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tech tips

Understanding Your VA62A Universal Video Analyzer™ Video Patterns

The Sencore VA62A Universal Video Analyzer contains complete color circuit testing and convergence patterns in a one of a kind, phase-locked troubleshooting system. All the test patterns meet the NTSC (FCC) tolerances for timing and amplitude ratios. The patterns may be interlaced or non-interlaced.

All standard signals are available, including the Multiburst Bar Sweep, for solving difficult response problems. The VA62A's patterns allow performance testing without removing the back from the set. Each video pattern provides important clues to circuit performance.

The VA62A's video patterns may be used to modulate the RF and IF generators, the video pattern position of the DRIVE SIGNAL switch, and the VCR STANDARD output.

A Pattern That Matches The Circuit

With the video patterns, IF Amplifier Frequency Response, Trap Performance, Video Amplifier, Automatic Fine Tuning, Static Convergence, Picture Centering, Dynamic Convergence, Color Demodulators, Color Bandpass Amplifier, Tint Range, Black and White Tracking (CRT Drive and Bias), and Color Killer, can be checked without taking the back off the set.

The VIDEO PATTERN switch begins with the single dot pattern. The single cross, crosshatch, and dots patterns form the standard convergence patterns.

DOT: This pattern produces a single dot centered between the horizontal and vertical blanking intervals. This places the dot in the exact center of the screen. Static convergence is correct if this dot is white. If not, the Yoke magnets need adjusting.

