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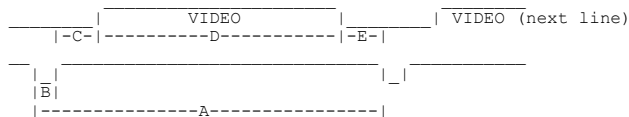
VGA timing information

This documents tries to collect together information about standard VGA card timing details.

Information form HP monitor manual

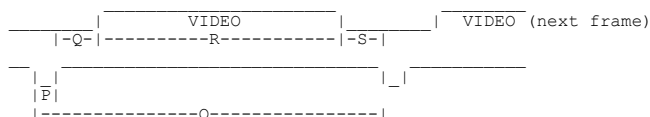
Horizontal Timing

Horizontal Dots	640	640	640	
Vertical Scan Lines	350	400	480	
Horiz. Sync Polarity	POS	NEG	NEG	
A (us)	31.77	31.77	31.77	Scanline time
B (us)	3.77	3.77	3.77	Sync pulse lenght
C (us)	1.89	1.89	1.89	Back porch
D (us)	25.17	25.17	25.17	Active video time
E (us)	0.94	0.94	0.94	Front porch



Vertical Timing

Horizontal Dots	640	640	640	
Vertical Scan Lines	350	400	480	
Vert. Sync Polarity	NEG	POS	NEG	
Vertical Frequency	70Hz	70Hz	60Hz	
O (ms)	14.27	14.27	16.68	Total frame time
P (ms)	0.06	0.06	0.06	Sync length
Q (ms)	1.88	1.08	1.02	Back porch
R (ms)	11.13	12.72	15.25	Active video time
S (ms)	1.2	0.41	0.35	Front porch



Informations source

- HP D1194A Super VGA Display & HP D1195A Ergonomic Super VGA Display Installation Guide, Hewlett Packard

"VGA industry standard" 640x480 pixel mode

General characteristics

Clock frequency 25.175 MHz
 Line frequency 31469 Hz
 Field frequency 59.94 Hz

One line

8 pixels front porch
 96 pixels horizontal sync
 40 pixels back porch
 8 pixels left border
 640 pixels video
 8 pixels right border

 800 pixels total per line

One field

2 lines front porch
 2 lines vertical sync
 25 lines back porch
 8 lines top border

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480 lines video
  8 lines bottom border
---
525 lines total per field

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Other details

Sync polarity: H negative, V negative
Scan type: non interlaced.

Information source

- Article "Re: VGA specifications ,where ?" posted 19 Nov 1997 to sci.electronics.design newsgroup by [Jeroen Stessen](#)

More VGA mode information

There are the 3 "standard" VGA modes that each VGA card is supposed to be able to do:

- 640 x 350 x 70 is compatible with the old EGA mode, but on a VGA display.
- 640 x 400 x 70 is the MS-DOS text mode (when the computer is booting !).
- 640 x 480 x 60 is the default Windows(tm) graphics mode (16 colours !).

Their line frequency is exactly twice that of the NTSC television system, or almost twice that of the PAL television system. This makes it fairly easy to implement a VGA input on a television set that uses line doubling for the television signals so the line deflection already runs on 31 kHz.

The following timings come from a list of 82 different computer timings, and by now there will be even more. Some video cards even have variable timing (allowing the user to set width, height and shift...). **The only standard is that there is no standard !**

"640 x 350 (EGA on VGA)"	"640 x 400 VGA text"	"VGA industry standard"
Clock frequency 25.175 MHz	Clock frequency 25.175 MHz	Clock frequency 25.175 MHz
Line frequency 31469 Hz	Line frequency 31469 Hz	Line frequency 31469 Hz
Field frequency 70.086 Hz	Field frequency 70.086 Hz	Field frequency 59.94 Hz

One line:	One line:	One line:
8 pixels front porch	8 pixels front porch	8 pixels front porch
96 pixels horizontal sync	96 pixels horizontal sync	96 pixels horizontal sync
40 pixels back porch	40 pixels back porch	40 pixels back porch
8 pixels left border	8 pixels left border	8 pixels left border
640 pixels video	640 pixels video	640 pixels video
8 pixels right border	8 pixels right border	8 pixels right border
---	---	---
800 pixels total per line	800 pixels total per line	800 pixels total per line

One field:	One field:	One field:
31 lines front porch	5 lines front porch	2 lines front porch
2 lines vertical sync	2 lines vertical sync	2 lines vertical sync
54 lines back porch	28 lines back porch	25 lines back porch
6 lines top border	7 lines top border	8 lines top border
350 lines video	400 lines video	480 lines video
6 lines bottom border	7 lines bottom border	8 lines bottom border
---	---	---
449 lines total per field per field	449 lines total per field	525 lines total

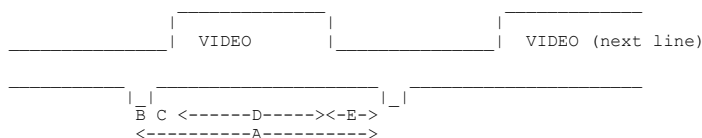
Sync polarity: H positive, V negative	Sync polarity: H negative, V positive	Sync polarity: H negative, V negative
Scan type: non interlaced.	Scan type: non interlaced.	Scan type: non interlaced.

