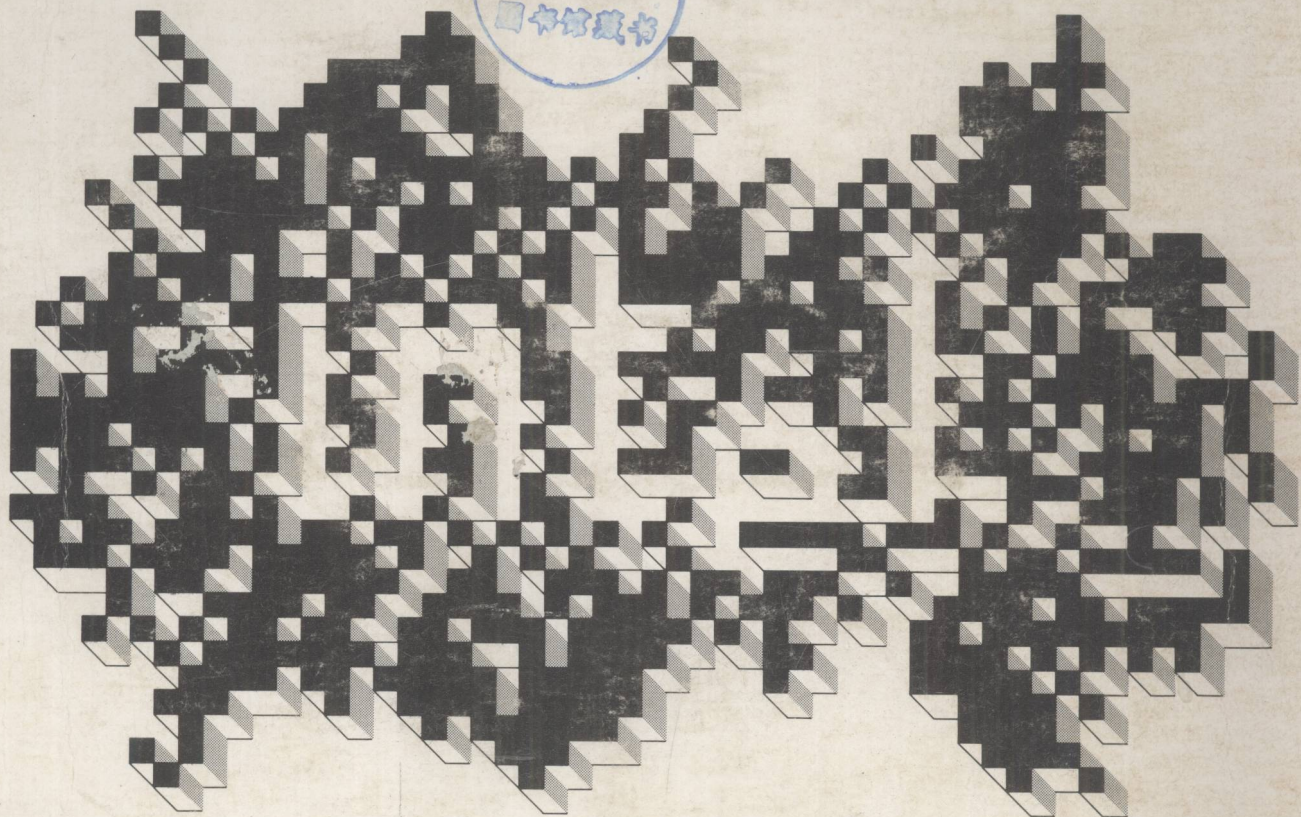




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iPLP 720 GRAPHICS SOFTWARE REFERENCE MANUAL

for Release 1



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GRAPHICS SOFTWARE REFERENCE MANUAL
for Release 1

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PREFACE

The purpose of this manual is to provide iRMX 86 users with the information they need to add the iPLP 720 software in their systems. This software is a device driver for Intel Graphics Controller Multimodule boards.

READER LEVEL

This manual is intended for programmers who are familiar with the concepts and terminology introduced in the iRMX 86 NUCLEUS REFERENCE MANUAL, the iRMX 86 BASIC I/O SYSTEM REFERENCE MANUAL, the ANSI VIDEOTEX/TELETEXT PRESENTATION LEVEL PROTOCOL SYNTAX (NORTH AMERICAN PLPS) STANDARD, and the iRMX 86 CONFIGURATION GUIDE.

Certain portions of this manual assume that you are a systems-level programmer experienced in dealing with I/O devices. In particular, it assumes that you are familiar with the following:

- The PL/M-86 programming language and/or the MCS-86 Macro Assembly Language.
- The GUIDE TO WRITING DEVICE DRIVERS FOR THE iRMX 86 AND iRMX 88 I/O SYSTEMS.

NOTATIONAL CONVENTIONS

The following conventions are used to show syntax in this manual:

- UPPERCASE Information appearing in uppercase must be entered or coded exactly as shown. This information, however, can actually be entered in uppercase or lowercase.
- lowercase Fields appearing in lowercase indicate variable information. The user must enter the appropriate value or symbol for variable fields.

