VMS Workstation Software Guide to Printing Graphics

June 1989

This manual provides information about the two printing options included with VMS Workstation Software: Print Screen and HCUIS.

Revision/Update Information:	This manual supersedes the *MicroVMS Workstation Guide to Printing Graphics*, available when VWS V3.2 was released (Order Number AA-HQ85B-TN).
Software Version:	This manual contains information for both VWS Version 3.3 and VWS Version 4.0.
Operating System and Version:	For systems running VMS Version 4.6 and later, VWS Version 3.3.
	For systems running VMS Version 5.0, VWS Version 4.0.

Digital Equipment Corporation

The postpaid READER'S COMMENTS form on the last page of this document requests the user's critical evaluation to assist in preparing future documentation.

The following are trademarks of Digital Equipment Corporation:

DEC	DIBOL	UNIBUS
DEC/CMS	EduSystem	VAX
DEC/MMS	IAS	VAXcluster
DECnet	MASSBUS	VMS
DECsystem–10	PDP	VT
DECSYSTEM–20	PDT	
DECUS	RSTS	**digital** TM
DECwriter	RSX	

This document was prepared using VAX DOCUMENT, Version 1.1

INSTRUCTIONS

The enclosed pages are to be placed in the *VMS Workstation Software Guide to Printing Graphics* as replacements for or additions to the current pages. On replacement pages, changes and additions are indicated by vertical bars (|).

Keep this notice in your manual to maintain an up-to-date record of changes.

Old Page(s)	New Page(s)
Title/Copyright	Title/Copyright
Contents iii/iv through v/blank	Contents iii/iv through v/blank
Preface vii through viii	Preface vii through viii
1–1/1–2 through 1–5/blank	1–1/1–2 through 1–3/blank
4–3/4–4	4–3/4–4 through 4–4.1/blank
A–1/blank	A–1/blank
Index–1/Index–2 through Index–3/blank	Index–1/Index–2 through Index–3/blank
Reader's Comments/Mailer	

Contents

PART I   USER INFORMATION

Contents

CHAPTER 6   HCUIS$ ROUTINES AND CONDITION VALUES   6-1

APPENDIX A   /DRAFT AND /NODRAFT DIFFERENCES   A-1

INDEX

TABLES

Preface

This manual describes the two printing options included in the VMS Workstation Software: Print Screen and HCUIS.

Print Screen, part of the Workstation Options menu, prints a specified portion of a display. Print Screen requires a printer that accepts sixel format.

Hardcopy User Interface Services (HCUIS) comes with your workstation software kit and can be automatically installed when you install the workstation software. HCUIS is part of the VWS base kit installation process.

HCUIS enables users and applications to translate UIS pictures to the formats needed for printing on a variety of hard-copy devices. HCUIS also enables applications to create UIS files.

Intended Audience

Part I of this manual is for workstation users who want to print pictures. Part II is for programmers who want to incorporate HCUIS into applications.

Document Structure

This guide is divided into two parts:

- Part I—User Information

  This section contains the following four chapters:

  - Chapter 1—Overview

    This chapter briefly describes Print Screen and HCUIS.

  - Chapter 2—Device Setup

    This chapter describes how to set up hard-copy devices.

  - Chapter 3—The Print Screen Function

    This chapter describes how to use the Print Screen function from the Workstation Options menu.

  - Chapter 4—The RENDER Command

    This chapter describes the RENDER command, which is part of HCUIS.

- Part II—Programmer Information

  This section contains information for programmers who want to incorporate HCUIS into applications.

  - Chapter 5—Programming Interface

This chapter gives a general description of how HCUIS routines are used and how picture fidelity varies across devices.

- Chapter 6—HCUIS$ Routines

This chapter is a reference section for HCUIS$ routines.

Associated Documents

The following VMS Workstation Software manuals are related to this guide:

- *VMS Workstation Software User's Guide*
- *VMS Workstation Software Graphics Programming Guide*

Conventions

This manual uses the following conventions:

Convention	Meaning
RETURN key	All commands end with a carriage return.
CTRL/x	The symbol CTRL followed by a slash and a letter means that you press the letter while holding down the CTRL key. For example, CTRL/B means press B while pressing CTRL.
Key symbols	In examples, keys and key sequences appear as symbols, such as PF2 and CTRL/Z.
Square brackets ([ ])	Optional parameters are enclosed in square brackets.
Vertical ellipsis	A vertical ellipsis indicates that part of an example is not included.
Lists	When a format item is followed by a comma and an ellipsis (,...), you can enter a single item or a number of the items separated by commas.
Italics	Italicized words indicate that you should supply a value.

Part I User Information

1 Overview

This chapter gives an overview of the Print Screen function, which is part of the Workstation Options menu, and Hardcopy UIS (HCUIS), which is an optional part of the workstation software kit.

1.1 Print Screen

Print (portion of) Screen is part of the workstation software that appears as an option on the Workstation Options menu. With Print (portion of) Screen, you can choose a rectangular portion of the display screen and print it. (Chapter 3 contains information on how to use Print Screen.)

Print Screen sends the bitmap screen display to the printer. For this reason, the printer must accept sixel format. Printers you can use with Print Screen include DIGITAL's LA50, LA75, and LA210 dot matrix printers; LJ250 ink jet printer; and LN03/LN03 PLUS laser printers. (Chapter 2 contains information about how to set up these printers.)

1.2 HCUIS

Hardcopy UIS (HCUIS) comes with your workstation software kit, and it can be automatically installed when you install the workstation software. (See the *VMS Workstation Software Installation Guide* for detailed instructions on installing VWS and HCUIS.) HCUIS enables users and applications to translate UIS pictures to formats that allow you to print them on a variety of hard-copy devices. HCUIS also makes it easy for applications to create UIS files.

Use the RENDER command to translate the picture in a UIS file to a format suitable for the hard-copy device you are using. This allows you to use graphics capabilities of your workstation hard-copy devices. If, for example, a printer uses PostScript,™ text in the translated file is printed, using PostScript fonts. Similarly, if a sixel printer has a higher resolution than the screen, the translated picture can be printed at the higher resolution. (Chapter 4 contains information on the RENDER command.)

To generate UIS files, you need applications that support their creation. If you have questions about whether an application can create UIS files, refer them to the applications vendor. The workstation software contains a picture-drawing application, SIGHT, that supports UIS files.

Use the HCUIS$ routines supplied with HCUIS to develop applications that support UIS files. (Chapters 5 and 6 contain information on the HCUIS$ routines.)

You can use the following hard-copy devices with HCUIS:

™ PostScript is a registered trademark of Adobe Systems, Incorporated.

DIGITAL Dot Matrix Printers

- LA50

- LA75

- LA100

- LA210

DIGITAL Laser Printers

- LN03

- LN03 PLUS

- LN03R

- PrintServer 40

DIGITAL Ink Jet Printers

- LCG01 (formerly the LCP01)

- LJ250

DIGITAL 6-Pen Plotter

- LVP16

Apple Laser Printer

- LaserWriter™

Hewlett-Packard 6-Pen Plotter

- HP 7475™

Hewlett-Packard 8-Pen Plotters

- HP 7550™

- HP 7580™

- HP 7585™

Hewlett-Packard File Recorder

- HP 7510™ film recorder

Lasergraphics' Film Recorder

- MPS-2000™

™ LaserWriter is a trademark of Apple Computer, Inc.

™ HP 7475, HP 7550, HP 7580, HP 7585, and HP 7510 are trademarks of the Hewlett-Packard Corporation.

™ MPS-2000 is a trademark of Lasergraphics, Inc.

DIGITAL Video Devices

- VT240

- VT241

Chapter 2 contains information about how to set up these devices.

These devices have very different characteristics. See Section Section 5.5 for information about how different devices interpret pictures.

1.2.1 HCUIS Translators

Each of the four translators supplied with HCUIS supports a different device class. In theory, the devices in a given class are compatible. In practice, minor differences exist among them. Thus, while HCUIS supports only the devices described in this manual, other devices might also be compatible with the translators.

The following table lists the translators and the devices they support:

Translator	Supported Devices
Sixel	LA50 printer
	LA75 printer
	LA100 printer
	LA210 printer
	LJ250 color printer
	LN03 printer
	LN03 PLUS printer
PostScript	LaserWriter printer
	PrintServer 40 printer
	LN03R printer
ReGIS	LCG01 color printer
	VT240 terminal
	VT241 terminal
HPGL	LVP16 plotter
	HP 7475 plotter
	HP 7550 plotter
	HP 7580 plotter
	HP 7585 plotter
	HP 7510 film recorder
	MPS-2000 film recorder

1.3 Where To Go from Here

To use the PRINT command, Print Screen, or HCUIS, you must set up your hard-copy devices properly. Refer to Chapter 2 for more information on setting up devices.

