling job to select the number of buffers based on its own memory pool size. It is recommended that you use the default value.

* Do you have any more DUIBs for this device? *

Respond "Yes" to this prompt "Do you have any more device-unit information blocks for this device?" if you plan to add any more DUIB's to the system.

While developing your initial systems, you can create as many device-unit information blocks as you want. The number of DUIBs can exceed the number of devices on your system. The particular DUIB associated with the device depends on the physical name you use when attaching it. Once you know that you will never need a particular DUIB, save memory by deleting it from your description file before you generate your configuration files (refer to Chapter 17 for additional information on generating configuration files).

IMPORTANT FEATURES OF THE iSBX@ 217 DEVICE DRIVER

You should be aware of several important characteristics of the iSBX 217 device driver when you are using it. Following are three important characteristics of the device driver:

- After you issue either the BACKUP or RESTORE command, the software automatically rewinds the tape unit.
- After you issue any other command other than BACKUP or RESTORE, such as COPY, the tape unit does not rewind.
- To rewind the tape unit, you must follow these steps:
 1. Detach the tape unit from the operating system by the DETACHDEVICE command.
 2. Attach the tape unit to the operating system by using the ATTACHDEVICE command. At this point the software rewinds the tape unit.

=====

iRMX™ 86 DEVICE DRIVER CHANGE PACKAGE: UPDATE 2

=====

Purpose

The change pages in this package update the iRMX™ 86 documentation to support the inclusion of the following new device driver:

- the iSBC® 188/48 Device Driver

Scope

The following manuals are affected by this change package:

iRMX™ 86 Installation and Configuration Guide (146197-001)

Installation Instructions

Change pages in the Update Package are accumulated from quarter to quarter. The change pages for each successive update are separated in this package by a blue cover page (similar to the sheet you are now reading). Within each update section, yellow, pink, green, and orange cover sheets segregate the change pages according to volume.

If this is the first iRMX™ 86 Release 6.0 Update to be installed in your documentation:

1. Install the change pages in this section before installing the change pages for Update 3.

If you have installed previous iRMX™ 86 Release 6.0 Updates in your documentation:

1. Discard this section.

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iRMX™ 86 Release 6.0 Documentation Change Package: Update 2

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CHAPTER 8 MODIFYING INDIVIDUAL INTEL PROCESSOR BOARDS

This chapter lists the hardware modifications you must make to Intel processor boards so that you can install the iRMX 86 Operating System. Listed below are the Intel processor boards which this chapter shows you how to alter to run the operating system:

iSBC 86/05
iSBC 86/14
iSBC 86/12A
iSBC 86/30
iSBC 186/03
iSBC 186/51
iSBC 188/48
iSBC 286/10

In discussions of how to modify boards, the term "modify" means removing factory-installed jumpers, installing additional jumpers, and making wiring changes to components that mount on a board (such as the DIP-header that is installed in the iSBX 351).

HOW TO USE THIS CHAPTER

This chapter is organized around a set of tables that contain a listing of the jumpers you need to change so that your hardware can run the iRMX 86 Operating System as defined by the ICU definition files supplied by Intel. Each table lists the changes you need to make based on a functional division. For example, one table lists the jumper changes for correctly setting the interrupt matrix while another table lists the jumper changes for setting the serial ports.

To use the information in this chapter, do the following procedure:

- Locate your board within the first table. The name of the board is always found on the left side of the table.
- Move across the table and find the listing of the jumper changes that you need to make. Across from each listed change is a short description of the change.
- Go to the second table in this chapter and repeat the first step of this process. That is, locate your board within the table and find what changes you need to make.
- Keeping repeating the entire procedure until you have gone through every table within this chapter. You must go through every table to insure that you have made all the essential changes to the controller board you are setting up to run the iRMX 86 Operating System as defined by the ICU definition file supplied by Intel.

Figure 8-1 shows a listing that you can use to help you keep track of the tables that you must consult. Make a photocopy of Figure 8-1 for each board that you must jumper.

INTEL PROCESSOR BOARD

Name of Table (Organized by Function)	Checked Table and Made Changes?	
	Yes	No
Interrupt Jumpers (Table 8-1)	<input type="checkbox"/>	<input type="checkbox"/>
Parallel Port Jumpers: Line Printer (Table 8-2)	<input type="checkbox"/>	<input type="checkbox"/>
Parallel Port: iSDM 86 Monitor (Table 8-3)	<input type="checkbox"/>	<input type="checkbox"/>
Parallel Port Component Installation (Table 8-4)	<input type="checkbox"/>	<input type="checkbox"/>
Serial Port Jumpers (Table 8-5)	<input type="checkbox"/>	<input type="checkbox"/>
EPROM Selection Jumpers (Table 8-6)	<input type="checkbox"/>	<input type="checkbox"/>
RAM Selection Jumpers (Table 8-7)	<input type="checkbox"/>	<input type="checkbox"/>
Dual Port Address Jumpers (Table 8-8)	<input type="checkbox"/>	<input type="checkbox"/>
Bus Priority Selection Jumpers (Table 8-9)	<input type="checkbox"/>	<input type="checkbox"/>
Test Pin Condition Jumpers (Table 8-10)	<input type="checkbox"/>	<input type="checkbox"/>
Miscellaneous (Table 8-11)	<input type="checkbox"/>	<input type="checkbox"/>

Figure 8-1. Checklist for Jumpering Intel Processor Boards

iSBC® 286/10 PROCESSOR BOARD AND THE iSBC® 188/48 COMMUNICATIONS BOARD

If you intend to use the iSBC 286/10 processor board with the iSBC 188/48 communications board, then you must make additional changes to the processor board. Consult Appendix F for these changes.

SPECIFIC MODIFICATIONS TO INTEL PROCESSOR BOARDS

The following sections contain the information you need to jumper your Intel single board computer. Again, the jumpering information is grouped according to certain functions. You must go through every table to properly jumper your processor board.