Topic headings used in this manual indicate the organizational level of the section that follows. The sequence of headings is as follows: CAPITALS UNDERLINED, CAPITALS, Initial Capitals.

RELATED PUBLICATIONS

The following manuals provide additional information that may be helpful to users of this manual.

- Guide to Writing Device Drivers for the iRMX™ 86 and iRMX™ 88 I/O Systems, Order Number: 142926
- Intel's Guide to Understanding the ANSI Videotex/Teletext Presentation Level Protocol Syntax (North American PLPS), Order Number: 145412
- Universal PROM Programmer User's Manual, Order Number: 9800819
- iRMX™ 86 Configuration Guide, Order Number: 9803126
- iSBX™ 275 Video Graphics Controller Multimodule Board Reference Manual, Order Number: 144829
- Microprocessor and Peripheral Handbook, Order Number: 210844
- iAPX 186 High Integration 16-bit Microprocessor, Order Number: 210451

Readers of this manual will want to have at hand a copy of the ANSI document BSR X3.110:

American National Standard

Videotex/Teletext Presentation Level Protocol Syntax
(North American PLPS)

If you do not already have a copy of this document, you can obtain one by sending a request for document BSR X3.110 to:

X3 Secretariat
CBEMA
311 First St., NW
Washington, DC 20001

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CHAPTER 1. OVERVIEW

The basic purpose of this manual is to provide iRMX 86 users with the information they need to add the iPLP 720 software in their systems. This software is basically a device driver for iSBX 275 and iSBC 186/78 graphics controller boards.

BACKGROUND INFORMATION

This chapter gives background information on the standard, the 82720 graphics display component, the iPLP 720 software, the iSBX 275 board, and the iSBC 186/78 board. This chapter also includes information on how the product is packaged.

THE NAPLPS STANDARD

This manual describes an implementation of and makes frequent references to the NAPLPS Standard (dated October 1982). Any changes made to the Standard after this date will be incorporated into future releases of the software.

Because this manual makes numerous references to the Standard, the following acknowledgment is included to satisfy a request made in the preface to the Standard:

"NAPLPS character sets are industry character sets and are not the property of any company or group of companies, or of any organization or group of organizations.

No warranty, expressed or implied, is made by any contributor as to the accuracy and functioning of the character sets. Moreover, no responsibility is assumed by any contributor, or by the committee, in connection therewith.

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OVERVIEW

Note: The user's attention is called to the possibility that conformance with this standard may require use of an invention covered by patent rights. By publication of this standard, no position is taken with respect to the validity of this claim or of any patent rights in connection therewith. The patent holder has, however, filed a statement of willingness to grant a license under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license."

THE 82720 GRAPHICS DISPLAY COMPONENT

The 82720 Graphics Display Controller (GDC) is an intelligent microprocessor peripheral designed to drive high-performance raster-scan computer graphics. Positioned between the video display memory and an Intel microprocessor bus, the GDC performs the actions needed to generate the raster display and to manage the display memory. Processor software overhead is reduced by the GDC's instructions set, graphics figure drawing, and DMA transfer capabilities. The display memory supported by the GDC can be configured in any number of formats and in sizes up to 256K 16-bit words. The display can be zoomed while partitioned screen areas can be independently scrolled and panned. Refer to Intel's MICROPROCESSOR AND PERIPHERAL HANDBOOK for detailed information about the 82720 component.

THE iPLP 720 SOFTWARE

The iPLP 720 software implements the NAPLPS videotex standard on an 82720-based graphics controller system under an iRMX 86 Operating System. You can use the software in two different environments. In one environment all elements of the software are either tasks in an iRMX 86 Operating System or the graphics applications programs. This defines a stand-alone configuration. In the other environment, a distributed configuration, the device driver interface runs in an iRMX 86-based environment and the remaining software can run on a separate processor. This architecture can be expanded to meet the needs of other operating systems by interfacing to an intelligent controller (such as the iSBC 186/78 board). In either environment there are numerous configuration options, including various display resolutions, scan rates, and fonts.

THE iSBX™ 275 AND iSBC® 186/78 BOARDS

Intel presently supports two graphics boards, the iSBX 275 and the iSBC 186/78 boards. Both of these boards use the 82720 component and support the iPLP 720 software. Because of hardware constraints, the iSBX 275 board is not fully compatible with the NAPLPS videotex standard. These constraints are discussed in chapter 2.

OVERVIEW

iSBX™ 275 Video Graphics Controller

The iSBX 275 Video Graphics Controller allows users to add high-level video display capability to their computer system. The iSBX 275 module offers a self-contained, bit-mapped graphics subsystem on a 3-inch by 7-inch iSBX MULTIMODULE board. This subsystem supports either black and white or eight-color displays. Under the control of the 82720 GDC, the iSBX 275 board directly supports the following high-level drawing commands:

- lines
- arcs
- circles
- rectangles
- characters
- area fill
- pan and scroll (black and white mode only)

The iSBX 275 board is compatible with any computer board or system product supporting the industry-standard iSBX bus. The host board passes commands, data, and status to and from the 82720 controller via two iSBX bus I/O ports.