Translator	Supported Devices
Sixel	LA50 printer
	LA75 printer
	LA100 printer
	LA210 printer
	LJ250 printer
	LN03 printer
	LN03 PLUS printer
PostScript	LaserWriter printer
	PrintServer 40 printer
	LN03R printer
ReGIS	LCG01 color printer
	VT240 terminal
	VT241 terminal
HPGL	LVP16 plotter
	HP 7475 plotter
	HP 7550 plotter
	HP 7580 plotter
	HP 7585 plotter
	HP 7510 film recorder
	MPS–2000 film recorder

1.3 Where To Go from Here

To use the PRINT command, Print Screen, or HCUIS, you must set up your hard-copy devices properly. Refer to Chapter 2 for more information.

2 Device Setup

This chapter explains how to connect hard-copy devices to your workstation.

2.1 Print Screen

You can use the following hard-copy devices with Print Screen:

LA50
LA75
LA100
LA210
LJ250
LN03
LN03 PLUS

Unless you use the Printer Setup menu to choose an alternate destination, Print Screen uses the printer attached to CSA0. (See Chapter 2 of the *VMS Workstation Software User's Guide* for information on the Printer Setup menu.)

2.2 Device Setup Command Procedure

The startup command file provided with the workstation software, STARTVWS.COM, calls another command file, HCUISDEVICES.COM. You can modify this second command file to set up the hard-copy devices on your system and to initialize print queues. In HCUISDEVICES.COM, each line begins with an exclamation point (!) to indicate the command line is a comment rather than a command. Delete the exclamation point and fill in the placeholders for the lines that apply to your workstation.

You can use hard-copy devices set up by HCUISDEVICES.COM with the PRINT command, HCUIS, or Print Screen, except as noted previously.

NOTE: **Before you can use print queues, the VMS Secure User Environment option must be installed.**

The following example shows the HCUISDEVICES.COM command file:

```
$SET NOON
$! HCUISDEVICES.COM - template for initializing hard-copy devices on your s
$!
$! Remove (!) in the START/QUEUE if you want to set up any print queues
$! via HCUISSETUP.
$! If you uncomment-out the START here, do NOT uncomment-out the START/QUEU
$! in SYSTARTUP.COM.
$!
$!❶START/QUEUE/MANAGER/BUFFER_COUNT=10/EXTEND_QUANTITY=25
$
$! Remove (!) from each HCUISSETUP line that applies to your system, AND:
$! 1) Replace csa0: with port the device is on if necessary -- eg. TTA1:
$! 2a) Delete qname & /whatever if you do NOT want to setup a print queue
$!     OR
$! 2b) Replace them with whatever queue name and qualifiers you wish to use
$!  (If you need no qualifiers, just delete /whatever).
$! 3) Change parameter 2, the device's speed, if desired.
$! You may have multiple lines that refer to the same type of device.
$! You may NOT have multiple lines that refer to the same port.
$!
$!❷@sys$manager:hcuissetup ❸la50 ❹4800 ❺csa0: ❻qname /❼whatever
$!@sys$manager:hcuissetup la75 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup la100 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup la210 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup lj250 4800 csa0: qname /whatever
$!@sys$manager:hcuissetup ln03 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup ln03r 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup ln03plus 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup lvp16 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup hp7475 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup hp7550 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup hp7580 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup hp7585 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup hp7510 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup mps2000 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup laserwriter 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup lcp01 9600 csa0: qname /whatever
$!@sys$manager:hcuissetup lcg01 9600 csa0: qname /whatever
```

The explanation for the parts of each line is as follows:

❶ Delete the comment character from this line if you want to set up print queues. If you delete this comment character, do **not** delete comments from the lines in SYSTARTUP.COM that are for setting up the queue manager. See the *VMS Software User's Manual* for information about SYSTARTUP.COM.

❷ @sys$manager:hcuissetup calls the setup procedure for a device. Normally, you would never delete or modify HCUISSETUP.COM.

If you delete the comment character, do **not** delete comments from the lines in SYSTARTUP.COM that are for the same port. See the *VMS Software User's Manual* for information about SYSTARTUP.COM.

❸ LA50 is the device type. If you have more than one device type, repeat the line for each device, making the necessary changes.

❹ 4800 is the device speed. It can be changed, if desired. Set the speed to match the setting on the device. Refer to the operator manual for your hard-copy device for information.

Note that for the port CSA0, this value is ignored. Instead, set the baud rate dial on the back of your VAX to match the device setting.

On the VAX I, 1200 baud is the fastest speed you can set for an LA50 attached to the port CSA0.

⑤ CSA0 is the port to which the device is connected. If the device is not connected to CSA0, change it to the correct name.

The workstation comes standard with only one printer port, named CSA0. See the Option Installation section of the *VAXstation Owner's Manual* for information on acquiring additional ports.

⑥ The *qname* placeholder allows you to set up a print queue for your hard-copy device. Print queues allow you to use the PRINT command.

To set up a print queue, replace *qname* with the name you want for the queue. The name for the default print queue is SYS$PRINT.

If you do not want to set up a print queue, delete *qname /whatever*.

⑦ The */whatever* placeholder allows you to modify the print queue you have set up. To change the default characteristics of the queue, replace the */whatever* with the necessary qualifiers.

If you are setting up a print queue with the default characteristics, delete */whatever* but still give the queue a name.

See the *VMS Software User's Manual* for information about print queues.

2.3   Setup Information

This section gives the workstation-specific information you need to physically set up the supported hard-copy devices. For general setup information, see the operator manual that comes with your hard-copy device. For general setup information, see your *VAXstation Owner's Manual*.

2.3.1 LA50 Printer

Set switch 1–5 to OFF to get the graphics mode dot ratio of 2 to 1. (See *Installing and Using the LA50 Printer* for information on setting the switches.)

On the VAX I, 1200 baud is the fastest speed you can set for an LA50 attached to the port CSA0.

2.3.2 LN03 Printer

At the front of your LN03 are slots for two cartridges. You must have one RAM cartridge to print pictures. If you print "artwork" as well as business graphics, you need two RAM cartridges. Each RAM cartridge gives the LN03 128K bytes more room for storing picture and font data.

It is possible that picture complexity could exceed LN03 limits. However, you might be able to rectify the problem as follows:

If a flashing 1 appears in the error box:

• Use solid fill or a simple pattern if a half-tone or other "busy" pattern was used across the width of the page.

• Specify /DRAFT when you translate the picture.

If the top half of the picture is printed on one piece of paper and the bottom half on a second piece:

- Try the remedies described for the flashing 1 error.

- Add another RAM cartridge.

When you use the Print Screen function, you should use a logical, UIS$PRINT_CRFF, if you want to append a carriage return and form feed to your output. Refer to the *VMS Workstation User's Guide*.

2.3.3 LA75 Printer

On the front panel, set the Protocol Set-up selector to "DEC".

2.3.4 LA100 Printer

The LA100 does not require any HCUIS-specific setup information.

See the operator's manual that came with your hard-copy device and your *VAXstation Owner's Manual* for general setup information.

2.3.5 LJ250 Printer

The LJ250 does not require any HCUIS-specific setup information.

See the operator's manual that came with your hard-copy device and your *VAXstation Owner's Manual* for general setup information.

2.3.6 LN03 PLUS Printer

When you use the RENDER command to print a file on the LN03 PLUS, Working Set Extent on your system must be approximately 2000 or more. The default value for Working Set Extent is 500. If the Working Set Extent is too small, the RENDER command generates many page faults.

To change this value, use the Authorize Utility (AUTHORIZE), as follows:

1　Log into the system account.

2　Type the following commands:

```
$ SET DEFAULT SYS$SYSTEM
$ RUN AUTHORIZE
```

The system responds with the UAF> prompt.

3　To change the value for Working Set Extent, type the following command:

```
UAF> MODIFY username/WSEXTENT=2000
```

4　To exit from Authorize, type the following command:

```
UAF> EXIT
```

To put the new values into effect, log out and log in again.

When you use the /NODRAFT qualifier to the RENDER command, the bitmap for drawing a picture on A-size paper is 1 megabyte. Make sure that the SYSGEN parameters of your VAXstation are set such that the sixel translator can allocate that amount of memory.

When you use the Print Screen function, you should use a logical, UIS$PRINT_CRFF, if you want to append a carriage return and form feed to your output. Refer to the *VMS Workstation Software User's Guide*.

2.3.7 LN03R Printer

The LN03R does not require any HCUIS-specific setup information.

See the operator's manual that came with your hard-copy device and your *VAXstation Owner's Manual* for general setup information.

2.3.8 Apple LaserWriter

To connect the LaserWriter to a VAXstation, you need a male-male cable in series with a standard DIGITAL printer cable.

Set the dial on the back of the LaserWriter to either 9600 or 1200.

2.3.9 LCG01 Color Printer

The LCG01 comes with a software kit that you must install before you use the printer on your system.

You need Version 1.2 or later of the LCG01 software if you want to draw pictures that use filled polygons or bold text.

Turn on the LCG01 before you boot your workstation.

If you set up HCUISDEVICES.COM to initialize an LCG01, its firmware is automatically loaded when you boot the workstation. If, after you boot the workstation, the LCG01 is turned off for any reason, you must reload its firmware. To do this, copy SYS$SYSROOT:[LCP01]LCP01SW.DAT to the LCG01.