CROSS: The cross pattern is used for picture centering and yoke alignment. It

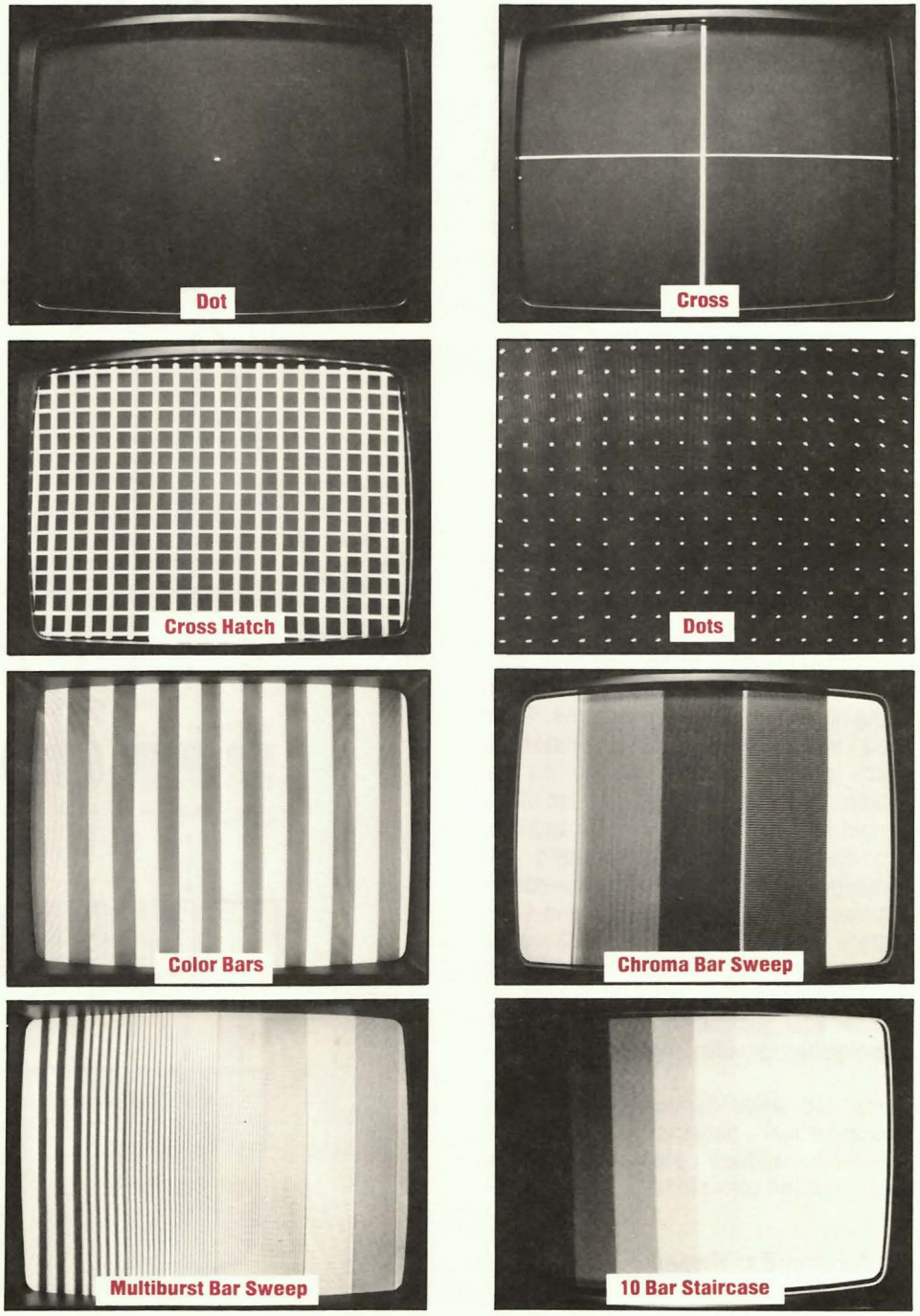


Fig. 1: Patterns are used for making adjustments and troubleshooting circuits such as convergence, color, IF and trap, brightness, and contrast.

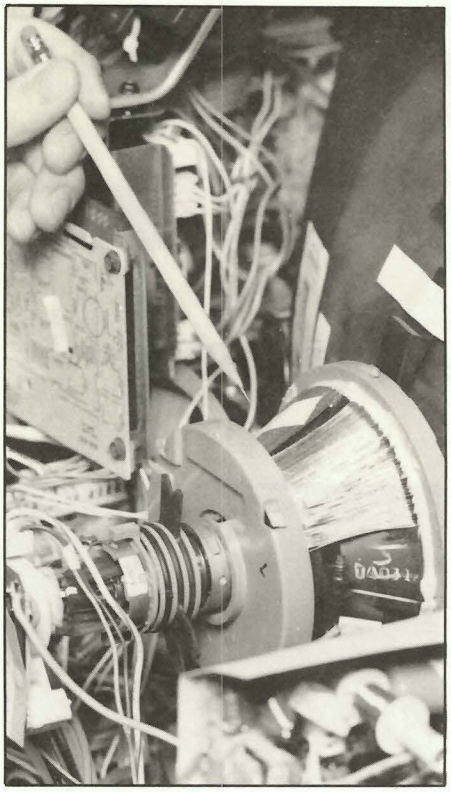


Fig. 2: The deflection yoke and convergence assembly.

should appear like cross hairs aimed at the center of the screen.

CROSSHATCH and DOTS: Dynamic convergence and screen size are checked using these two full screen patterns. There are 21 Vertical lines and 15 horizontal lines which produce perfect squares on the screen. Dots may be chosen instead of the perfect squares. Both crosshatch and dots provide excellent indications of convergence and pincushion problems. A dot-size control adjusts the dot and cross pattern lines to allow more accurate convergence adjustments on different sizes and types of color CRTs. Set the dot size for your application, whether it is TV, video games, or video monitors.

Black and white (luminance), and color (chrominance) patterns allow you to accurately analyze problems in video amplifiers and color circuits.

Multiburst Bar Sweep

The Multiburst Bar Sweep pattern may be compared to the sweep curve shown in service literature. The multiburst bars occur every 0.5 MHz all the way to 4.5 MHz, providing a complete dynamic check of the resolution of video systems. The high frequency bars (near the color carrier) roll off at the same rate at the video detector as a sweep generator, allowing you to compare directly to any service literature. But, more importantly, the Multiburst Bar Sweep pattern allows the circuits to work normally without applying external AGC bias. The Bar Sweep Pattern duplicates the signal found in the stages during normal operation.

How does the Bar Sweep pattern compare to a sweep and marker generator for RF and IF alignment? Each point on the video IF response curve represents a different part of the video frequency response. The traps determine the upper and lower frequency limits.

