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Consumer Products Division

VDP1
User's Manual Supplement

Doc. #ST-13-SP1-052794

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REFERENCES

In translating/creating this document, certain technical words and/or phrases were interpreted with the assistance of the technical literature listed below.

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2. *Computer Dictionary*
   Kyoritsu Publishing Co., LTD.
   Tokyo, Japan
   1978

3. *IBM Dictionary of Computing*
   McGraw-Hill, Inc.
   New York, New York
   1994

Revision History

Revision 7.1	December 6, 1993 • Minor corrections • Total 155 pages
First Edition	March 20, 1994 • Added even/odd coordinate selection bit (EOS) to frame buffer change mode register (FBCR) • Added high speed shrink (HSS) and pre-clipping disable (Pclp) to draw (paint) mode word (+04H) in the command table. • Total 163 pages
Supplement	March 31, 1994 • Explained functions for version 0 of the VDP1 device. • The following functions added to version 1 are not included in version 0: >The frame buffer change mode register (FBCR) does not have an even/odd coordinate selection bit (EOS) function. >The draw (paint) mode word (+04H) in the command table does not high speed shrink (HSS) and pre-clipping disable (Pclp) functions. • Total 7 pages.

Table of Contents

Introduction

This manual contains additional explanations of version 0 of the VDP1 device. It explains the functions of version 0 while noting the differences between the functions of version 1 and the functions of version 0 of the VDP1 device. Refer to *VDP1 User's Manual*, 1st edition, regarding version 1.

This supplement is valid only for version 0 of the VDP1 device. Refer to the appropriate manual regarding VDP1 devices other than version 0.

Confirmation of Version Number

First, confirm the version number. Use the method described below to confirm the version number.

Version Number

The version number (VER, version number) is handled by bits 15 to 12 of the mode register (MODR, 100016H), thus the version number of the VDP1 device is indicated by four bits. Bits 15 to 12 indicate the version number when the mode register is read out. When the value is 0 (0000B), the version number of the VDP1 device is 0.

1.0 Differences in Functions

1.1 Functions of Version 0

The differences in the functions of version 0 from the functions of version 1 are explained below. These functions are not included in the version 0 VDP1 device. Refer to the *VDP1 User's Manual*, 1st edition (version 1).

Even/Odd Coordinate Select Bit (EOS): bit 4

In version 1, an even/odd coordinate selection bit (EOS) was added at bit 4 of the frame buffer change mode register (FBCR, 100002H). However, in version 0, this bit does not have that function.

When writing a value to the frame buffer change mode register (FBCR) in version 0, set bit 4 to "0". Version 0 does not have the bit for high speed shrink (HSS) in the draw (paint) mode word (CMDPMOD) or that function.

High Speed Shrink (HSS)

In version 1, high speed shrink (HSS) is added at bit 12 of the draw (paint) mode word (CMDPMOD, +04H). However, version 0 does not have this function at this bit.

When drawing (painting) a scaled sprite or distorted sprite in version 0, set bit 12 of the draw (paint) mode word (CMDPMOD) in the command table to "0".

Pre-Clipping Disable (Pclp)

In version 1, pre-clipping disable (Pclp) was added at bit 11 of the draw (paint) mode word (CMDPMOD, +04H). However, version 0 does not have this function at this bit.

When a draw (paint) command is used in version 0, set bit 11 of the draw (paint) mode word (CMDPMOD) in the command table to "0".

1.2 Functions Added to Version 1

For reference, the functions of version 1 which were added after version 0 are explained below. These functions are not included in version 0 VDP1 devices. The newly added functions are as follows. For more information, refer to each item.

Even/Odd Coordinate Select Bit (EOS): bit 4

An even/odd coordinate selection bit (EOS) was added at bit 4 of the frame buffer change mode register (FBCR, 100002H).

This bit becomes valid when "1" is specified for high speed shrink in drawing (painting) a scaled sprite or a distorted sprite. When HSS = 1 is specified, lines with respect to which the drawing is scaled down are drawn by sampling only pixels at even or odd coordinates in the original picture data. The sampling of pixels at even or odd coordinates is specified by this bit.

If EOS = 0, then pixels at even coordinates are sampled, and if EOS = 1, then pixels at odd coordinates are sampled.

When HSS = 0, this bit is not referenced.

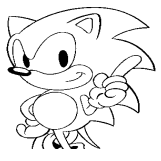
High Speed Shrink (HSS)

High speed shrink was added at bit 12 of the draw (paint) mode word (CMDPMOD, +04H).

When scaling down and drawing a scaled sprite or a distorted sprite, this bit is used to select whether precedence is given to speed or to accuracy. This is valid only for the drawing (painting) commands of scaled sprites and distorted sprites. Leave it fixed at "0" for all other drawing commands.