2.3.10 VT240/VT241 Terminals

You must have Version 2.1 or later of the terminal firmware to draw pictures that use filled polygons. To determine the revision level of your terminal firmware, press the Set-Up key.

2.3.11 PrintServer 40 Printer

You must install V1.0 or later of the PrintServer 40 Client Software on the VAX/VMS system that will print your pictures. This system would normally be your VAXstation, but it could be another system. For example, you could use the RENDER command to create an REN file on your VAXstation, then copy the REN file to a remote VAX and print your picture there.

There are two methods to render and print a picture on the PrintServer 40. The first requires that you render and print the file separately. The second allows you to render and print the file simultaneously. To use the second method, you must have the PrintServer 40 Client Software installed on your VAXstation.

1   To render the picture, type the RENDER command, as follows:

```
$ RENDER MYPIC/DEVICE=LPS40
```

This creates an output file called MYPIC.REN.

To print the REN file, you should specify the /PARAMETER = (DATA_ TYPE = POST) qualifier after the PRINT command as follows:

```
$ PRINT MYPIC.REN/PARAMETER=(DATA_TYPE=POST)
```

2   If you have the PrintServer 40 Client Software installed on your VAXstation, you can use the RENDER command to render and print your picture as follows:

```
$ PRINT MYPIC.UIS/PARAMETER=(DATA_TYPE=UIS)
```

Also, if you render a picture to a paper size different from the default size for the PrintServer 40, make sure that you include /SHEET_SIZE = *physical-size* in the /PARAMETER = () list. Normally, the default PrintServer 40 paper sheet size matches the RENDER default paper size (8.5 x 11 inches). In that case, you may omit the /SHEET_SIZE parameter.

2.3.12 LVP16 and HP 7475 Plotters

On an LVP16 or HP 7475 plotter, you can specify only one file for each PRINT command. This is because you must manually remove and insert paper into the plotter.

2.3.12.1   **Loading Pens**

For best results, load the pens in the order shown in Table 2-1.

Table 2-1   Order of Colors to Load in 6-Pen Plotters

Pen Number	Color
PEN 1	RED
PEN 2	GREEN
PEN 3	BLUE
PEN 4	VIOLET
PEN 5	GOLD
PEN 6	BLACK

2.3.12.2   **LVP16 Switches**

The Y/D switch on the LVP16 controls cabling. For direct connection (D setting), you need the BCC19 cable for a 25-pin connector and the BCC20 cable for a 9-pin connector.

The S1 and S2 switches control byte size and parity. Set both to OFF (for 8-bit bytes and no parity checking).

2.3.13   HP 7550 Plotter

To connect the HP 7550 plotter, use a standard DIGITAL printer cable. Insert its 25-pin end into the middle receptacle on the plotter labeled COMPUTER/MODEM.

2.3.13.1   **Loading Pens**

For best results, load the pens in the order shown in Table 2-2.

Table 2-2   Order of Colors to Load in 8-Pen Plotter

Pen Number	Color
PEN 1	RED
PEN 2	GREEN
PEN 3	BLUE
PEN 4	VIOLET
PEN 5	GOLD
PEN 6	BLACK
PEN 7	TURQUOISE
PEN 8	BROWN

2.3.13.2	**HP 7550 Front Panel**

The settings you need for the VAXstation are as follows:

- Display 5: select STANDARD (lower left corner).

- Display 6: DATA FLOW subdisplay: select REMOTE (upper left) and STANDARD (lower right).

- Display 6: BYPASS subdisplay: select OFF (lower right).

- Display 6: HANDSHAKE subdisplay: select XON/XOFF and DIRECT (lower right).

- Display 7: DUPLEX subdisplay: select FULL (lower right).

- Display 7: PARITY subdisplay: select 8-BITS (lower left) and OFF (lower right).

- Display 7: BAUD subdisplay: select value (lower right) to match desired value.

2.3.14 HP 7580 and HP 7585 Plotters

To connect the HP 7580 or HP 7585 plotter, use a standard DIGITAL printer cable. Insert the 25-pin end into the receptacle on the plotter, labeled COMPUTER/MODEM.

2.3.14.1	**Loading Pens**

For best results, load the pens in the order shown in Table 2-2.

2.3.14.2	**Loading Paper**

On the HP 7580 and HP 7585, the long side of the paper should face in the direction indicated in the following table:

Device	Paper Size	Direction
HP 7580	A/A4	Horizontal
	B/A3	Vertical
	C/A2	Vertical
	D/A1	Vertical
HP 7585	A/A4	Horizontal
	B/A3	Vertical
	C/A2	Horizontal
	D/A1	Vertical
	E/A0	Vertical

2.3.14.3	**HP 7580 and HP 7585 Switches**

To use the HP 7580 or the HP 7585 with your workstation, set the switches on the rear panel of the plotter to the settings described in this section.

Set the top left switch, labeled INTERFACE MODE, to RS-232-C.

Set the five switches to the right of the INTERFACE MODE switch as follows:

- NORMAL

- EMULATE
- STAND ALONE
- NORMAL
- NORMAL

Set the RS–232–C switches as follows:

- OFF
- ODD
- FULL
- HARDWIRE
- NORMAL

2.3.15 HP 7510 Film Recorder

In the first page of the I/O menu on the HP 7510 film recorder, set the following parameters:

- using SERIAL
- DIRECT connection
- STANDALONE configuration
- bypass OFF
- REMOTE mode
- XON/XOFF handshake

In the second page of the I/O menu, set the following parameters:

- Set baud rate to desired value
- NO parity
- FULL duplex
- 8 data bits
- NO auto-disc

In the Format menu, film orientation should normally be ADAPTIVE.

2.3.16 MPS–2000 Film Recorder

You must have the HPGL option to the MPS–2000 to use the MPS–2000 film recorder with your VAXstation.

There are three banks of DIP switches on the back of the rasterizer unit. Some of these switches control the connection between the VAXstation and the MPS–2000. Set these switches as follows:

- Switch 5: OFF (calibration mode off)
- Switch 9: OFF (monitor mode off)

- Switch 10: ON (HPGL mode on)

- Switch 11: OFF (do not report errors to host)

- Switch 13: OFF (no DTR to host)

- Switch 14: OFF (no XON/XOFF from host)

- Switch 15: ON (XON/XOFF to host)

- Switch 16: OFF (full duplex)

- Switch 17: OFF (no parity to host)

- Switch 18: OFF (no parity to host)

Very complicated pictures—for example, pictures with many large, filled polygons or pictures with large, intricate images—may exceed the internal memory limits of the device. This results in only a partial picture on the film. Memory expansion upgrades are available from Lasergraphics, Inc.

If you are not using the 35-mm motor drive camera, you can specify only one file at a time with the PRINT command.

3 The Print Screen Function

The Print Screen function is part of the Workstation Options menu. Print Screen lets you choose a rectangular portion of a display window and send it to a printer.

To use Print Screen, you must have a sixel printer. See Chapter 2 for information on setting up printers.

3.1 Using Print Screen

When you use the Print Screen function, use the logical, UIS$PRINT_CRFF, if you want to append a carriage return and form feed to your output.

See the *VMS Workstation Software User's Guide* for more information about UIS$PRINT_CRFF.

If you have a color printer, make sure that your system is properly set up before you use the Print Screen function. Refer to the *VMS Software Workstation User's Guide* for setup information.

Connect a sixel printer to the console port on your system and follow these steps to use Print Screen:

1   Turn on the printer and load the paper properly.

2   Use the pointer to select "Print (portion of) screen" from the Workstation Options menu. The pointer changes shape to resemble an arrow and it points to the upper left-hand corner of the screen.

3   Move the pointer to a corner of the rectangular area you want to print.

4   Click and *hold down* the SELECT button. The arrow now points to the lower right-hand corner of the screen.

5   Move the pointer to create a box around the area you want to print.

6   When the box surrounds the area you want to print, release the SELECT button. The printer begins printing, and the pointer again changes shape, so that it resembles an hourglass. The pointer retains the hourglass shape until the printing has completed, then it returns to its arrow shape.

To cancel the operation before you begin printing, position the pointer at the starting point and release the SELECT button.

3.2 Selecting an Alternate Printer

As an alternative to printing on the default console device, you can send portions of the screen to a file or a print queue.

Select the Printer setup option from the Workstation Setup menu. This invokes the Printer Setup menu. The "Enter new print destination" item from this menu allows you to choose a printer other than the default.

If you select "Enter new print destination," a window appears containing the default print destination and an active cursor. You can enter a new destination or press RETURN to choose the default.

You can change the destination to any other local or remote device that supports the sixel format, for example, an LA50, LA100, LN03, or LN03 PLUS printer.

NOTE: **A workstation screen is not a valid output device.**

The formats for entering a new print destination are as follows:

- The logical device name in the form [*nodename*::]*devicename*:

- The name of a print queue that has already been set up using the Secure User Environment Option

- A file in the form [*nodename*::]*devicename*:*filename*

For more information on device and queue name formats, see the *VMS Software User's Guide*.