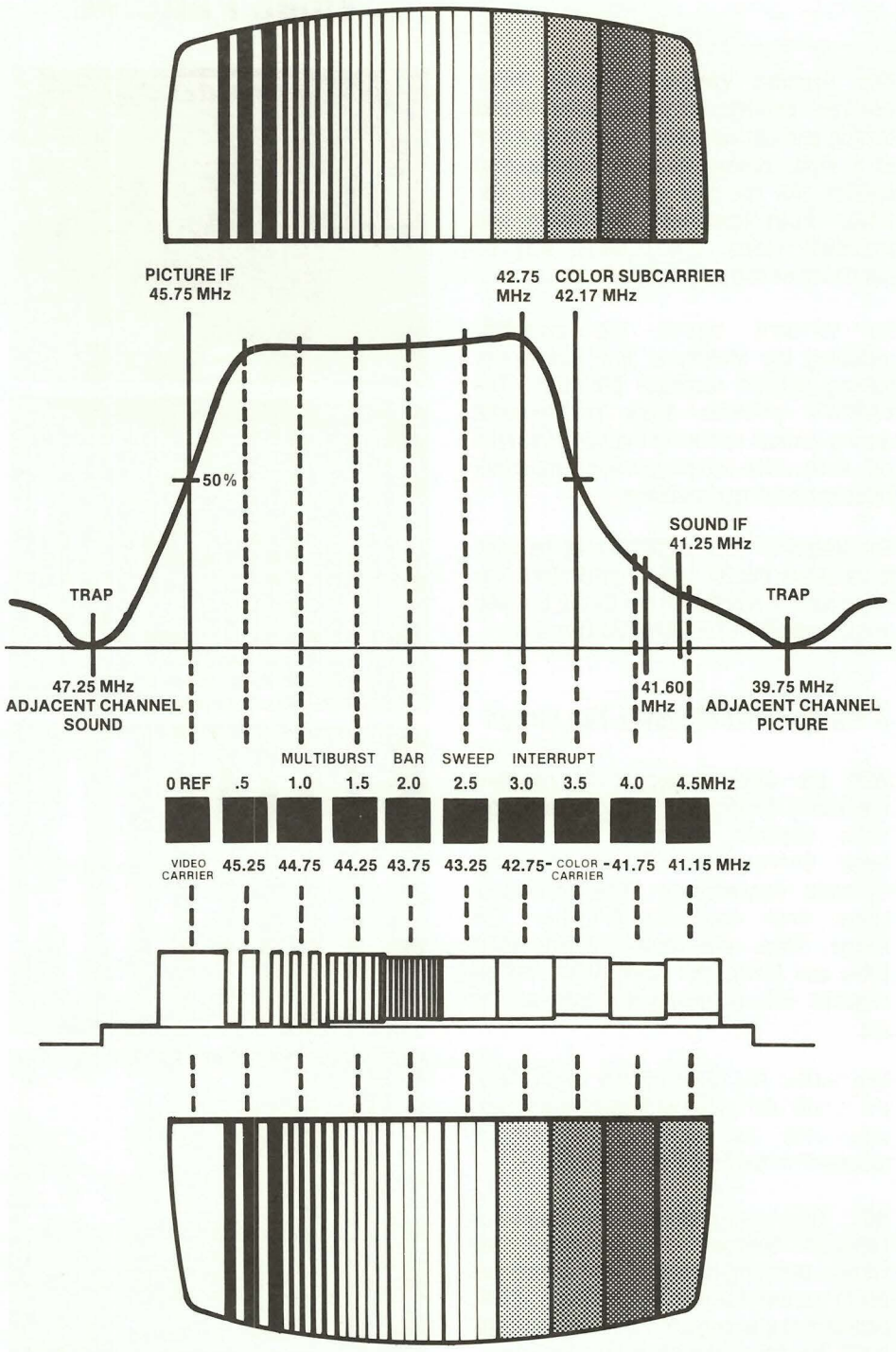
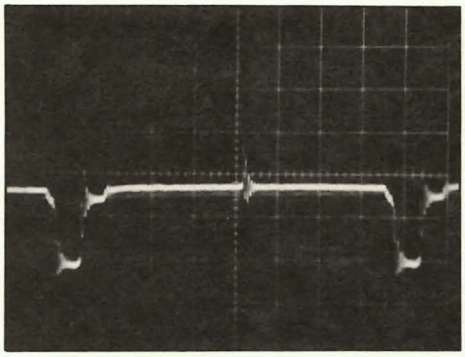


Fig. 3: The traps determine the upper and lower frequency limits of the video IF response curve. Each point on the curve represents a different part of the frequency response.



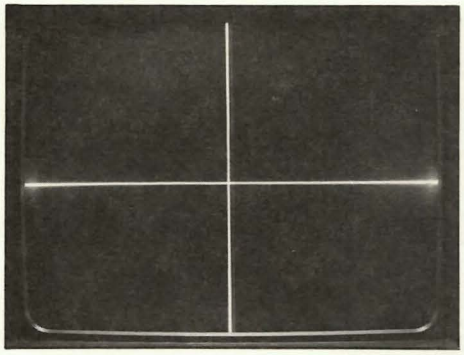


Fig. 4: Ringing in the IF amplifiers will appear as harsh white edges on the lower frequency bars. The distortion may show on the white or the black area, depending on the direction of the overshoot in the circuits.