Information source

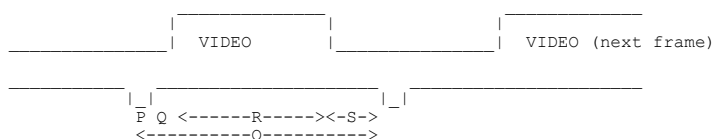
[Jeroen H. Stessen](#) kindly mailed this information for me to be added to this document at November 1997.

SuperVGA timing from NEC monitor manual

Horizontal :



Vertical :



For VESA 800*600 @ 60Hz:

```

Fh (kHz) :37.88
A (us)   :26.4
B (us)   :3.2
C (us)   :2.2
D (us)   :20.0

```

E (us) :1.0
 Fv (Hz) :60.32
 O (ms) :16.579
 P (ms) :0.106
 Q (ms) :0.607
 R (ms) :15.84
 S (ms) :0.026

Information source

- NEC Multisync manual

Necessary timing information about VGA modes

Vertical timing information

Mode name	Lines Total	line width (us)	sync pulse (us) (lin)	back porch (us) (lin)	active time (us) (lin)	front porch (us) (lin)	whole frame period (us) (lin)
VGA 640x480 60Hz	525	31.78	63 2	953 30	15382 484	285 9	16683 525
VGA 640x480 72Hz	520	26.41	79 3	686 26	12782 484	184 7	13735 520
VGA 720x400 70Hz	449	31.78	63 2	1016 32	12839 404	349 11	14268 449
VGA 720x350 70Hz	449	31.78	63 2	1811 57	11250 354	1144 36	14268 449
VGA 800x600 56Hz	625	28.44	56 1	568 20	17177 604	-1*	17775 625
VGA 800x600 60Hz	628	26.40	106 4	554 21	15945 604	-1*	16579 628
VGA 800x600 72Hz	666	20.80	125 6	436 21	12563 604	728 35	13853 666
IBM 640x480 75Hz	525	25.397	51 2	761 30	12292 484	228 9	13333 525
MAC 640x480 66Hz	525	28.57	86 3	1057 37	13827 484	28 1	14999 525

Notes:

- Active area is actually an active area added with 4 overscan border lines (in some other VGA timing tables those border lines are included in back and front porch)
- Note than when the active part of VGA page is widened, it passes by the rising edge of the vertical sync signal in some modes (marked with *)

Horizontal timing information

Mode name	Pixel clock (MHz)	sync pulse (us) (pix)	back porch (pix)	active time (pix)	front porch (pix)	whole line period (pix)
VGA 640x480 60Hz	25.175	3.81 96	45	646	13	800
VGA 640x480 72Hz	31.5	1.27 40	125	646	21	832
VGA 720x400 70Hz	28.322	3.81 108	51	726	15	900
VGA 720x350 70Hz	28.322	3.81 108	51	726	15	900
VGA 800x600 56Hz	36	2 72	125	806	21	1024
VGA 800x600 60Hz	40	3.2 128	85	806	37	1056
VGA 800x600 72Hz	50	2.4 120	61	806	53	1040
IBM 640x480 75Hz	31.5	3.05 96	45	646	13	800
MAC 640x480 66Hz	30.24	2.11 64	93	646	61	864

Notes:

- Active area is actually an active area added with 6 overscan border pixels (in some other VGA timing tables those border pixels are included in back and front porch)

Information source

- Jere Mäkelä, Software design for a video conversion equipment, Master's Thesis, Helsinki University of Technology, 23. August 1994, Appendix B.1

Timing used in one VGA monitor tester product

The following timings are used in VTG-KIT VGA monitor tester kit sold my [Data Sync Engineering](#).

Mode	Horiz Dots	Vertical Lines	Horiz KHz	Vert Hz	Horiz Sync	HSYNC Pol	Vertical Sync	VSYNC Pol
VGA-480	640	480	31.5	60	3.8 us	-	64 us	-
VGA-400	640	400	31.5	70	3.8 us	-	64 us	+
SVGA I	800	600	35.2	56	2.0 us	-	57 us	-
SVGA II	800	600	37.8	60	3.2 us	+	106 us	+
SVGA III	800	600	48.0	72	2.4 us	+	125 us	+
XGA	1024	768	48.5	60	2.0 us	-	124 us	-

Information source:

- [VGT-KIT information web page](#)

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