If you change the print destination, the new attribute takes effect upon the next print request.

4 The RENDER Command

To use the RENDER command, you must have HCUIS installed on your workstation. The RENDER command translates a UIS file into the format necessary for the specified hard-copy device. If you set up a print queue, you can use the PRINT command to print translated files.

Unless otherwise specified, the translated file has the file type REN. The translated file correctly prints only to the specified output device type, so you may want to give the file name a file type that corresponds to its output device. For example, you could name a file that has been translated for an LA210, *filename*.LA210.

4.1 RENDER Command

The format of the RENDER command is as follows:

input-filespec
The UIS file to be translated. You can specify more than one file. If you specify two or more files, separate the file names with commas. You can use wildcard characters in the directory, file name, file type, and version number fields. A file specification may contain a node name.

If you do not specify a file type for the file, RENDER uses the source data type name as the file type, which defaults to UIS.

The following qualifiers and their defaults can be used with the RENDER command:

Qualifier	Default
/CARRIAGE_CONTROL = cc-type	CARRIAGE_RETURN
/DESTINATION_DATA_TYPE	See text.
/DEVICE-TYPE = device-type	/DEVICE_TYPE = UIS
/[NO]DRAFT_QUALITY	/NODRAFT_QUALITY
/[NO]FRAME	/NOFRAME
/[NO]LOG	/NOLOG
/OUTPUT = output-filespec	/OUTPUT = [default-directory]input-filename.REN
/PAPER_SIZE = size	See text.
/SIZE = (width,height)	See text.
/SOURCE_DATA_TYPE	/SOURCE_DATA_TYPE = UIS
/UNITS = unit-keyword	/UNITS = CENTIMETERS

QUALIFIERS

/CARRIAGE_CONTROL = cc-keyword

The /CARRIAGE_CONTROL qualifier allows you to control the type of RMS carriage control applied to the output file(s) that RENDER creates.

The value for the /CARRIAGE_CONTROL qualifier can be either of the following:

    CARRIAGE_RETURN
    NONE

The default is CARRIAGE_RETURN.

/DESTINATION_DATA_TYPE = name

The /DESTINATION_DATA_TYPE qualifier allows you to specify the data type your output file should contain once you RENDER a file.

The value for the /DESTINATION_DATA_TYPE qualifier can be any one of the following:

    HPGL
    PS
    REGIS
    SIXEL

You cannot abbreviate these values.

Some devices accept more than one data type. The /DESTINATION_DATA_TYPE qualifier allows you to specify a data type to send to a device.

If the /DESTINATION_DATA_TYPE qualifier is not specified, a value derived from the /DEVICE_TYPE qualifier is assumed. For example, if you specify LPS40 as a value for the /DEVICE_TYPE qualifier, /DESTINATION_DATA_TYPE = PS is assumed because the PrintServer 40 is a PostScript device.

If you specify both the /DEVICE_TYPE and /DESTINATION_DATA_TYPE qualifiers, HCUIS determines the output data type from the value given to the /DESTINATION_DATA_TYPE qualifier.

Normally, you do not need to use the /DESTINATION_DATA_TYPE qualifier because the default, which is set by using the /DEVICE_TYPE value, is usually appropriate.

/DEVICE_TYPE = device-type

The /DEVICE_TYPE qualifier causes RENDER to generate output for the specified type of device. DEVICE_TYPE can be any of the following:

    UIS
    LA50
    LA75
    LA100
    LA210
    LJ250
    LN03
    LN03PLUS
    LN03R
    LASERWRITER
    LPS40 (PrintServer 40)

```
LCG01
VT240
VT241
LVP16
HP7475
HP7550
HP7580
HP7585
HP7510
MPS2000
```

The device type UIS indicates the VAXstation screen.

If /DEVICE_TYPE is not specified, UIS is assumed.

These devices have very different characteristics. See Section 5.5 in Chapter 5 for information about the differences in how a picture looks when it is drawn on different devices.

/[NO]DRAFT

If /DRAFT is specified, the translator optimizes drawing speed at the expense of reduced picture quality. If /NODRAFT is specified, the translator optimizes picture quality at the expense of drawing speed. The default is /NODRAFT.

The trade-offs depend on the output device. For example, on the LN03, /DRAFT causes dot density to be 75 x 75 dots/inch; /NODRAFT causes it to be 150 x 150 dots/inch. See Appendix A for more information on the differences in picture quality using /DRAFT or /NODRAFT.

NOTE: **When you render to an LJ250, this switch has no effect on drawing resolution. The number of colors (256) has been optimized at the expense of resolution (90 dpi). For more information on this, refer to the *LJ250 Programmer Reference Manual*.**

/[NO]FRAME

The /FRAME qualifier causes RENDER to assume that the specified picture will be part of a larger page (for example, a frame within a document). If you want to combine a picture created by RENDER with some other page-formatting software you have, you can process the picture with RENDER/FRAME and then use the resulting REN file with your other formatting software (for example, page markup languages).

/FRAME causes RENDER to omit device-control information from the output file (for example, form feeds for SIXEL devices and *setdash* and *setgray* for PostScript devices).

Normally, HCUIS scales (and possibly rotates by 90 degrees) the picture so that the largest possible area of the target paper can be filled with the picture. When /FRAME is specified, these steps are not performed. By default, the picture is rendered at its natural size.

If the output device is a SIXEL device, the size of the picture is the size of its virtual display (or DISPLAY_EXTENT).

If the output device is a PostScript device, the default size of the picture is the size of its virtual display (or DISPLAY_EXTENT).

If the output device type is HPGL, the size of the picture is determined by the settings of P1 and P2 on the plotter. The HPGL translator only supports clipping to the boundary of the picture. If a picture tries to establish a smaller clipping region, the clipping command is ignored.

If the output device is a ReGIS device, /FRAME is ignored and the device's default paper size is used.

/NOFRAME is the default.

/[NO]LOG

When you specify the /LOG qualifier, HCUIS displays a message each time an input file is successfully rendered to an output file.

/NOLOG is the default.

/OUTPUT = output-filespec

The /OUTPUT qualifier gives the file specification of the output file. Wildcards are not allowed in the output file specification.

If a device or directory is omitted, the default is your current default device or directory. If the file name is omitted, the default is the file name of the input file. If the file type is omitted, the default is REN. For example, RENDER MYPIC/DEV = LN03/OUT = SYS$LOGIN: creates SYS$LOGIN:MYPIC.REN.

Since the translated file correctly draws only to the specified device type, you may want to give the file name a file type that corresponds to its device type. For example, RENDER MYPIC/DEV = LA75/OUT = .LA75 creates an output file called MYPIC.LA75.

If /OUTPUT's device is a page printer, there is a pause, in addition to translation time, before the image is printed. The pause can range from several seconds to several minutes. The image is not printed until the device has received and interpreted the entire picture.

If /OUTPUT is omitted, the default output file specification is [*default-directory*]*input-name*.REN.

If /DEVICE_TYPE = UIS, the output file specification is ignored.

/PAPER_SIZE = size-name

The /PAPER_SIZE qualifier identifies the size of the paper. If the output device is UIS, /PAPER_SIZE is ignored.

The value for size can be A, A4, B, A3, C, A2, D, A1, E, A0, LEGAL, LP, or VT. See Table 4-1 for the paper sizes.

Table 4-1   Paper Sizes

Size Value	Paper Size
Size A	8.5 x 11 inches
Size A4	210 x 297 mm
Size B	11 x 17 inches
Size A3	297 x 420 mm

Table 4–1 (Cont.) Paper Sizes

Size Value	Paper Size
Size C	17 x 22 inches
Size A2	420 x 594 mm
Size D	22 x 34 inches
Size A1	594 x 841 mm
Size E	34 x 44 inches
Size A0	841 x 1189 mm

Table 4-1 (Cont.) Paper Sizes

Size Value	Paper Size
Size LEGAL	8.5 x 14 inches
Size LP	13.7 x 11 inches
Size VT	8 x 5 inches

The area available for drawing on a paper is called the page size. Page size is device dependent; the approximate rule is .25-inch margins for the printers and .75-inch margins for the plotters.

For some printers, you place the desired size paper in the device to print that size picture. For other printers, you must change the setting on the printer, as well as changing the paper. See the installation guide for your printer for information on printing on different paper sizes.

If the /PAPER_SIZE qualifier is omitted or an illegal size is specified, the default for the device is used. Table 4-2 shows the default paper size and the paper sizes allowed for each device.