INTERRUPT JUMPER CHANGES FOR PROCESSOR BOARDS

Table 8-1 describes the changes the user must make to the jumpering of the interrupt matrix to use the configurations of the I/O boards described in previous chapters with systems generated from Intel-supplied ICU definition files.



APPENDIX F JUMPERS FOR THE iSBC® 188/48 COMMUNICATIONS BOARD

Few jumper changes are necessary for a user to integrate the iSBC 188/48 into an iRMX 86 operating system environment. The jumper changes in this appendix set the base address of the board at 0E400:0H. This is the base address that the ICU assumes for the controller board.

Table F-1. iSBC® 188/48 Jumper Changes

REMOVE	ADD
E251-E252	E251-E274 *
E292-E293	E276-E335 *
E294-E295	E302-E303
E296-E297	E353-E354
E298-E299	
E335-E336	
E348-E349	
E351-E352	

Note: * Jumper only if adding iSBX™ 354 MULTIMODULE™.

To install the iSBC 188/48 communications board into your system, you must make some additional changes to the iSBC 286/10 processor board. (Refer to Chapter 8 for base changes to the iSBC 286/10 processor board.) This appendix lists these additional changes. Make these additional changes only if you are adding the iSBC 188/48 communications board to your system and configuring the board's dual port memory to include locations OEC000H through OEFFFFH.

Table F-2. iSBC® 286/10 Processor Board Changes to Support the iSBC® 188/48 Communications Board

REMOVE	ADD
E155-E156	E154-E160
E157-E158	E227-E228
E159-E160	
E222-E223	
E224-E225	
E226-E227	



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Change Pages for:

iRMX™ 86 Installation and Configuration Guide (Order No: 146548-001)

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(NFD) Named File Driver Required.....	10-175
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(DSZ) Device Size.....	10-176
(UN) Unit Number on this Device.....	10-176
(UIN) Unit Information Name.....	10-177
(RUT) Request Update Timeout.....	10-177

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RAM

All of the Intel-supplied definition files define RAM-based systems. These systems use the RAM specified on the "Memory" screen for two purposes. First, the RAM is used to store system code. Second, the RAM is used to provide free space to the operating system.

If you are not using one of the supplied definition files or you have made changes to one of the supplied definition files (described in Chapter 2), you may need to change the default value for RAM. Four possible situations in which you might want to change the default value are described in the following sections.

iOSP™ 86 User Considerations

If you are a user of an iOSP 86-based system and the only off-chip code you need is the supplied off-chip initialization code, you should change the default values for RAM. The low RAM address for your system could be 80H rather than the 104H used as a default. The upper RAM address could be no greater than FFFH. However, the values you choose should be made on the basis of a memory map and your specific board. Laying out memory maps is discussed in Chapter 19.

Upper Memory Address Considerations

If your system does not contain the same amount of memory as specified by the upper RAM address, you can change this upper address. The value you use should reflect the maximum memory your system can address. However, if the value you use is greater than the maximum memory your system can address, the Nucleus resets this limit to that memory actually present in your system.

iSBC® 544 Driver Considerations

The iSBC 544 board has on-board dual port memory which should not be managed by the Operating System. If your system includes an iSBC 544 board, do not include the iSBC 544's on-board memory in the memory declared on the "Memory" screen.

A default value on the "iSBC 544 Driver" screen allows the on-board memory to start at E000H. Using this default value on the "iSBC 544 Driver" screen dictates that the upper RAM address on the "Memory" screen should be DFFFH. If you change the "Memory Address Base" parameter line on the "iSBC 544 Driver" screen, you must also reflect that change on the "Memory" screen. Refer to Chapter 10 for more information about the iSBC 544 Driver.

In addition, you cannot use the iSBC 544 device driver in a system that includes the iSBC 188/48 device driver.



CHAPTER 10 DEVICE DRIVER PARAMETERS

This chapter discusses how to respond to the prompts that appear on the Intel Device Driver screens. If you are using this chapter to understand a particular parameter line, search Table 10-1 for the device driver that interests you and then turn to the page indicated to the right of the device driver.

Table 10-1. Intel-Supplied Device Drivers

Device Driver	Page Number
iSBC 204	10-02
iSBC 206	10-12
iSBC 208	10-21
iSBC 215	10-34
iSBX 218	10-50
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If you are adding a user-supplied device driver, refer to page 10-213.

iSBC® 204 DRIVER PARAMETERS

The iSBC 204 flexible disk driver:

- Supports 8-inch, single-sided, single-density diskettes.
- Supports the READ, WRITE, SEEK, SPECIAL, ATTACH\$DEVICE, and DETACH\$DEVICE functions.
- Accepts functions OPEN and CLOSE but performs no operations for them.

Track formatting and volume change notification are supported via the SPECIAL function. Refer to the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL for further information about these special functions.

The iSBC 204 driver supports up to four units per controller, two for each 8271 flexible disk controller component. The typical controller has one 8271 component. This component supports two single-sided units.

There are three screens that define the interface between the iSBC 204 random access device driver and the I/O system. These screens relate to the three device configuration tables: the device information table, the unit information table, and the device unit information block (DUIB). Refer to Appendix D for further information about these tables.

