3.3.2 Test Patterns

In addition to text, the Character Generator produces a variety of different test patterns. It generates three different crosshatches - a "plain" crosshatch, a dense crosshatch and a crosshatch with a dot in the center of each square. It generates a dot field, which is useful for stigmator setup. It also generates a grayscale pattern, which is useful during color temperature setup.

Crosshatch and dot patterns are created with a circuit consisting of a PAL (U117) and a delay line (U109). Horizontal and vertical counter outputs from PLD U111 are ANDed in the PAL to create a crosshatch and ORed to create dots. The delay line allows the width of vertical lines (and of dots) to be controlled.

Horizontal lines in the crosshatch are single scan lines whose on-screen position is defined by ATC from U111 and VLTC from the vertical RAM. Vertical lines are created from signals HX and HC3 from U111. The HX signal is composed of 32 narrow pulses on every scan line. Each pulse is high for one half of a single PIXCLKB cycle. HX is input to delay line U109, which outputs several versions of the pulse train, delayed by integer multiples of 5 nsec. These signals are input to PAL U117, which selects one of the pulse trains according to a code formed by W0, W1 and W2 from register U94. The delayed pulses are ORed with the undelayed pulses. This narrows the width of the pulses, resulting in theinner vertical lines. The width is chosen by software according to the horizontal scan frequency.

SELECT0 and SELECT1 from register U94 are input to U117 to select the specific crosshatch or dot pattern that will be output. The resulting signal, XHATCH, is input to PAL U108 and mixed with pixels from the shift registers in the text generation circuit.

The grayscale pattern is generated by a circuit consisting of OR gates (U103), open drain inverters (U104), a precision R2R resistor ladder and a video amplifier (U110). The circuit produces an eight level stairstep which reverses direction half way down the raster. PLD U111 outputs HCOUNT5*, HCOUNT6* and HCOUNT7*, which are the three most significant bits of the horizontal count. These are gated in U103 by a blanking signal from U108, which disables the counter outputs when text is being displayed on top of the grayscale pattern. The counter outputs are converted to video levels by the open drain inverters. A weighted sum is then performed by the R2R ladder. The resulting voltage stairstep is amplified by U110 and added equally to the red, green and blue video signals from PAL U108. To reverse the direction of the stairstep midway down the raster, the counter signals are inverted by signal MIDV from the vertical RAM.

3.3.3 G2 Control Voltages

The High Voltage Power Supply (HVPS) provides voltages in the range of 0 - 1000V to each of the CRTs. These voltages bias grid 2 (G2) of the electron gun in each CRT and must be adjusted so that black portions of the video signal appear black on-screen. The Character Generator outputs three control voltages, R-G2-CONT, G-G2-CONT, and B-G2-CONT, in the range 0 - 10V to allow these adjustments.

The control voltages are produced by an I^2C 6-bit octal DAC (U4). To ensure fine adjustment resolution, two channels are used for each control voltage. They are summed in a 64:1 ratio into op-amp U200 to approximate 12 bits of resolution. A stable reference voltage is provided by regulator U2. The regulator's +12V output is also used as a reference for DACs U37 and U39 in the convergence waveform circuit.