Table 4-2 Paper Sizes Allowed on Workstation Output Devices

Device Type	Default Paper Size	Allowed Paper Sizes
LA50	A	A, A4, LEGAL, VT
LA75	A	A, A4, LEGAL, VT
LA100	LP	LP, A, A4, LEGAL, B, A3, VT
LA210	LP	LP, A, A4, LEGAL, B, A3, VT
LJ250	A	A, A4, VT
LN03	A	A, A4, VT
LN03PLUS	A	A, A4, VT
LN03R	A	A, A4, VT
LASERWRITER	A	A, VT
LCG01	A	A, VT
VT240	VT	VT
VT241	VT	VT
LPS40	A	A, A4, B, A3, LEGAL, VT
LVP16	A	A, A4, B, A3
HP7475	A	A, A4, B, A3
HP7550	A	A, A4, B, A3
HP7580	D	A, A4, B, A3, C, A2, D, A1
HP7585	E	A, A4, B, A3, C, A2, D, A1, E, A0

Table 4-2 (Cont.)   Paper Sizes Allowed on Workstation Output Devices

Device Type	Default Paper Size	Allowed Paper Sizes
HP7510	A	A, A4, B, A3
MPS2000	A	A

/SIZE = (width,height)

Before translating the input file, RENDER compares the size of the picture with the size of the output page in order to fill the output page as completely as possible without distorting the picture's shape. For example, if page size is 13.2 x 10.5 inches and picture size is 12 units x 16 units, RENDER draws the picture sideways. Picture height is 13.2 inches, and picture width is 12/16 of 13.2 inches.

The /SIZE qualifier allows you to specify the dimensions of the picture that HCUIS produces. See also the /UNITS qualifier.

Values for the qualifier can be any pair of numbers (decimal fractions are allowed). The values are interpreted according to the units of measurement specified in the /UNITS qualifier.

If you do not specify /SIZE, the default size will fill as much of the output paper size as possible.

If a picture size exceeds the paper size, HCUIS translates the picture into numerous files. Each file contains a rectangular region of the picture, where the name of the file is *filename*.REN_1, *filename*.REN_2, and so on. HCUIS generates the rectangular regions of the picture beginning at the top, going from left to right, then continuing down to the botton.

Note: **When HCUIS translates a picture for a paper size, some space is left blank for margins (the width of the margin is device dependent but averages .5 inch on all sides; the usable area of an 8.5 x 11-inch sheet of paper thus might be 8.0 x 10.5 inches). For example, if you specify /SIZE = (8,10)/PAPER_SIZE = A, the drawing may span two sheets of paper.**

/SOURCE_DATA_TYPE = name

The /SOURCE_DATA_TYPE qualifier allows you to specify the type of data your input file contains.

UIS is the only value that the /SOURCE_DATA_TYPE qualifier accepts. If /SOURCE_DATA_TYPE is not specified, UIS is assumed.

/UNITS

The /UNITS qualifer allows you to specify the units of measurement for the /SIZE qualifer. See also the /SIZE qualifier. The value for the /UNITS qualifier can be any one of the following:

    CENTIMETERS
    CM (synonymous with CENTIMETERS)

INCHES
POINTS
PTS (synonymous with POINTS)

If you do not use the /UNITS qualifer, the default is CENTIMETERS.

Part II Programmer Information

5   Programming Interface

A display list contains drawing commands used to create a picture. You can request that UIS maintain a display list by calling UIS$ENABLE_DISPLAY_LIST. You can request that UIS not maintain a display list by calling UIS$DISABLE_DISPLAY_LIST.

If UIS maintains a display list, you can then ask UIS for an executable copy of it, called a UIS metafile. (See the *VMS Workstation Software Graphics Programming Guide* for more information about display lists and metafiles.)

You can ask HCUIS to send a UIS metafile to a file. Such a file is called a UIS file.

5.1   Creating and Displaying a UIS File

An application can create a UIS file in the following way:

1   If needed, use UIS$ENABLE_DISPLAY_LIST (*vd_id*).

2   Draw a picture, using UIS.

3   Use HCUIS$WRITE_DISPLAY (*vd_id, file_spec*) to create the UIS file.

4   If desired, use UIS$DISABLE_DISPLAY_LIST (*vd_id*).

For an application to later redisplay this picture, perform the following steps:

1   Set *vd_id* = 0.

2   Use HCUIS$READ_DISPLAY (*vd_id, file_spec*) to read the picture as a new virtual display.

3   Use *wd_id* = UIS$CREATE_WINDOW (*vd_id, ...*).

If you need more control in creating a UIS file, you can use a variant of UIS$EXTRACT with HCUIS$WRITE_BUFFER. If you need more control in displaying a UIS file, you can use HCUIS$READ_BUFFER with UIS$EXECUTE.

5.2   Creating UIS Metafile Data

As noted, a metafile is the external form of a display list. HCUIS processes UIS metafile data, which can be created in several ways.

1   An application that always runs with the display list enabled can call HCUIS$WRITE_DISPLAY or a variant of UIS$EXTRACT.

2   An application that normally runs with the display list disabled can also create UIS metafile data — if the application can draw a picture at the user's request. The application can place calls to UIS$ENABLE_DISPLAY_LIST and UIS$DISABLE_DISPLAY_LIST around the user's request.

3 An application that uses UISDC can use the second method of creating metafile data. The application can create a virtual display whose world coordinates are equal to the regular display's device coordinates and then use UIS$ routines rather than UISDC$ routines when drawing the picture. Note that UIS$ uses floating-point coordinate parameters; UISDC$ uses integers.

4 An application can manually construct UIS metafile data. See Chapter 15 of the *VMS Workstation Software Graphics Programming Guide* for information.

To use the RENDER command, HCUIS$READ_DISPLAY, or HCUIS$READ_BUFFER, you should use HCUIS$WRITE_BUFFER or HCUIS$WRITE_DISPLAY when storing UIS metafile data in a file.

5.3 Translating UIS Metafile Data

The routines introduced in this section allow you to compose a translated picture from an arbitrary series of picture fragments. You do this as follows:

```
        HCUIS$BEGIN_TRANSLATOR (tranid, device, ...)
TOP:
        Put UIS metafile data in a buffer
            (eg. call a variant of UIS$EXTRACT)
        HCUIS$TRANSLATE (tranid, buflen, buffer)
        Goto TOP until done
        HCUIS$END_TRANSLATOR (tranid)
```

HCUIS$BEGIN_TRANSLATOR initializes the translator for the specified device. HCUIS$TRANSLATE processes the UIS metafile data. HCUIS$END_TRANSLATOR finishes the translation process and terminates the translator.

To create the first buffer for HCUIS$TRANSLATE, you should use UIS$EXTRACT_HEADER. Similarly, before the last call to HCUIS$TRANSLATE, you should use UIS$EXTRACT_TRAILER. See the *VMS Software Workstation Graphics Programming Guide* for information on UIS$ routines.

5.4 Compiling and Linking Against HCUIS$ Routines

The symbols used with HCUIS$BEGIN_TRANSLATOR and the definition of each HCUIS entry point are located in SYS$LIBRARY:HCUISDEF.*type*. A separate HCUISDEF file exists for each supported language, with the file type determined by the language. For example, the PASCAL definitions file is HCUISDEF.PAS. See your language reference manual for information on how to refer to a declarations file in your source program.

The HCUIS$ routines are in a shareable image, HCUISSHR. On a workstation, this is located in the library IMAGELIB.OLB. Thus, to link your files against the HCUIS$ routines, you use the following command line:

```
$ LINK file-specs
```

On a system where you have not installed HCUIS, but you have copied HCUISSHR.EXE, you use the following command line to link your files against the HCUIS$ routines:

```
$ LINK file-specs, option-file.opt/OPTIONS
```

Option-file.opt must contain HCUISSHR/SHARE and may contain other options as well.

5.5 Creating Device-Independent Pictures

When HCUIS translates a UIS picture to a device-dependent format, the translated picture is similar to the original, but it is not always identical. For example, a color picture looks different when printed on a black and white device. This section describes the general and device-specific ways in which picture fidelity is lost.

Differences in resolution cause pattern sizes to differ across devices. Fill pattern alignment also differs across devices.

On devices that do not have a color map, the background color cannot change dynamically, as it can on the screen. For pictures on these devices, the background color is set to the value of color 0 when the first drawing operation is performed.

For proportionately spaced fonts, word length differs across devices, because the font widths are not identical across devices. HCUIS deals with this in two ways. It tries to hide the differences by adjusting interword spacing and by setting average character width, mostly using the widths of the lowercase letters and digits. However, this means that tightly fitted text that is mostly uppercase letters tends to overflow the right margin.

The potential quality of text improves as device resolution increases. However, when a device's built-in fonts cannot be used, the quality depends on the UIS fonts in SYS$FONT. For example, if HCUIS needs text that is 80 x 60 pixels, but the largest font available is 20 x 15 pixels, the text will look very jagged when HCUIS scales it to 80 x 60.

5.5.1 Sixel Output Devices

The LA50, LA75, LA100, LA210, LN03, and LN03 PLUS are not color printers. Solid fill is mapped to an appropriate shade of gray. Other objects are mapped to either black or white.

Line width, line style, and fill pattern size are limited in UIS and the sixel translator. When the dot density of the output device is about the same as the screen resolution, the limits are the same. When the dot density of the output device is higher, maximum line width, length of line style, and maximum fill pattern size are correspondingly smaller.

5.5.1.1 LN03 Printer

The LN03 cannot image "busy" fill patterns, such as halftones. The busy patterns in the UIS$FILL_PATTERNS file are mapped to less busy patterns in the same file. See the *VMS Workstation Software Graphics Programming Guide* for information about fill patterns.