The values shown on the screens in this section are the same as values you would see if you choose option "0" from the Intel-supplied device driver screen.

iSBC® 204 DRIVER SCREEN

The ICU uses the information from the following screen to create a device information table for the iSBC 204 driver. If your system includes more than one iSBC 204 controller, you must specify a unique interrupt level and port address for each controller.

```

***                                     ***
***                                     ***
***                                     ***
*** iSBC 204 Driver                     ***
*** (IL) Interrupt Level [Encoded Level]   0018H   ***
*** (ITP) Interrupt Task Priority [0--OFFH] 0082H   ***
*** (PA) Port Address [0-OFFFFH]          00A0H   ***
***                                     ***
***. Enter Changes [Abbreviation ?/= new value] : .***
****! Do you have any units for this device?      !****
o****!                                             !****o
o*****!
o*****o

```

iSBC[®] 188/48 DRIVER PARAMETERS

The iSBC 188/48 device driver is an intelligent terminal controller that can manage buffered input and output. The iSBC 188/48 communications controller supports up to twelve communication channels per board. The iSBC 188/48 driver:

- Supports the READ, WRITE, SPECIAL, ATTACH\$DEVICE, DETACH\$DEVICE, OPEN, and CLOSE functions.
- Can only be used with the physical file driver.

There are three screens that define the interface between the iSBC 188/48 terminal support driver and the I/O system. These screens relate to the three device configuration tables: the device information table, the unit information table, and the device unit information block (DUIB). Refer to Appendix D for further information about these tables.

The values shown on the screens in this section are the same as values you would see if you use the rmx86.def file when invoking the ICU.

CAUTION

Application programs that need to know when transmission errors occur may no longer function properly with the iSBC 188/48 communications board. Whenever the iSBC 188/48 firmware receives a character with a parity error, the firmware discards the character. If the firmware receives a character with a framing error, the firmware replaces the character with an eight bit null character (00H). The iSBC 188/48 firmware does not inform the device driver that it performed these actions.

iSBC[®] 188/48 DRIVER SCREEN

The ICU uses the information from the following screen to create a device information table for the iSBC 188/48 driver. If your system includes more than one iSBC 188/48 controller, you must specify a unique interrupt level and memory address base for each controller.

```

***
***
*** iSBC 188/48 Driver ***
*** (IL) Interrupt Level [Encoded Level] 0038H ***
*** (MA) Memory Address Base [0-0FFFFH] E400H ***
*** (PA) Port Address [0-0FFFFH] 08A6H ***
***. Enter Changes [Abbreviation ?/= new value] : .***
***! Do you have any units for this device? !****
****! ****
*****
*****

```

```

*****
* (IL) Interrupt Level [Encoded Level] 0038H *
*****

```

This parameter line lets you specify the encoded interrupt level for the iSBC 188/48 driver. The interrupt task uses this value to associate itself with the correct interrupt level. The default value 0038H (0000 0000 0011 1000 binary) specifies master interrupt level 3.

The possible values for this field are encoded as follows (where bit 0 is the low-order bit):

Master		with Slave Attached		Master		with Slave Attached	
Level	Code	Level	Code	Level	Code	Level	Code
0	0008H	0-7	0000-0007H	4	0048H	0-7	0040-0047H
1	0018H	0-7	0010-0017H	5	0058H	0-7	0050-0057H
2	0028H	0-7	0020-0027H	6	0068H	0-7	0060-0067H
3	0038H	0-7	0030-0037H	7	0078H	0-7	0070-0077H

```

*****
* (MA) Memory Address Base [0-0FFFFH] E400H *
*****

```

The Memory Address Base (MA) is the lowest address in dual port RAM that is visible to other boards on the MULTIBUS. This parameter line lets you specify the base address in 16-byte paragraphs of the dual port RAM that matches the jumper configuration of the iSBC 188/48 board.

When the user is configuring the jumpers on the board, he or she must be aware that the firmware on the communications controller board needs at least 48 K-bytes of MULTIBUS dual port RAM.

The user can compute the lowest visible dual port RAM on the board by using the following formula:

$$\text{Address} = (256\text{K boundary start address}) \\ + (\text{number of the block selected} * 64\text{K}) + 16\text{K}$$

```
*****
*      (PA) Port Address [0-0FFFFH]          08A6H      *
*****
```

This parameter line lets you specify the I/O wakeup address of the iSBC 188/48 controller. This value should match the appropriate jumpers on your iSBC 188/48 board. Refer to the iSBC 188/48 ADVANCED COMMUNICATING COMPUTER HARDWARE REFERENCE MANUAL for more information. It is recommended that you do not change the default value (08A6H).

The iSBC 188/48 board features a two-part access arrangement in which a bus master board can access the on-board dynamic RAM via the MULTIBUS system bus.

```
*****
*      Do you have any units for this device?          *
*****
```

Respond to this prompt with a "Yes" if you have not already defined a unit information table for this driver. Respond to this prompt with a "No" if the following statements are true:

- You are defining more than one device information table for this driver (that is, you have more than one controller for this driver).
- You already have a unit information table that describes the additional controller.

If you respond "No" to this prompt, you must also define a DUIB that has a unique "Device-Unit Name".

iSBC® 188/48 UNIT INFORMATION SCREEN

The ICU uses the information from the following screen to create a unit information table for the iSBC 188/48 driver.

```

.*****.
*****
!****o                                     o****!
****o                                     o****
****o                                     o****
***o                                     ***
-----
iSBC 188/48 Unit Information
(NAM) Unit Info Name [1-17 Chars]
(LEM) Line Edit Mode [Trans/Normal/Flush]          Normal
(ECH) Echo Mode [Yes/No]                            Yes
(IPC) Input Parity Control [Yes/No]                 No
(OPC) Output Parity Control [Yes/No]                No
(OCC) Output Control in Input [Yes/No]              Yes
(OSC) OSC Controls [Both/In/Out/Neither]           Both
(DUP) Duplex Mode [Full/Half]                       Full
(TRM) Terminal Type [CRT/Hard Copy]                 CRT
(MC) Modem Control [Yes/No]                         No
(RPC) Read Parity Checking [See Help/0-3]           0000H
(WPC) Write Parity Checking [See Help/0-4]          0004H
(BR) Baud Rate [0-OFFFFH]                           2580H
(SN) Scroll Number [0-OFFFFH]                       0012H

***                                     ***
****. Enter Changes [Abbreviation ?/= new value] : .****
****! Do you have any more units for this device? !****
o****!                                     !****o
*****
o*****o

```

```

*****
*      (NAM) Unit Info Name [1-17 Chars]      *
*****

```

This parameter line lets you specify a unique name for this unit information table. The first character must be an alphabetic character. Refer to the 8086/8087/8088 MACRO ASSEMBLER LANGUAGE REFERENCE MANUAL for rules regarding this name. This parameter does not have a default value. Therefore, you must provide a name.

