

# SB-114

*SB-114 Monitor - VGA*



Literature Number: SNOA183

# Monitor—VGA

National Semiconductor  
System Brief 114  
June 1990

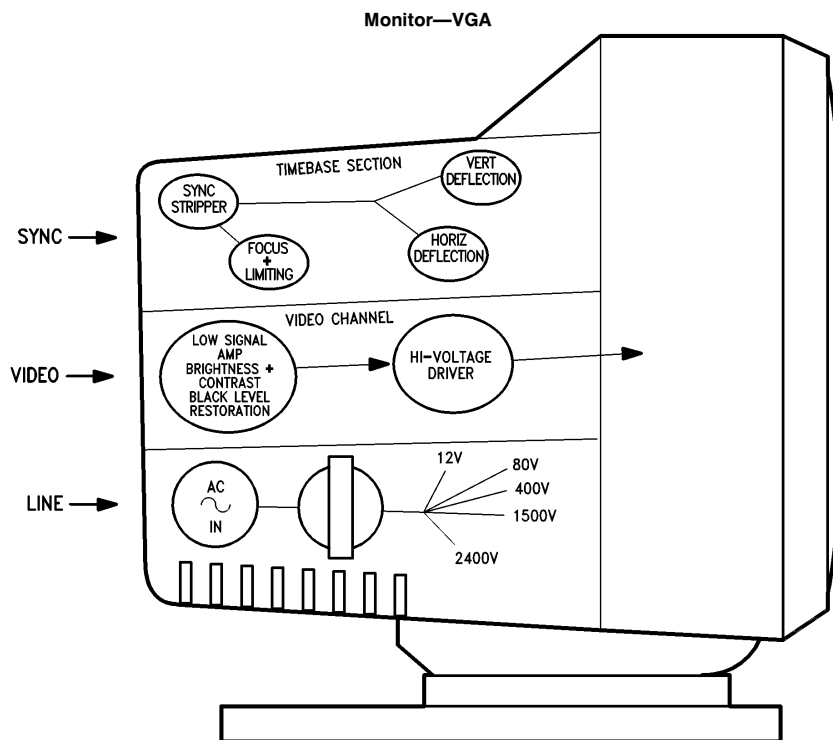


Monitor—VGA

## SYSTEM DESCRIPTION

The typical VGA (Video Graphics Array) monitor is composed of three key sections: Video, Timebase, and Power. The Video Section receives the signal from the monitor cable and amplifies it to a 50–60 V<sub>p-p</sub> grad running at 50 MHz to drive the electron gun. At the same time, it manages Brightness Control—“How white is white?”; Contrast Control—AC gain control that sets the difference between white and black; Blanking—making sure the gun is turned off between each line drawn; and finally, DC Restoration—the feedback signal to ensure the black level remains consistent. In the Timebase Section, or deflection processor section, all activities in the monitor are synchronized.

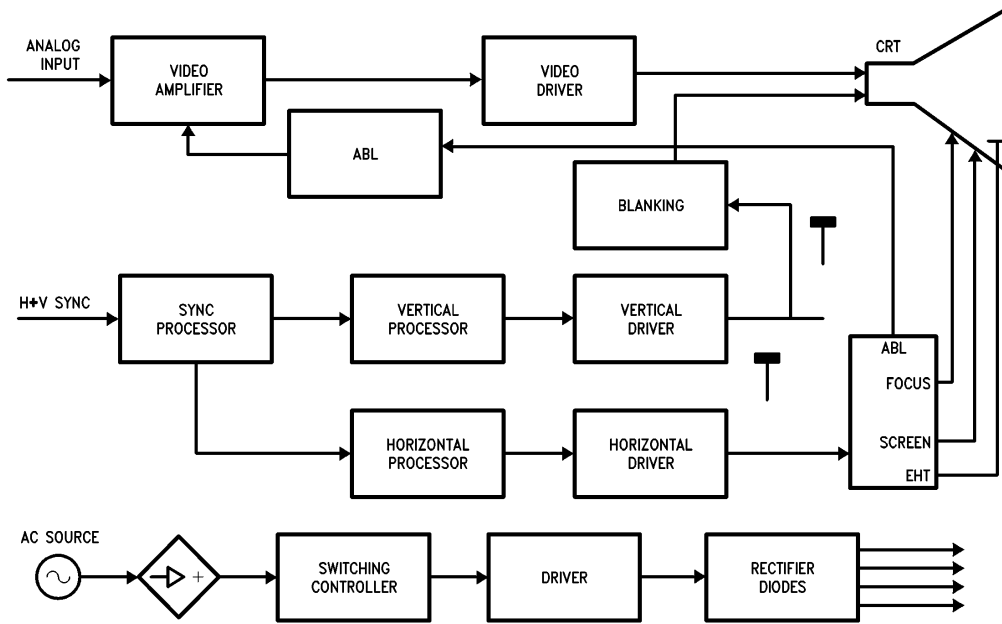
These activities include Sync Recognition and Stripper—where sync pulses can appear as sync-on-green or separate H and V, Focus and Limiting. Also handled are Horizontal Deflection—to generate a high (1500V) voltage ramp to induce a magnetic field which aims the electron gun, and also, Vertical Deflection—similar in function to Horizontal Deflection but at a couple of hundred volts only. The final section, Power Supply, must provide between 30W–100W of power and also supply a series of voltages from 5V for the silicon, to 2 kV for the high voltage grid to accelerate the electrons in the gun.