5.5.2 PostScript Output Devices

On PostScript printers, colors are represented by an appropriate shade of gray.

When you specify the DEC Multinational or DEC Technical Character Set, the available PostScript font families are Courier, Times, and Helvetica. If you use another font family, it is mapped to one of the available ones.

If HCUIS does not find a compatible font for one you have used in your picture, it will use Helvetica for any unformatted text (for example, unjustified text) and Times for any formatted text.

When you specify a character set other than DEC Multinational, HCUIS uses the raster font UIS would have used. A raster font often decreases the quality of the text, because the screen is a low-resolution device.

A filled polygon that crosses an interior section of itself has the interior section filled rather than empty.

Table 5–1 lists PostScript-specific writing modes.

Table 5–1   Writing Modes for PostScript

Writing Mode Specified	Translated Writing Mode
Bit-Set	Overlay mode
Bit-Set Negate	Overlay-Negate mode
Bit-Clear	Erase mode
Bit-Clear Negate	Transparent mode
XOR	Replace mode
Complement	Overlay mode

5.5.3 ReGIS Output Devices

HCUIS uses eight character rotation angles: 0, 45, 90, 135, 180, 225, 270, and 315. The specified text rotation angle is mapped to the nearest available one.

For the DEC Multinational Character Set, HCUIS uses the ReGIS Courier-like font. Other characters are imaged as if they were part of the DEC Multinational Character Set.

You cannot use the DEC Supplemental characters when you draw a picture on a VT240 or VT241.

The ReGIS translator only supports clipping to the boundary of a picture. If a picture requests a smaller clipping region, the request is ignored.

If you render a picture that contains continuous tone color images, HCUIS will create a large output file.

The ReGIS devices can only draw filled polygons that have less than 256 vertices.

5.5.3.1	**ReGIS Color Limitations**

Essentially, UIS supports an infinite number of colors. Of those, theoretically you can use 32,767 in one picture (that is, one virtual color map) to draw objects. On the other hand, the ReGIS protocol, as implemented by the devices HCUIS supports, has a color palette size of only 64 to 216 colors and a color map size of only four to eight. Thus, in general, the full color content of a UIS picture cannot be expressed in ReGIS.

To create a ReGIS color map, HCUIS does a two-pass translation. The steps are performed as follows:

1   HCUIS parses the UIS picture and keeps a list of the color map entries that it uses. For example, assume a picture contains a color map of 256 entries, but the objects only use a few of the possible colors (this occurs with graphics editors that present many drawing colors).

2   Once the entire picture is parsed, HCUIS creates the ReGIS color map.

   If the number of colors used is greater than the ReGIS color map available (four colors for the VT240/VT241, eight for the LCG01), then HCUIS uses a fixed color map consisting of the eight colors: black, red, green, blue, cyan, magenta, yellow, and white for the LCG01 or four colors: white, red, green, and blue for the VT240/VT241.

   If the number of colors is less than or equal to the color map size, then HCUIS initializes the map with colors that are as close as possible to the exact colors (within the color palette limits) used in the picture.

   Finally, HCUIS reparses the picture and draws the objects. If the color map is hard wired, then each object is drawn with the closest available color (pink maps to red, and so on).

If the translation is done in draft mode, the two-pass process is not performed. Instead, the color map is hard wired.

5.5.4 HPGL Output Devices

A line style is mapped to the line style supported by the output device that most closely resembles the specified style.

The thickness of the strokes in a character does not increase in proportion to character size, except when you use bold text.

The HPGL translator draws characters only for the DEC Multinational Character Set.

The plotters and film recorders can image fill patterns that contain only edge-to-edge straight lines. If you use a more complicated pattern in UIS$FILL_PATTERNS, it is emulated with a similar pattern that contains only edge-to-edge straight lines.

User-defined patterns are arbitrarily mapped to one of the patterns in the UIS$FILL_PATTERNS set. See the VMS *Software Workstation Graphics Programming Guide* for information about fill patterns.

For the DEC Multinational character set, HCUIS uses the appropriate font. The LVP16, HP 7475, and MPS-2000 have a Courier-like font. The HP 7550, HP 7580, HP 7585, and the HP 7510 have a Helvetica-like and a Courier-like font.

Writing Modes

Except for filled polygons, writing mode is mapped to either Blend mode or Transparent mode. Blend mode is the same as Overlay mode, except that overlapping colors blend rather than the second replacing the first.

Table 5-2 indicates how writing modes for all objects, except filled polygons, are handled.

Table 5-2   Writing Modes on HPGL Devices

Writing Mode Specified	Translated Writing Mode
Erase	Transparent
Bit-Clear	Transparent
Bit-Clear-Negate	Transparent
Bit-Set	Blend
Bit-Set-Negate	Blend
Complement	Blend
Copy	Blend
Copy-Negate	Blend
Overlay	Blend
Overlay-Negate	Blend
Replace	Blend
Replace-Negate	Blend

Writing Modes for Filled Polygons

Writing modes for filled polygons are treated differently, depending on whether you specify /DRAFT or /NODRAFT. For /NODRAFT, when a filled polygon is drawn on top of another filled polygon, the hidden part of the first polygon is erased, if appropriate. However, any redrawn lines, text, or images are not erased.

Table 5-3 describes how writing modes for filled polygons are implemented.

Table 5-3   Writing Modes for Filled Polygons on HPGL Devices

Writing Mode Specified	Translated Writing Mode with /DRAFT	Translated Writing Mode with /NODRAFT
Erase	Transparent	Erase
Bit-Clear	Transparent	Erase mode if the fill is mostly on-bits, and Transparent mode otherwise.
Bit-Set	Blend	Blend
Complement	Blend	Overlay
Copy	Blend	Replace

Table 5–3 (Cont.) Writing Modes for Filled Polygons on HPGL Devices

Writing Mode Specified	Translated Writing Mode with /DRAFT	Translated Writing Mode with /NODRAFT
Overlay	Blend	Blend mode if the fill is mostly off-bits, and Replace mode otherwise.
Replace	Blend	Replace
Erase-Negate	Sets the fill pattern to PATT$C_FOREGROUND and then uses Blend mode	Erase-Negate
Bit-Clear-Negate	Transparent	Erase mode if the fill is mostly off-bits, and Transparent mode otherwise.
Bit-Set-Negate	Blend-Negate	Blend-Negate
Copy-Negate	Blend-Negate	Replace-Negate
Overlay-Negate	Blend-Negate	Blend-Negate mode if the fill is mostly on-bits, and Replace-Negate mode otherwise.
Replace-Negate	Blend-Negate	Replace-Negate

If you render a picture that contains continuous tone color images, HCUIS creates a large output file (especially for film recorders).

5.5.4.1 LVP16, HP 7475, HP 7550, HP 7580, and HP 7585 Plotters

The background color is always white (or the color of the paper). The picture's other colors are mapped to the available pens on the plotter. For best results, load the pens in the order shown in the Six Pen Loading Table or the Eight Pen Loading Table.

5.5.4.2 HP 7510 Film Recorder

The HPGL translator sometimes changes the color of the color map entries 0 and 1. Two different situations can cause the HPGL translator to change the assignments of colors 0 and 1.

First, if color 0 is white and color 1 is black, the translator reverses them: color 0 is set to black and color 1 is set to white. This is to keep thin black foreground lines, text, and so on, from being lost in the glare and light bleed due to a bright background.

Second, the intensity of the background is dimmed, if necessary. For example, if the background is set to bright red, then the translator dims the background to dark red.

On the HP 7510, Blend mode is additive rather than subtractive. On a plotter, the intersection of two colors is darker. On the HP 7510, the intersection of the two colors is brighter. There are two side effects of this behavior:

1 The intersection of two bright colors creates a third. For example, blue on red creates magenta.

2   A dark object drawn on top of a bright object is hard to see (perhaps even invisible).

5.5.4.3   **MPS-2000 Film Recorder**

The HPGL translator sometimes changes the color of the color map entries 0 and 1. If color 0 is white and color 1 is black, the translator reverses them: color 0 is set to black and color 1 is set to white. This is to keep thin black foreground lines, text, and so on, from being lost in the glare and light bleed due to a bright background.

6 HCUIS$ Routines and Condition Values

6.1 HCUIS$ Routines

This chapter contains reference material for the HCUIS$ routines and condition values. This manual uses the same conventions for documenting routines as are used in the *VMS Workstation Graphics Programming Guide*. Refer to Chapter 18 of that manual for information on the format of the routines.

HCUIS$BEGIN_TRANSLATOR

This routine initializes the translator for the specified device type.

FORMAT   *status* = **HCUIS$BEGIN_TRANSLATOR** *tranid,*
devtyp,
putroutine,
allocroutine,
freeroutine,
[attrlist]

RETURNS

VMS Usage: **cond_value**
type: **longword (unsigned)**
access: **write only**
mechanism: **by value**

Longword condition value returned in the variable *status* or R0 (VAX MACRO). Condition values that can be returned by this routine are listed under Condition Values Returned in R0.