A DUIB uses the "Unit Info Name" to point to this particular unit information table. When developing your initial systems, you can create unit information tables that are never pointed to by a DUIB. There is no harm in this process during the development stages. However, when you configure your final system, eliminate all unused unit information tables to save memory.

```
*****
*      (LEM) Line Edit Mode [Trans/Normal/Flush]      Normal      *
*****
```

This parameter line lets you specify the initial default line editing mode. You must choose from the following three options:

Transparent	Console input is transparent (not line-edited). The terminal support code transmits input to the requesting task exactly as entered at the terminal. Before being transmitted, the terminal support code accumulates data in a buffer until an operator enters the requested number of characters.
Normal	Console input is line-edited. Edited data accumulates in a buffer until an operator enters a carriage return.
Flush	Console input is not line-edited and the terminal support code transmits input to the requesting task exactly as entered at the terminal. Before being transmitted, the terminal support code accumulates data in a buffer until it receives an input request. At that time, it transmits the contents of the buffer (or the number of characters requested, if the buffer contains more than that number) to the requesting task. If any characters remain in the buffer, the terminal support code saves the characters for the next input request.

You can alter the value you specify for this parameter at run time if you invoke the A\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```
*****
*      (ECH) Echo Mode [Yes/No]      Yes      *
*****
```

This parameter line lets you specify "Yes" if you want characters entered into the terminal to be "echoed" to the terminal's display screen. Otherwise, specify "No".

You can alter the value you specify for this parameter at run time if you invoke the A\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```
*****
*      (IPC) Input Parity Control [Yes/No]          No      *
*****
```

This parameter line lets you specify "Yes" if you want characters entered into the terminal to have their parity bit (bit 7) set to zero or not set, according to the value of the input parity control bit. Specify "No" if you do not want the terminal driver to change bit 7 of the input character.

You can alter the value you specify for this parameter at run time if you invoke the A\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```
*****
*      (OPC) Output Parity Control [Yes/No]         No      *
*****
```

This parameter line lets you specify "Yes" if you want characters being output to the terminal to have their parity bits (bit 7) set to zero or not set, according to the value of the output parity control bit. Specify "No" if you want bit 7 in output characters to remain unchanged.

You can alter the value you specify for this parameter at run time if you invoke the A\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```
*****
*      (OCC) Output Control in Input [Yes/No]       Yes      *
*****
```

This parameter line lets you specify "Yes" if you want the terminal support code to accept output control characters in the input stream. Specify "No" if you want the terminal support code to ignore output control characters. Control characters are described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

You can alter the value you specify for this parameter at run time if you invoke the A\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```
*****
*      (OSC) OSC Controls [Both/In/Out/Neither]     Both     *
*****
```

This parameter line lets you specify whether the device driver should act upon Operating System Command (OSC) controls when they appear in either an input or an output stream. Choose one of the following options as the initial default value for the device driver:

Both	Act upon OSC control sequences in either input or output stream (from either terminal or program).
Input	Act upon OSC control sequences in input stream only (from terminal and not from program).
Output	Act upon OSC control sequences in output stream only (from program and not from terminal).
Neither	Do not act upon OSC control sequences.

The OSC control sequence, used in communicating from a program or a terminal to an operating system, is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL. You can alter the value you specify for this parameter at run time if you invoke the A\$\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```
*****
*      (DUP) Duplex Mode [Full/Half]                Full      *
*****
```

This parameter line lets you specify the line protocol mode for a terminal. Choose either full-duplex or half-duplex.

When line protocol mode is full-duplex, the terminal driver concurrently handles input to and output from the terminal. If you specified both echo mode and full-duplex, the terminal driver echoes each character. When the line protocol mode is half-duplex, there can be input to and output from the terminal, but not concurrently. If you specify both echo mode and half-duplex, the terminal, not the terminal driver, echoes each character.

You can alter the value you specify for this parameter at run time if you invoke the A\$\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```
*****
*      (TRM) Terminal Type [CRT/Hard Copy]          CRT        *
*****
```

This parameter line lets you specify how your terminal supports the rubout function. Respond "CRT" if your terminal can backspace and leave a blanking character on the screen for each character "rubbed out". Respond "Hard Copy" if you terminal cannot backspace and leave a blanking character on previously-displayed characters.

You can alter the value you specify for this parameter at run time if you invoke the A\$\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```
*****
*      (MC) Modem Control [Yes/No]                No      *
*****
```

This parameter line lets you specify "Yes" to establish an initial modem-based link between a task and a terminal. Specify "No" if your system contains a "smart" modem (one you use ASCII characters to program) or you do not intend on using the Modem Query OSC sequence. This OSC sequence is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

If you specify "Yes" to this parameter, set the "OSC Controls" parameter to either "Both" or "Out".

Terminal Support Code supports terminals that communicate with an iRMX 86-based application system through a modem. For the most part, tasks and terminals communicate through a modem as if linked by a dedicated line, but they must control the modem using OSC sequences to break the link (hang up) and to re-establish a link (dial and answer). However, the initial link is established only if you specify "Yes" to the modem control parameter.