When "1" is specified for this bit, lines with respect to which the drawing is scaled down are drawn by sampling only the even or odd pixels of the original picture data. The selection of even coordinates or odd coordinates is done with the even/odd coordinate selection bit (EOS) of the frame buffer change mode register (FBCR).

When "0" is specified, the original picture data are sampled irrespective of even or odd coordinates at any magnification ratio. Use "0" to give precedence to accuracy over speed, and use "1" to give precedence to speed.



Pre-Clipping Disable (Pclp)

Pre-clipping disable (Pclp) has been added at bit 11 of the draw (paint) mode word (CMDPMOD, 04H). This bit specifies whether pre-clipping is performed or disabled. When "0" is specified, pre-clipping is performed. When "1" is specified, pre-clipping is not performed.

One drawing (painting) command comprises a group of several lines, and the respective lines comprise a number of dots. Each dot is drawn (painted) based on clipping area (drawing [painting] area) information specified by the CPU.

A line that is completely removed from the drawing (painting) area—and an entire 1 line drawing (painting) is not required—can be detected in advance, and drawing (painting) efficiency can be increased by not allowing the drawing (painting) to be started. Also, when one end of 1 line is outside the drawing (painting) area, efficiency can be improved by starting drawing (painting) from inside the drawing (painting) area (that line is limited to vertical and horizontal directions).

The VDP1 normally performs this detection, but in the case of small elements whose points are in the (A)—(B) or (D)—(C) direction, the overhead required for that detection (up to five CPU clock cycles for one line) becomes conspicuous and can lower the drawing (painting) efficiency.

In the case of large elements that extend greatly out of the drawing (painting) area, it is more efficient to perform pre-clipping. This bit is only valid for drawing (painting) commands. Fix it to "0" for other commands.

2.0 Using Version 0

Use version 0 as described below.

2.1 High Speed Shrink (HSS)

When drawing (painting) scaled sprites and distorted sprites reduced in version 1, it is possible to specify high speed shrink in order to give precedence to speed.

Version 0 does not have this function. In order to give precedence to speed when scaled sprites and distorted sprites are scaled down and drawn (painted), a method other than one that scales down and draws (paints) scaled sprites and distorted sprites is required.

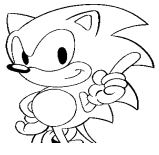
For example, a method that draws (paints) using scaled sprites or that registers reduced scaled sprites or distorted sprites and draws (paints) them without reduction must be used. If the drawing (painting) speed is slow in version 0, confirm whether or not a scaled sprite or distorted sprite is being scaled down and drawn.

2.2 Pre-Clipping Disable (Pclp)

When pre-clipping is not required in version 1, drawing (painting) speed can be raised by specifying pre-clipping disable.

Version 0 does not have this function. When drawing (painting) small horizontal or vertical lines, it is necessary to employ a method that reduces the overhead required to detect whether drawing (painting) with pre-clipping is necessary.

For example, measures must be taken by making several small elements large when drawing (painting) them or exchanging left and right for up and down and increasing the size when drawing (painting) them. If the drawing (painting) speed is slow in version 0, confirm whether or not many small elements are being drawn (painted).



3.0 Manual Changes

The manual for version 1 can be changed into the manual for version 0 by making the following changes.

3.1 Description of Changes

The items changed include explanations of the three bits added and their functions. The manual can be used for version 0 by deleting the explanations of these functions.

Version Number (VER)

The value of the version number (VER, bits 15-12) of the mode register (MODR, 100016H) is "0" (0000B).

Even/Odd Coordinate Selection Bit (EOS)

Information regarding the even/odd coordinate selection bit (EOS, bit 4) of the frame buffer change mode register (FBCR, 100002H) is deleted. Bit 4 of FBCR is set to "0". Information regarding the even/odd coordinate selection bit (EOS, bit 7) of the mode register (MODR, 100016H) is also deleted. Bit 7 of MODR becomes undefined.

High Speed Shrink (HSS)

Information regarding high speed shrink (HSS, bit 12) of the draw (paint) mode word (CMDPMOD, +04) is deleted. Bit 12 of CMDPMOD is set to "0" for scaled sprites and distorted sprites. Information regarding HSS = 1 in the explanation of end code disable is deleted. The information regarding HSS = 0 remains valid.

Pre-Clipping Disable (Pclp)

Information regarding pre-clipping disable (Pclp, bit 11) of the draw (paint) mode word (CMDPMOD, +04) is deleted. Bit 11 of FBCR is set to "0" in the draw (paint) command table.

3.2 Detailed Descriptions

The items changed for version 0 and their descriptions are given in the table below. V0 in the table refers to version 0 of the VDP1 device.