ARGUMENTS   *tranid*
VMS Usage: **identifier**
type: **longword (unsigned)**
access: **write only**
mechanism: **by reference**

The address of a longword. HCUIS$BEGIN_TRANSLATOR sets this longword to a unique value, which is used as a parameter in HCUIS$TRANSLATE and HCUIS$END_TRANSLATOR.

devtyp
VMS Usage: **char-string**
type: **character string**
access: **read only**
mechanism: **by descriptor**

The address of a string descriptor that points to a device type. The defined strings are LA50, LA75, LA100, LA210, LJ250, LN03, LN03R, LN03PLUS, LASERWRITER, LPS40, LCG01, VT240, VT241, LVP16, HP7475, HP7550, HP7580, HP7585, HP7510, and MPS2000. The string may contain uppercase or lowercase characters.

putroutine
VMS Usage: **procedure**
type: **procedure entry mask**
access: **read only**
mechanism: **by reference**

The address of the routine that is called when HCUIS$TRANSLATE or HCUIS$END_TRANSLATOR has translated data to output. The translator calls this routine with an argument list of (*buflen*, *buffer*). *Buflen* is the address of a longword that contains the number of bytes in the specified buffer. *Buffer* is the address of an array that contains the translated bytes. Putroutine returns a condition value to the translator.

allocroutine

VMS Usage: **procedure**
type: **procedure entry mask**
access: **read only**
mechanism: **by reference**

The address of a routine to allocate memory. The translator calls this routine when it needs to allocate memory. Allocroutine is called with an argument list of (*buflen*, *bufaddr*). *Buflen* is the address of a longword that contains the number of bytes to allocate. *Bufaddr* is the address of a longword into which Allocroutine returns the address of the allocated memory. Allocroutine returns a condition value. Note that LIB$GET_VM conforms to this definition.

freeroutine

VMS Usage: **procedure**
type: **procedure entry mask**
access: **read only**
mechanism: **by reference**

The address of a routine to deallocate memory. Freeroutine is called with an argument list of (*buflen*, *bufaddr*). *Buflen* is the address of a longword that contains the number of bytes to free. *Bufaddr* is the address of a longword that contains the address of the memory Freeroutine should deallocate. Freeroutine returns a condition value. Note that LIB$FREE_VM conforms to this definition.

attrlist

VMS Usage: **item_list_pair**
type: **longword**
access: **read only**
mechanism: **by reference**

The address of a list of longword pairs. Within the first longword, the first word is reserved and the second contains an attribute code. The second longword contains an attribute value. The list of pairs is terminated by a longword containing HCUIS$C_END_OF_LIST. The defined attributes are:

- HCUIS$C_PAGE_FRAGMENT: This attribute controls how a picture is mapped to a page and can accept the following values:

    HCUIS$C_MULTI_PAGE: This value tells the translators to produce the device-control information (for example, form feeds) necessary to print the picture on a device.
    HCUIS$C_PAGE_FRAME: This value tells the translators to omit any device-control information from a picture.

- HCUIS$C_PAGE_WIDTH: This value specifies the picture width.

- HCUIS$C_PAGE_HEIGHT: This value specifies the picture height.

Together, the HCUIS$C_PAGE_WIDTH and HCUIS$C_PAGE_HEIGHT item codes control the size of the printed picture. Each code has a numeric value that specifies the desired size of the picture, in points. One point equals 1/72 of an inch.

If you specify only one item code, it is ignored.

If the shape you specify does not match the shape of the UIS input picture, the translators do not distort the picture.

- HCUIS$C_PAPER: This value needs a paper size value (HCUIS$C_PAPER_xxx), which can be any of the following:

Value	Paper Size	Value	Paper Size
A	8.5 x 11 inches	A1	594 x 841 mm
A4	210 x 297 mm	E	34 x 44 inches
B	11 x 17 inches	A0	841 x 1189 mm
A3	297 x 420 mm	LEGAL	8.5 x 14 inches
C	17 x 22 inches	LP	13.7 x 11 inches
A2	420 x 594 mm	VT	8 x 5 inches
D	22 x 34 inches		

The drawing area for a page is device dependent. The approximate rule is .25-inch margins for the printers and .75-inch margins for the plotters.

- HCUIS$C_APPEARANCE: This is a value for flags that control the appearance of the translated picture.

If HCUIS$M_DRAFT is set, the translator sacrifices picture quality for speed. If it is not set, the translator favors picture quality over speed.

VALUES RETURNED IN R0

SS$_NORMAL	The routine completed successfully.
HCUIS$_INTCHKFAIL	An internal consistency check failed.
HCUIS$_UNKDEVTYPE	The target device type specified in the **devtyp** parameter is unknown.

HCUIS$BEGIN_TRANSLATOR can also return any condition values returned by the RTL or one of the caller-supplied routines.

HCUIS$END_TRANSLATOR

This routine finishes the translation process and terminates the translator.

FORMAT   *status* = **HCUIS$END_TRANSLATOR**   *tranid*

RETURNS

VMS Usage: **cond_value**
type: **longword (unsigned)**
access: **write only**
mechanism: **by value**

Longword condition value returned in the variable *status* or R0 (VAX MACRO). Condition values that can be returned by this routine are listed under Condition Values Returned in R0.

ARGUMENT

tranid
VMS Usage: **identifier**
type: **longword (unsigned)**
access: **read only**
mechanism: **by reference**

Identifies the translator context to finish. See HCUIS$BEGIN_TRANSLATOR for more information.

VALUES RETURNED IN R0

SS$_NORMAL	A routine completed successfully.
HCUIS$_BADTRANID	An unknown translator ID was encountered.
HCUIS$_INTCHKFAIL	An internal consistency check failed.

HCUIS$END_TRANSLATOR can also return any condition values returned by the RTL or a condition value from one of the routines identified in HCUIS$BEGIN_TRANSLATOR.

HCUIS$READ_BUFFER

This routine opens the specified UIS file; allocates room in memory for it, using Allocroutine; reads the contents of the file into memory; and closes the file.

FORMAT

status = **HCUIS$READ_BUFFER** *buflen, bufaddr, allocroutine, filespec, [defaultspec]*

RETURNS

VMS Usage: **cond_value**
type: **longword (unsigned)**
access: **write only**
mechanism: **by value**

Longword condition value returned in the variable *status* or R0 (VAX MACRO). Condition values that can be returned by this routine are listed under Condition Values Returned in R0.

ARGUMENTS

buflen
VMS Usage: **longword_unsigned**
type: **longword (unsigned)**
access: **write only**
mechanism: **by reference**

The address of a longword that is set to the number of bytes allocated by Allocroutine.

bufaddr
VMS Usage: **longword_unsigned**
type: **longword (unsigned)**
access: **write only**
mechanism: **by reference**

The address of a longword that is set to the address of the memory allocated by Allocroutine.

allocroutine
VMS Usage: **procedure**
type: **procedure entry mask**
access: **read only**
mechanism: **by reference**

The address of a routine to allocate memory for the UIS metafile data. Allocroutine is called with an argument list of (*buflen, bufaddr*). *Buflen* is the address of a longword that contains the number of bytes to allocate. *Bufaddr* is the address of a longword into which Allocroutine returns the address of the allocated memory. Allocroutine returns a condition value. Note that LIB$GET_VM conforms to this definition.

filespec

VMS Usage: **char_string**
type: **character string**
access: **read only**
mechanism: **by descriptor**

The address of a string descriptor that points to the file specification of a UIS file.

defaultspec

VMS Usage: **char_string**
type: **character string**
access: **read only**
mechanism: **by descriptor**

The address of a string descriptor that points to the default components to use in creating the file specification of the UIS file. If the file specification is omitted, the default file specification UIS is used.

VALUES RETURNED IN R0

SS$_NORMAL	The routine completed successfully.

HCUIS$READ_BUFFER can also return any condition values returned by the RTL, VAX RMS routines, or from Allocroutine.

HCUIS$READ_DISPLAY

This routine opens the specified UIS file; reads it into a buffer, using SYS$READ; performs a variant of UIS$EXECUTE; deletes the buffer; and closes the file. To display the picture on the screen, use UIS$CREATE_WINDOW after HCUIS$READ_DISPLAY.

FORMAT   *status* = **HCUIS$READ_DISPLAY** *vd_id, filespec,*
                                              [defaultspec]

RETURNS   VMS Usage: **cond_value**
               type: **longword (unsigned)**
               access: **write only**
               mechanism: **by value**

               Longword condition value returned in the variable *status* or R0 (VAX MACRO). Condition values that can be returned by this routine are listed under Condition Values Returned in R0.

ARGUMENTS *vd_id*
               VMS Usage: **identifier**
               type: **longword (unsigned)**
               access: **read/write**
               mechanism: **by reference**

               Option 1:

               The address of a longword value that uniquely identifies a virtual display. UIS$CREATE_DISPLAY is used to get a vd_id. You should also use UIS$CREATE_COLOR_MAP to create a virtual color map for the display.