You can alter the value you specify for this parameter at run time if you invoke the \$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```
*****
*      (RPC) Read Parity Checking [See Help/0-3]    0000H   *
*****
```

This parameter line lets you specify one of the following four values:

- 0 Ignore parity checking and set the input parity bit (bit 7) to zero.
- 1 Ignore parity checking and do not change the input parity bit. (This is a valid response only if you have specified "No" to the "(IPC) Input Parity Control" parameter.)
- 2 Set the input parity bit to zero if even parity is received. Set input parity bit to one if odd parity is received, if received stop bit has a value of zero (framing error), or if a new character has been input before the interrupt routine for character processing has completed (overrun error).
- 3 Set input parity bit to zero if odd parity is received. Set input parity bit to one if even parity is received, or the stop bit has a value of zero (framing error), or if a new character has been input before interrupt routine for character processing has completed (overrun error).

Note that a response of zero or one is only meaningful if your response to the "(IPC) Input Parity Control" parameter is "No". Likewise, a response of two or three to this parameter implies that you responded "Yes" to the (IPC) parameter.

You can alter the value you specify for this parameter at run time if you invoke the A\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```
*****
*      (WPC) Write Parity Checking [See Help/0-4]      0004H      *
*****
```

This parameter line lets you specify one of the following five values:

- 0 Set the output parity bit to zero.
- 1 Set the output parity bit to one.
- 2 Set the output parity bit to one if the total number of 1's in the character is odd. Set the parity bit to zero if the total number of 1's is even (even parity). This option should be used if the driver is using even parity checking for input.
- 3 Set the output parity bit to zero if the total number of 1's in the character is odd. Set the output parity bit to 1 if the total number of 1's is even (odd parity). This option should be used if the driver is using the odd parity checking for input.
- 4 Do not change the output parity bit. (This is a valid response only if you have specified "No" to the "(OPC) Output Parity Control" parameter.)

Note that a response of four is only meaningful if your response to the "(OPC) Output Parity Control" parameter is "No". Likewise, a response of zero through three to this parameter implies that you responded "Yes" to the (OPC) parameter.

You can alter the value you specify for this parameter at run time if you invoke the A\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```
*****
*      (BR) Baud Rate [0-OFFFFH]      2580H      *
*****
```

This parameter line lets you specify the initial baud rate of this terminal. Specify a value of one if you want the controller to ascertain the initial baud rate automatically. The default value 2580H is equivalent to 9600 decimal.

You can alter the value you specify for this parameter at run time if you invoke the A\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```

*****
*      (SN) Scroll Number [0-OFFFFH]                0012H      *
*****

```

This parameter line lets you specify the number of lines to scroll when an operator enters the scrolling output control character (Control-W is the default). Typical values should be from 10 to 24. The default value of 0012H is equivalent to 18 decimal.

You can alter the value you specify for this parameter at run time if you invoke the A\$SPECIAL system call or send an OSC sequence. This system call is described in the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL.

```

*****
*      Do you have any more units for this device?          *
*****

```

Respond "Yes" to this prompt if you need to define another unit information table for this device. Otherwise, respond with a "No".

iSBC® 188/48 DEVICE-UNIT INFORMATION SCREEN

The ICU uses the information from the following screen to create a device unit information block (DUIB) for the iSBC 188/48 driver.

```

***                                     ***
***                                     ***
----- iSBC 188/48 Device-Unit Information
(NAM) Device-Unit Name [1-13 chars]
(UN) Unit Number on this Device [0-OFFH]           0000H
(UIN) Unit Info Name [1-17 Chars]
(MB) Max Buffers [0-OFFH]                           0000H
***                                     ***
***. Enter Changes [Abbreviation ?/= new value] :
***! Do you have any more DUIBs for this device?
***!
*****!
*****!

```

```

*****
*      (NAM) Device-Unit Name [1-13 chars]      *
*****

```

This parameter line lets you specify a name that uniquely identifies the device-unit for the I/O System. If a task invokes the A\$PHYSICAL\$ATTACH\$DEVICE BIOS system call or the LOGICAL\$ATTACH\$DEVICE EIOS system call, it must use the name you enter for this configuration parameter as the system call's dev\$name input parameter. Because the iSBC 188/48 communications board is being used as a terminal driver, the device unit name normally begins with the letter "t", and then is followed by a number between the values of 0 to 11 (for example, t5).

The ICU allows you to enter from one to thirteen characters. Refer to the 8086/8087/8088 MACRO ASSEMBLER LANGUAGE REFERENCE MANUAL for rules regarding this name.

```

*****
*      (UN) Unit Number on this Device [0-OFFH]           0000H      *
*****

```

This parameter line lets you specify the unit number of this device-unit. The unit numbers for the device begin with zero and increase sequentially to a maximum value of 11.

Unit numbers zero to seven (0-7) are on board the iSBC 188/48 controller. Unit numbers eight and nine (8-9) are on SBX socket 1. Unit numbers ten and eleven (10-11) are on SBX socket 2.


```
*****
*      (UIN) Unit Info Name [1-17 Chars]      *
*****
```

This parameter line lets you specify the "Unit Info Name" of a unit information table that fills the needs of this DUIB. The following rules apply to the name you choose:

- You must create a unit information table with this "unit info name" before you run the second stage of the ICU.
- Each DUIB can point to only one unit information table.
- A particular unit information table can be pointed to by more than one DUIB.

```
*****
*      (MB) Max Buffers [0-OFFH]              0000H      *
*****
```

This parameter line lets you specify the maximum number of buffers that the Extended I/O System can allocate for this device's I/O. Unless you are planning on using a terminal for output only, do not change the default value. For terminals used for output only, you may want to specify a small non-zero value. Note, however, that the EIOS will delay output until the buffer is full or you close the connection to the device.

```
*****
*      Do you have any more DUIBs for this device?      *
*****
```

If you plan to use the iSBC 188/48 controller with two terminals that have different characteristics, respond "Yes" to the prompt "Do you have any more device-unit information blocks for this device?".