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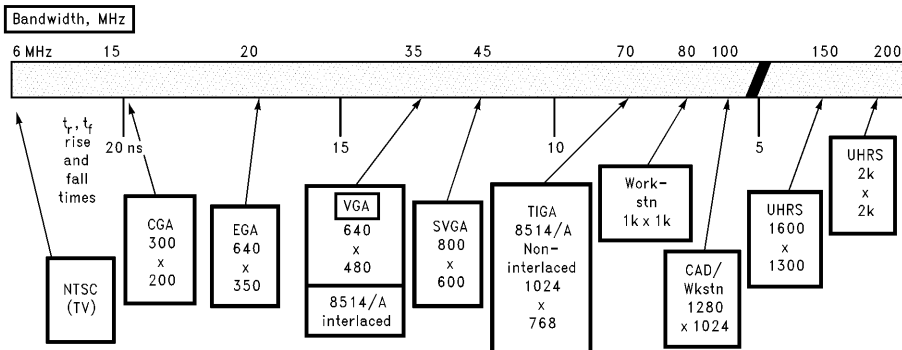
### Block Diagram of VGA Monitor



TL/F/11007-2

### Video Standards Video Speedometer of Monitor Solutions

<b>Mono</b>	LM1201 + DISCRETES	LM1201 + LM24xx (future)	LH 2440	LH 2440A	1201 + LH 2424
<b>Color</b>	LM1203 + DISCRETES	LM1203 + LM2416	LM1203 + LH2426	3X 1201 + 2426	3X 1201 + 3X 3424



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**CHALLENGES—MONITOR**

1. Typical discrete design using the cascaded output approach can be unreliable.
2. Size and weight limit considerations for the board when placed in the neck of the tube.
3. EMD radiation interference and FCC regulations concerning VDT boxes.
4.  $t_r$ ,  $t_f$  limitations of rise and fall times.

**KEY COMPONENTS**

LM1203—video amplifier for excellent brightness matching, wide contrast range, and less interconnections.  
 LM1881—sync processor strips sync from video and provides for DC restoration.  
 LM1391—horizontal processor provides synchronized signal for horizontal output.  
 LM2416—video driver is a triple CRT driver at 50 MHz.  
 Hybrid driver solution reduces the power per channel, the number of components on the board, provides symmetrical rise and fall times, and also reduces EMD.

Function	Description	NSC Part	Other	Qty
RGB Video Amplifier	Video Amplifier	LM1203	✓ ✓	1 or, 1 or, 1
Video Driver	CRT Driver  or Discrete	LH2426 or LM2416	✓ ✓ ✓	1 or, 1 or, 3 or, 3 or, 3
Sync Processor	Linear Logic	LA1881 CD4052		1 1
Horizontal Processor	Linear	LM1391	✓ ✓	1 or, 1 or, 1
Vertical Processor	Linear		✓ ✓	1 or, 1
Horizontal + Vertical Processor	Linear Deflector		✓	1
Horizontal Driver	Discrete		✓ ✓	1
Vertical Driver	Linear Discrete	LM675	✓	1 or, 1
Blanking	Discrete	TO-92 Diode		2 2
ABL	Discrete	TO-92 Diode		2 2
Switching Controller	Linear	LM494	✓	1 or, 1
Rectifier Diode	Discrete	FRPXXX		8

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