               Option 2:

               The address of a longword containing 0. This causes HCUIS$READ_DISPLAY to create a virtual display and a virtual color map and replace the 0 with the vd_id of the created display.

               If your application requires the virtual color map ID, you can use the UIS$GET_VCM_ID routine.

               filespec
               VMS Usage: **char_string**
               type: **character string**
               access: **read only**
               mechanism: **by descriptor**

               The address of a string descriptor that points to the file specification of a UIS file.

defaultspec

VMS Usage: **char_string**
type: **character string**
access: **read only**
mechanism: **by descriptor**

The address of a string descriptor that points to the default components to use in creating the file specification of the UIS file. If the file specification is omitted, the default file specification UIS is used.

VALUES RETURNED IN R0

SS$_NORMAL	The routine completely successfully.

HCUIS$READ_DISPLAY can also return any condition values returned by the RTL, VAX RMS, or UIS routines.

HCUIS$TRANSLATE

This routine translates the UIS metafile data in the specified buffer to the form of the output device.

FORMAT   *status* = **HCUIS$TRANSLATE**   *tranid, buflen, buffer*

RETURNS

VMS Usage: **cond_value**
type: **longword (unsigned)**
access: **write only**
mechanism: **by value**

Longword condition value returned in the variable *status* or R0 (VAX MACRO). Condition values that can be returned by this routine are listed under Condition Values Returned in R0.

ARGUMENTS   *tranid*

VMS Usage: **identifier**
type: **longword (unsigned)**
access: **read only**
mechanism: **by reference**

Identifies the translator context to use when translating the specified buffer. See HCUIS$BEGIN_TRANSLATOR for more information.

buflen

VMS Usage: **longword_unsigned**
type: **longword (unsigned)**
access: **read only**
mechanism: **by reference**

The address of a longword that contains the number of bytes in the specified buffer.

buffer

VMS Usage: **vec_byte_unsigned**
type: **byte (unsigned)**
access: **read only**
mechanism: **by reference**

The address of an array that contains the UIS metafile data.

VALUES RETURNED IN R0

SS$_NORMAL	The routine completed successfully.
HCUIS$_BADTRANID	An unknown translator ID was encountered.
HCUIS$_INTCHKFAIL	An internal consistency check failed.

HCUIS$TRANSLATE can also return any condition values returned by the RTL, UIS, or one of the routines identified in HCUIS$BEGIN_TRANSLATOR.

NOTES   The buffer passed to HCUIS$TRANSLATE may consist of one or more drawing commands. You may not put the beginning of a drawing command at the end of one buffer and the end of the command at the start of the next buffer.

HCUIS$WRITE_BUFFER

This routine creates a UIS file from the specified buffer of UIS metafile data and closes the file.

FORMAT   *status* = **HCUIS$WRITE_BUFFER** *buflen, buffer, filespec, [defaultspec]*

RETURNS

VMS Usage: **cond_value**
type: **longword (unsigned)**
access: **write only**
mechanism: **by value**

Longword condition value returned in the variable *status* or R0 (VAX MACRO). Condition values that can be returned by this routine are listed under Condition Values Returned in R0.

ARGUMENTS   *buflen*

VMS Usage: **longword_unsigned**
type: **longword (unsigned)**
access: **read only**
mechanism: **by reference**

The address of a longword that contains the number of bytes in the specified buffer.

buffer

VMS Usage: **vec_byte_unsigned**
type: **byte (unsigned)**
access: **read only**
mechanism: **by reference**

The address of an array that contains the UIS metafile data.

filespec

VMS Usage: **char_string**
type: **character string**
access: **read only**
mechanism: **by descriptor**

The address of a string descriptor that points to a file specification.

defaultspec

VMS Usage: **char_string**
type: **character string**
access: **read only**
mechanism: **by descriptor**

The address of a string descriptor that points to the default components to use in creating the file specification of the UIS file. If the file specification is omitted, the default file specification UIS is used.

VALUES RETURNED IN R0

SS$_NORMAL   The routine completed successfully.

HCUIS$WRITE_BUFFER can also return any condition values returned by the RTL or VAX RMS routines.

NOTES

The buffer should start with a UIS metafile header and end with a UIS metafile trailer, which you can generate using UIS$EXTRACT_HEADER and UIS$EXTRACT_TRAILER. See the *VMS Workstation Graphics Programming Guide* for information on UIS routines.

HCUIS$WRITE_DISPLAY

This routine allocates a buffer for the metafile, performs a UIS$EXTRACT for the specified virtual display's root segment, sends the buffer to the file, deletes the buffer, and closes the file.

FORMAT

status = **HCUIS$WRITE_DISPLAY** *vd_id, filespec, [defaultspec]*

RETURNS

VMS Usage: **cond_value**
type: **longword (unsigned)**
access: **write only**
mechanism: **by value**

Longword condition value returned in the variable *status* or R0 (VAX MACRO). Condition values that can be returned by this routine are listed under Condition Values Returned in R0.

ARGUMENTS

vd_id
VMS Usage: **identifier**
type: **longword (unsigned)**
access: **read only**
mechanism: **by reference**

The address of a longword value that uniquely identifies the virtual display to save.

filespec
VMS Usage: **char_string**
type: **character string**
access: **read only**
mechanism: **by descriptor**

The address of a string descriptor that points to a file specification.

defaultspec
VMS Usage: **char_string**
type: **character string**
access: **read only**
mechanism: **by descriptor**

The address of a string descriptor that points to the default components to use in creating the file specification of the UIS file. If the file specification is omitted, the default file specification UIS is used.

VALUES RETURNED IN R0

SS$_NORMAL	The routine completed successfully.

HCUIS$WRITE_DISPLAY can also return any condition values returned by the RTL, VAX RMS, or UIS routines.

6.2   HCUIS Condition Values

Two HCUIS condition values can be returned by HCUIS$ routines:

- HCUIS$_BADTRANID

   The condition value HCUIS$_BADTRANID indicates that an unknown translator ID was passed to HCUIS$TRANSLATE or HCUIS$END_TRANSLATOR.

- HCUIS$_INTCHKFAIL

   The condition value HCUIS$_INTCHKFAIL indicates that an internal consistency check failed. Submit a Software Performance Report (SPR) to DIGITAL.

A /DRAFT and /NODRAFT Differences

The following table describes the differences in picture quality when you use the /DRAFT qualifier or the /NODRAFT qualifier to the RENDER command.

Table A-1 Differences in Picture Quality with /DRAFT and /NODRAFT

Device	Differences
LA50, LA100, LA210	There are no differences in picture quality.
LA75	The picture is printed at 72 dots/inch with /DRAFT. The picture is printed at 144 dots/inch with /NODRAFT.
LN03	The picture is printed at 75 dots/inch with /DRAFT. It is printed at 150 dots/inch with /NODRAFT.
LN03 PLUS	The picture is printed at 150 dots/inch with /DRAFT. The picture is printed at 300 dots/inch with /NODRAFT.
LaserWriter, LN03R, and PrintServer 40	The edge of a filled curve area is less smooth than it is with /NODRAFT.
LCG01	Fill looks more solid when you use /NODRAFT.
VT240, VT241	Generally, the picture's color map is better approximated when you use /NODRAFT.
HPGL Devices	The hidden surface is not removed when you use /DRAFT. For thick lines, polygon fill, bold text, and images, the separation between adjacent lines is greater when you use /DRAFT. Conversely, the fill looks more solid when you use /NODRAFT.

Index

Index

R

S

T

U

W

READER'S COMMENTS

Note: This form is for document comments only. DIGITAL will use comments submitted on this form at the company's discretion. If you require a written reply and are eligible to receive one under Software Performance Report (SPR) service, submit your comments on an SPR form.

Did you find this manual understandable, usable, and well organized? Please make suggestions for improvement.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Did you find errors in this manual? If so, specify the error and the page number.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Please indicate the type of user/reader that you most nearly represent:

☐ Assembly language programmer
☐ Higher-level language programmer
☐ Occasional programmer (experienced)
☐ User with little programming experience
☐ Student programmer
☐ Other (please specify) _____

Name _____ Date_____

Organization_____

Street _____

City _____ State _____Zip Code_____
                                                or Country

digital™

BUSINESS REPLY MAIL

FIRST CLASS   PERMIT NO. 33   MAYNARD, MASS.

POSTAGE WILL BE PAID BY ADDRESSEE

VWS Engineering
Digital Equipment Corporation
110 Spitbrook Rd. ZKO3-2/S30
Nashua, New Hampshire 03062-2698
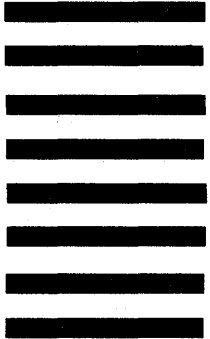
Do Not Tear - Fold Here

94-003/102/24

()

Update Notice 1

VMS Workstation Software Guide to Printing Graphics

Order Number: AD-HQ85C-T1

June 1989

NEW INFORMATION

This update contains changes to the *VMS Workstation Software Guide to Printing Graphics*, AA–HQ85C–TE.

Digital Equipment Corporation