While developing your initial systems, you can create as many device-unit information blocks as you want. The number of DUIBs can exceed the number of devices on your system. The particular DUIB associated with the device depends on the physical name you use when attaching it. Once you know that you will never need a particular DUIB, save memory by deleting it from your description file before you generate your configuration files (refer to Chapter 17 for additional information on generating configuration files).

Table 18-1. Files Created by the Generate Command

File Name	Screens Used to Define the File
NTABLE.A86	Nucleus, Object Sys Calls, Job And Task Sys Calls, Exchange Sys Calls, Free Space Sys Calls, Interrupt Sys Calls, Extension Sys Calls, Exception Sys Calls
NDEVCF.A86	Hardware, Interrupts, iAPX 186 Initialization
MTH1.A86	Dynamic Debugger and Terminal Handler
ITABLE.A86	BIOS, Non-File Sys Calls, Physical File Sys Calls, Stream File Sys Calls, Named File Sys Calls
IDEVCF.A86	iSBC 204 Driver, iSBC 206 Driver, iSBC 208 Driver, iSBC 215/218 Driver, iSBC 220 Driver, iSBC 254 Driver, iSBX 270 Driver, iSBC 534 Driver, iSBC 544 Driver, 8251A Driver, Line Printer Driver, Terminal Handler Driver, 8274 Terminal Driver, Line Printer for iSBC 286/10, iSBX 251 Driver, SCSI Driver for iSBC 186/03, iSBX 218A Driver, RAM Driver, 82530 Driver, iSBC 188/48 Driver
ETABLE.A86	EIOS Sys Calls
EDEVCF.A86	EIOS, Logical Names
EJOB CF.A86	I/O Users, I/O Jobs
HCONFIG.P86	Human Interface, HI Jobs, Resident User, Prefixes, HI Logical Names
LCONFIG.P86	Application Loader
SDBCNF.A86	System Debugger

The files listed in Table 18-1 are the configuration files that define your system. These files are assembled while running your SUBMIT file. The ICU creates the SUBMIT file with the same filename as your definition file (with a .CSD extension). It is important that you don't already have files with these filenames in this directory on your disk. The ICU recreates these files every time you regenerate your system.



Changes made to the ICU definition file are not reflected in your configuration files until you again generate these files.

COPYING FILES

Before you can run the SUBMIT file created by the Generate Command, you must copy the contents of the release diskettes to your development system. If you followed the installation instructions listed in the iRMX 86 INSTALLATION GUIDE, you have already copied these files to their correct directories.

These files do not need to be copied to your development system until you are ready to use the SUBMIT file that the ICU generates for you. You must copy, if needed, the device driver files and the BIOS system files to the same disk.

From your responses to the "Includes and Libraries" screen the ICU knows where you should have copied your release diskette files. Verify that the files listed in Chapter 16 are in the directories or disks that you specified.

SUBMITTING THE SUBMIT FILE

After you exit the ICU and you insure that all of the files needed to configure your system are present, you simply submit your SUBMIT file and wait for your system to be generated.

The entire configuration process can be run on an Intellec development system with 192 K-bytes of dynamic memory. It should be noted, however, the SUBMIT file runs faster with additional memory.

The SUBMIT file assembles or compiles any configuration files generated by the ICU, links the object files created while running ASM86 with any needed libraries used by a subsystem, executes the second stage of the ICU, locates the subsystems, and creates libraries which identify the locations of the system code.

The syntax for invoking the SUBMIT file is:

```
SUBMIT output-file[.CSD]
```

where output-file is the name of your definition file.

Assembling the Configuration Files

The SUBMIT file identifies the configuration files that ASM86 assembles or PL/M86 compiles for each of your subsystems. The number of files assembled varies from system to system and depends upon the features that you choose for each subsystem. No errors should be caused during this phase. However, the compilation of the HCONFIG.P86 configuration file has one warning. Figure 18-1 shows portions of information generated during this phase of the configuration process.

If you mis-enter a screen name, the ICU prompts you with a screen that contains the information found in Table 2-4. You should note, however, that you do not have to enter the complete screen name - you must only enter enough characters to uniquely identify a particular screen. For example, since the "BIOS" screen is the only screen that has a name that begins with the letter "B", you only need to enter a "B" or a "b" to identify the "BIOS" screen.

```

***                                     ***
***. ENTER COMMAND : c b                .***
***!                                     !***
!***!                                   !***!
!***!                                   !***!
*****
*****

```

If you did not invoke the ICU with the name of an existing definition file, you must start your edit with the "Hardware" screen. If you did invoke the ICU with the name of an existing definition file, you can start your edit with the name of any screen that the input definition file already defined. If you enter a valid screen name but you have yet to define this screen, the ICU will display the next "main" screen. There is a logical order in which the ICU progresses from screen to screen. Refer to the section "Special Commands for Editing" for more information.

GENERATE COMMAND

```

***                                     ***
***. ENTER COMMAND : G                  .***
***!                                     !***
!***!                                   !***!
!***!                                   !***!
*****
*****

```

The Generate Command allows you to generate the configuration modules and the SUBMIT file that are needed to complete the configuration process. Refer to Chapter 18 for more information.

USING THE ICU TO DEFINE THE TARGET SYSTEM

This section describes a dialogue between a user (us) and the ICU. This dialogue demonstrates the steps needed to define the target system described in the previous section. In the dialogue, user input is underscored.