The software interface consists of a series of high-level commands passed to the 82720 component. Table 1-1 contains a summary of 82720 software commands.

The iSBX 275 board contains 32K bytes of high-speed display memory, all of which is under the control of the 82720 component. The 82720 component writes and reads 16-bits of display data to and from the screen and refreshes the screen.

Table 1-1. 82720 Command Summary

Video Control Commands	
RESET:	Resets the GDC to its idle state
SYNC:	Specifies the video display format
CCHAR:	Specifies the cursor and character row heights
Display Control Commands	
START:	Ends idle mode and unblanks the display
BCTRL:	Controls the blanking and unblanking of the display
ZOOM:	Specifies zoom factors for graphics character writing
CURS:	Sets the position of the cursor in display memory
xPRAM:	Defines starting addresses and lengths of the display areas and specifies the eight bytes of a graphics character
PITCH:	Specifies the width of the X dimension of display memory

OVERVIEW

Table 1-1. 82720 Command Summary (continued)

Drawing Control Commands	
WDAT: MASK: FIGS: FIGD: GCHRD:	Writes data words or bytes into display memory Sets the mask register contents Specifies the parameters for the drawing processor Draws the figure as specified by FIGS Draws the graphics character into display memory and provides area-filling
Data Read Commands	
RDAT: CURD: LPRD:	Reads data words or bytes from display memory Reads the cursor position Reads the light pen address

iSBC® 186/78 Intelligent Video Graphics Subsystem

The iSBC 186/78 Intelligent Graphics Controller is a MULTIBUS-based, intelligent, medium resolution graphics board. The board's CPU is an 80186 processor. The 80186 CPU provides three timers and two DMA channels. One channel is connected to the GDC DMA request logic and the other channel is used for iSBX DMA requests.

The graphics section of the iSBC 186/78 board is similar to that of the iSBC 275 board. The iSBC 186/78 board, however, provides the following additional features: four times more display RAM, multi-write (a feature that allows parallel writing into four memory planes), DMA to or from the display RAM, and a color lookup table. The color lookup table includes a 16 X 12 bit RAM array and the digital-to-analog drivers to drive the Red, Green, and Blue CRT guns. Sixteen colors, from a menu of 4096 colors, may be displayed on the CRT.

Neither the iSBC 186/78 board nor the iSBX 275 board provides two features that the GDC supports: an external character generator and zoom read. The board does support graphics mode, mixed graphics and character mode, and light pen input.

PREREQUISITES

In order to use the iPLP 720 software (object form), you must have an iRMX 86-based system with an iSBC 275 or iSBX 278 board. The source code for the iPLP 720 software and the related documentation is not part of the iRMX 86 object-code product.

OVERVIEW

THE iRMX™ 86-BASED SYSTEMS

Your iRMX 86-based system must include the Nucleus, the Basic I/O System and either the iSBX 275 Video Graphics Controller or the iSBC 186/78 Intelligent Graphics Controller. If your system includes an ES (Engineering Sample) release of the iSBC 186/78 board, you also need the ES documentation for this board.

The iPLP 720 SOFTWARE PACKAGE

Your shipment of the iPLP 720 software includes this manual and 6 release diskettes. Each of the diskettes are 8-inch, single-sided, double-density flexible diskettes in one of two medias. The contents of these diskettes are listed in Appendix A.

CHAPTER 2. FEATURES OF THE iPLP 720 SOFTWARE

This chapter discusses how the iPLP 720 software implements the NAPLPS Standard. The chapter is intended for users who want to understand the design of the iPLP 720 software and its capability with respect to the Standard and its Service Reference Models. To fully understand this chapter you should be familiar with the Standard. A user who simply wants to install the iSBX 275 or the iSBC 186/78 board and the iPLP 720 software may need to reference this chapter during the configuration process.

IMPLEMENTING THE NAPLPS STANDARD

This chapter is designed for easy cross-reference with the Standard. For the most part, information that appears in the Standard is not duplicated in this manual. However, the Standard does not always state how a given feature should be implemented. In these cases the Standard provides guidelines that require definition when implemented. This chapter defines how Intel has implemented these guidelines.

NOTE

The iPLP 720 software implements the Standard dated October 1982. The Standard as of this date did not clearly define unprotected fields. This software, however, implements unprotected fields and is very close to the requirements described in the approved ANSI NAPLPS standard.

FEATURES THAT REQUIRE NO SPECIAL IMPLEMENTATION

For ease of reference, this section lists those functions that do not require any special implementation. Refer to the standard for information about any of these functions.

The following list includes the attribute control functions and geometric drawing primitives that require no special implementation.

- RESET
- POINT
- LINE
- RECTANGLE
- INCREMENTAL