Table 3.1 Changes and Their Descriptions

Page	Line	Item	Description
		(Chapter 4 System Registers)	
35	11	System Registers	Delete change timing of even/odd coordinate selection bit (EOS). This bit is not defined in version 0.
38	Top figure	Frame buffer change mode register	Delete even/odd coordinate selection bit (EOS). Set bit 4 to "0". This bit is not defined in V0.
44	—	Even/odd coordinate selection bit	Delete explanation of function of even/odd coordinate selection bit (EOS). Set bit to "0". This bit is not defined in V0.
57	Figure	Mode register	Delete even/odd coordinate selection bit (EOS). Bit 7 is undefined. This bit is not defined in V0.
	11	Version number	The value of bits 15-12 is "0" (0000B).
	15	Even/odd coordinate selection bit	Delete even/odd coordinate selection bit (EOS).
		(Chapter 5 Tables)	
66	Figure 5.5	Command table	Delete HSS (high speed shrink) from bit 12 and Pclp (pre-clipping) from bit 11 of the draw (paint) mode word (CMDPMOD, +04H). Set both bits 11 and 12 to "0". These bits are not defined in V0.
		(Chapter 6 Command Tables)	
79	Figure 7 10	CMDPMOD	Delete HSS (high speed shrink) from bit 12 and Pclp (pre-clipping disable) from bit 11. Set both bits 12 and 11 to "0". These bits are not defined in V0.
81 82	— —	High speed shrink	Delete the explanation of the function of high speed shrink (HSS). Set bit 12 to "0". This bit is not defined in V0.
83	—	Pre-clipping disable	Delete the explanation of the function of pre-clipping (Pclp). Set bit 11 to "0". This bit is not defined in V0.
86	Top table	End code disable	Delete end code processing when HSS is "1". HSS is not defined in V0. Set HSS to "0".

(Continued on next page.)

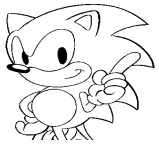


Table 3.1 Changes and Their Descriptions (continued)

Page	Line	Item	Description
		(Chapter 7 Commands)	
118	Figure 17	Normal sprite draw (paint) command	Delete Pclp from CMDPMOD. Delete Pclp definition. Set bit 11 of CMDPMOD to "0".
120 121	Figure 5	Scaled sprite draw (paint) command (Specification of two coordinate points)	Delete HSS and Pclp from CMDPMOD. Delete definition of HSS and Pclp. Set bits 12 and 11 of CMDPMOD to "0".
122	Figure 16	Scaled sprite draw (paint) command (Specification of zoom point)	
124	Figure 19	Distorted sprite draw (paint) command	
126	Figure 13	Polygon draw (paint) command	Delete Pclp from CMDPMOD. Delete definition of Pclp. Set bit 11 of CMDPMOD to "0".
128	Figure 13	Polyline draw (paint) command	
130	Figure 13	Line draw (paint) command	
		(Chapter 8 Quick Reference)	
135	Figure	Frame buffer change mode register	Delete even/odd coordinate selection bit (EOS). Set bit 4 of MODR to "0".
	Bottom table	Even/odd coordinate selection bit	Delete even/odd coordinate selection bit (EOS). Set bit 4 of MODR to "0".
139	Figure	Mode register	Delete even/odd coordinate selection bit (EOS). Bit 7 of MODR is undefined.
	4	Even/odd coordinate selection bit	Delete even/odd coordinate selection bit (EOS).
142	Figure	Command table	Delete HSS and Pclp from CMDPMOD. Set both bits 11 and 12 of CMDPMOD to "0".
146	Figure	Draw (paint) mode word	Delete HSS (high speed shrink) from bit 12 and Pclp (pre-clipping disable) from bit 11. Set both bits 12 and 11 to "0".
	2	High speed shrink	Delete high speed shrink (HSS). Set bit 12 of CMDPMOD to "0".
	3	Pre-clipping disable	Delete pre-clipping (Pclp). Set bit 11 of CMDPMOD to "0".
147	Top table	End code disable	Delete end code processing when HSS is "1". HSS is not defined in V0. Set HSS to "0".
152	Bottom table	Normal sprite draw (paint) command	Delete Pclp from CMDPMOD. Set bit 11 of CMDPMOD to "0".
153	Figure	Scaled sprite draw (paint) command	Delete HSS and Pclp from CMDPMOD. Set bits 12 and 11 of CMDPMOD to "0".
154	Top figure	Distorted sprite draw (paint) command	
	Bottom figure	Polygon draw (paint) command	Delete Pclp from CMDPMOD. Set bit 11 of CMDPMOD to "0".
155	Top figure	Polyline draw (paint) command	
	Bottom figure	Line draw (paint) command	
		(Index)	
161 162	right 12 right 33 right 42	Index	Delete "even/odd coordinate selection." Delete "high speed shrink." Delete "pre-clipping".