After having invoked the SUPER command, we invoke the ICU, giving the name of the default file and the desired name of the modified definition file, as follows:

```
super- ICU86 rmx86.def TO sam86.def
```

This produces the display shown in Figure B-1. We respond by indicating that we want to change the definition file and we want to begin with the sub-systems screen (shown in Figure B-2).

```

.*****.
*****
!****°                                     °****!
****°                                     °****
***°                                       °***
***                                       ***
***                                       ***
***                                       ***
***                                       ***
***   iRMX 86 Interactive Configurator For iRMX 86, V2.0   ***
***   Copyright 1982, 1984 Intel Corporation                 ***
***   The following commands are available                   ***
***                                                         ***
***   Change                                               ***
***   Generate                                             ***
***   List                                                 ***
***   Save                                                 ***
***   Quit                                                 ***
***   Exit                                                 ***
***   Replace                                              ***
***                                                         ***
***   ENTER COMMAND : c su                               ***
***.                                                       ***
****!                                                       !****
°****!                                                       °****°
*****
°*****°
```

Figure B-1. Initial ICU Screen (First)

We remove the System Debugger by changing the value of the SDB parameter to "No" on the "Sub-systems" screen. Then, to assign an iSBC 208 controller to level 1, we use the ^f editing command to find and display the "iSBC 208 Driver" screen. As is the case whenever there are no units yet defined in the definition file for the specified controller, doing this takes us to the device driver menu, shown in Figure B-3.


```

***                                     ***
***                                     ***
*** iSBC 544 Driver                       ***
*** (IL) Interrupt Level [Encoded Level]   0038H   ***
*** (MA) Memory Address Base [0-0FFFFH]    E000H   ***
*** (MS) Dual Port Memory Size [0-0FFFFH]  4000H   ***
*** (NB) Number of iSBC 544 Boards [1-4]   0001H   ***
***                                     ***
***. Enter Changes [Abbreviation ?/= new_value] : ^f iSBC 220 .***
****!                                     !****
°****!                                     !****°
*****
°*****°

```

Figure B-11. The iSBC® 544 Driver Screen

We plan to keep the iSBC 544 driver with no changes, so we request the iSBC 220 screen, which takes us to the device driver menu, shown in Figure B-12. Note that when we requested the iSBC 215/218 driver screen, we were taken directly to it, but now, when we request the iSBC 220 driver screen, we must go through the device driver menu. The reason for the difference is that, if the definition file already contains the definition of a unit for a particular driver, then we can go directly to the screen for that driver simply by requesting it, whereas, if there are no existing units for a driver, we can get to the screen for the driver only by way of the device driver menu.

From the device driver menu, we go to the iSBC 220 driver screen, which is shown in Figure B-13.

```

***                                     ***
***                                     ***
*** The following Intel-supplied device drivers are available ***
***                                     ***
*** 0) iSBC 204                1) iSBC 206                ***
*** 2) iSBC 208                3) iSBC 215/iSBX 218       ***
*** 4) iSBC 220                5) iSBC 254                ***
*** 6) iSBX 270                7) iSBC 534                ***
*** 8) iSBC 544                9) 8251A Terminal Driver   ***
*** 10) Line Printer           11) Terminal Handler Driver  ***
*** 12) 8274 Terminal Driver  13) Line Printer for iSBC 286/10 ***
*** 14) iSBX 251              15) SCSI Driver for iSBC 186/03 ***
*** 16) iSBX 218A            17) RAM Driver                ***
*** 18) iSBC 188/48          19) 82530 Terminal Driver   ***
***                                     ***
*** Enter the number for the device you wish to configure: 4 ***
***.                                     .***
****!                                     !****
°****!                                     !****°
*****
°*****°

```

Figure B-12. The Device Driver Menu


```

***
***
***
*** iSBC 220 Driver
*** (IL) Interrupt Level [Encoded Level] 0058H ***
*** (ITP) Interrupt Task Priority [0-OFFH] 0082H ***
*** (WIP) Wakeup I/O Port [0-OFFFFH] 0100H ***
***
***. Enter Changes [Abbreviation ?/= new value] : .***
***! Do you have any units for this device? y !****
***! ****!
*****
*****

```

Figure B-13. The iSBC® 220 Driver Screen

Since we do not need to make any changes to the "iSBC 220 Driver" screen in Figure B-13, all we need to do is respond "y" to the "Do you have any units for this device" prompt. This progresses us to the "iSBC 220 Unit Information" screen, shown in Figure B-14.

On the iSBC 220 unit information screen, we make three changes based on the data in our owner's manual for the drive (a 315-megabyte Century Data Systems AMS 315-1), and we assign a unique name to this unit. As before, by responding with only a carriage return to the question about more units, we indicate that there are no more units. This takes us to the device-unit information screen shown in Figure B-15.

```

*** iSBC 220 Unit Information ***
*** (NAM) Unit Info Name [1-17 Chars] ***
*** (MR) Maximum Retries [0-OFFFFH] 0009H ***
*** (CS) Cylinder Size [0-OFFFFH] 007EH ***
*** (NC) Number of Cylinders [0-OFFFFH] 024DH ***
*** (NFH) Number of Heads/Fixed Disk [0-OFFH] 0007H ***
*** (NRH) Number of Heads/Removable Disk [0-O0FFH] 0000H ***
*** (NS) Number of Sectors/Track [0-OFFFFH] 0012H ***
*** (NAC) Number of Alt. Cylinders [0-O0FFH] 0006H ***
*** (SSN) Starting Sector Number [0-OFFFFFFFH] 00000000H ***
*** (BTI) Bad Track Information [Yes/No] Yes ***
***
***. Enter Changes [Abbreviation ?/= new value] : nc= 34dh ***
*** : nfh= 13h ***
*** : nc= 14h ***
*** : nam= uinfo_220c ***
*** : bt= n ***
***. : ***
***! Do you have any more units for this device? !****
***! ****!
*****
*****

```

Figure B-14. The iSBC® 220 Unit Information Screen


```

***
***
*** The following Intel-supplied device drivers are available ***
***
*** 0) iSBC 204          1) iSBC 206          ***
*** 2) iSBC 208          3) iSBC 215/iSBX 218 ***
*** 4) iSBC 220          5) iSBC 254          ***
*** 6) iSBX 270          7) iSBC 534          ***
*** 8) iSBC 544          9) 8251A Terminal Driver ***
*** 10) Line Printer     11) Terminal Handler Driver ***
*** 12) 8274 Terminal Driver 13) Line Printer for iSBC 286/10 ***
*** 14) iSBX 251         15) SCSI Driver for iSBC 186/03 ***
*** 16) iSBX 218A        17) RAM Driver        ***
*** 18) iSBC 188/48      19) 82530 Terminal Driver ***
***
*** Enter the device number you wish to configure: 17 ***
***. Do you have any units for this device? y ***
****! ****! ****
o****! ****o
*****
o*****o

```

Figure B-16. The Device Driver Menu

interrupt handler DD 3-3; IG 7-5; NU 1-7, 8-1, 8-14, 12-73, 12-116,
 12-136, 12-152
 duties NU 8-17
 setting up NU 8-15
 using NU 8-16
 interrupt jumpers IG 8-2
 interrupt level CG 3-11, B-1; DD 3-8, 7-5; NU 8-8, 8-27, 12-60, 12-66,
 12-84, 12-116, 12-136; TH 4-3; see also: appropriate device driver
 assignment IG 7-1
 selection of IG 6-3
 interrupt lines IG 5-2, 6-3, 7-1, 7-2, 8-3; NU 8-1
 interrupt management NU 8-1
 interrupt mechanisms NU 8-1
 Interrupt Screen CG 3-12
 interrupt servicing NU 12-165
 patterns NU 8-20
 examples NU 8-29
 multiple buffers NU 8-22
 INTERRUPT SYS CALLS screen CG 13-12
 interrupt task CA 4-9, 4-22; DD 3-3, A-3; NU 8-14, 12-136, 12-152,
 12-165
 duties NU 8-18
 priorities NU 8-18
 using NU 8-17
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 interrupt task priority DD 3-9; see also: appropriate device driver
 interrupt vector table NU 8-8, 10-3, 12-141
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 interrupt vectors CG 19-3
 INTERRUPT\$TASK procedure DD 3-3, A-9
 Interrupts screen CG 3-8
 intertask coordination IN 4-7, 5-4
 inventory IG 1-1
 invisible files OP 3-41
 invoking an exception handler NU 7-13
 invoking the Analyzer CA 3-5
 invoking the Crash Analyzer CA 3-1
 invoking the Debugger DB 1-3
 invoking the Disk Verification Utility DV 1-1
 invoking the Dumper CA 3-4
 invoking the Interactive Configuration Utility CG 2-3
 on a Series III Development Systems CG 2-5
 on a iRMX™ 86-Based Systems CG 2-5
 invoking the System Debugger SD 3-1
 IOOPTL.LIB file CG 16-3

AL Application Loader (V3)	DB Debugger (V3)	HI Human Interface (V3)	OP Operator (V1)
BI BIOS (V2)	DD Device Drivers (V3)	IG Installation (V4)	PT Programming Techniques (V3)
BL Bootstrap Loader (V3)	DV Disk Verify (V1)	IN Introduction (V1)	SD System Debugger (V3)
CA Crash Analyzer (V3)	EI EIOS (V2)	NU Nucleus (V2)	TH Terminal Handler (V3)
CG Configuration (V4)			UD UDI (V3)

V1 = Introduction and Operator's Reference Manual
 V2 = Programmer's Reference Manual, Part I

V3 = Programmer's Reference Manual, Part II
 V4 = Installation and Configuration Guide

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 IOS.LIB file CG 16-3
 IOS.MP2 file CG 21-6
 iOSP™ 86 Support Package IN 4-38
 iOSP™ firmware CG 18-9
 iOSP-based systems CG 1-1, 4-2
 iOSP86 CG 16-3
 IPIFC.LIB library CG 16-4, 19-13; PT 2-4
 IPIFL.LIB library CG 16-4, 19-13; PT 2-4
 IPRNTR.P86 printer driver source file DD B-2
 iRMX™ 86 Operating System CG 5-1; IN 1-1; see also: individual subsystems
 Basic I/O System BI 2-1, 3-1; EI 1-1, 4-17, 7-29, 7-34, 7-48, 7-54, E-1
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 iSBC® 186/03 processor board CG 3-3, 3-18, 10-165
 iSBC® 186/03 SCSI driver CG 2-12
 iSBC® 186/51 processor board CG 3-3, 3-18, 10-152.1, 19-3
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 iSBC® 204 flexible disk driver CG 10-2
 iSBC® 206 hard disk driver CG 10-12
 iSBC® 208 flexible diskette driver CG 10-21
 iSBC® 215 Winchester disk driver CG 10-34
 iSBC® 215G board CG 9-7
 iSBC® 215G controller BI 8-92
 iSBC® 216 tape driver CG 10-201
 iSBC® 220 disk driver CG 10-62
 iSBC® 254 bubble memory controller CG 10-76
 iSBC® 254 driver CG 10-76
 iSBC® 254S bubble memory controller CG 10-76
 iSBC® 286 monitor DB 1-1
 iSBC® 534 boards CG 10-96
 iSBC® 534 device driver BI G-1
 iSBC® 534 terminal driver CG 10-95
 iSBC® 544 device driver BI G-2
 iSBC® 544 driver CG 4-2
 iSBC® 544 intelligent communications board CG 4-2, 10-108, 10-106
 iSBC® 544 terminal driver CG 10-106
 iSBC® 86,88,186,188,286 boards IN 4-36
 iSBC® 86/05 processor board CG 3-2



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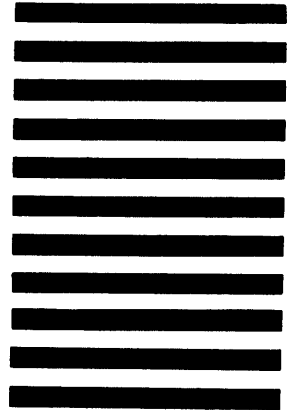
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