Each Bar Sweep bar corresponds to a video frequency shown above the selector pushbutton for reference, and an IF frequency shown below each pushbutton.

The bar frequencies of the Multiburst Bar Sweep video pattern are related directly to the critical frequencies of the IF response curve. These ten bars provide a complete frequency response test of the IF system from zero to 4.5 MHz in half-megahertz steps. Many comb filter receivers have video frequency responses out to 4.2 MHz.

Bar Sweep alignment prevents tuning problems at the color end of the IF curve because all key frequencies are present and adjustments may be made to achieve best overall IF response.

The VA62A Multiburst Bars are actually squarewaves. Squarewaves are better for testing because they will help in detecting IF circuit ringing.

The Multiburst Bar Sweep pattern dynamically tests every video stage (from the antenna to the CRT) for signal amplification, linearity, frequency response, and circuit ringing.

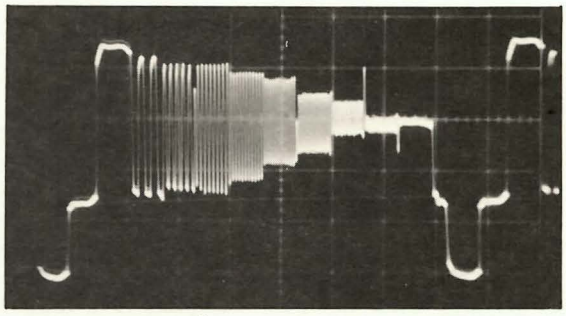
Luminance Patterns

The 10 Bar Staircase and Multiburst Sweep patterns provide complete information about the frequency response and dynamic range of any video system, TV, or VCR.

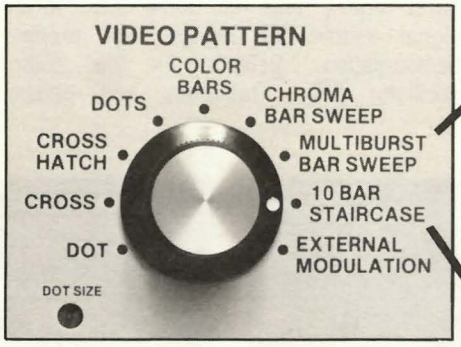
Looking at the Universal TV Block Diagram, blocks (1) and (2) are antenna terminals. Follow this block diagram throughout our discussion. Inputs and outputs of the various circuits are numbered and arrows show signal direction.

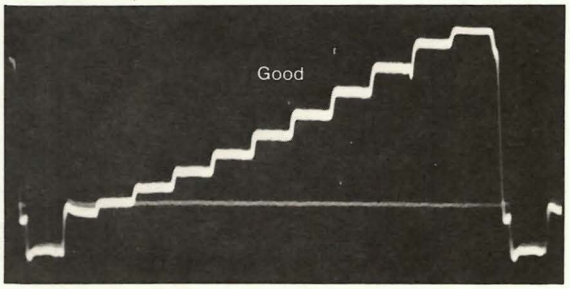
Feed the "RF-IF OUT" signal into the antenna terminals (1) or (2), set the RF-IF LEVEL VERNIER, choose the channel with the RF-IF SIGNAL SWITCH, pick a VIDEO PATTERN, and you are ready for a complete performance check. Just select the Multiburst Bar Sweep (Figure 5A) or the EIA Staircase (Figure 5B) pattern to see frequency response or dynamic video range right on the front of the screen. Use the MULTIBURST BAR SWEEP INTERRUPT buttons to select any increment of the entire video carrier.

Inject at the IF input (11) and connect your scope to the video detector output (15) so you can see what both Multiburst and EIA staircase patterns do. Note the picture detail in the frequency bars of the Multiburst Bar Sweep pattern and the distinct stairstep of the EIA test pattern (Figure 5). When aligning the synchronous detector, you simply adjust for best linearity of the staircase pattern. This ensures full dynamic range of the picture from black to pure white.



A





B

Fig. 5: Select the Multiburst Bar Sweep (A), and EIA Staircase (B) patterns to see frequency response and dynamic range.

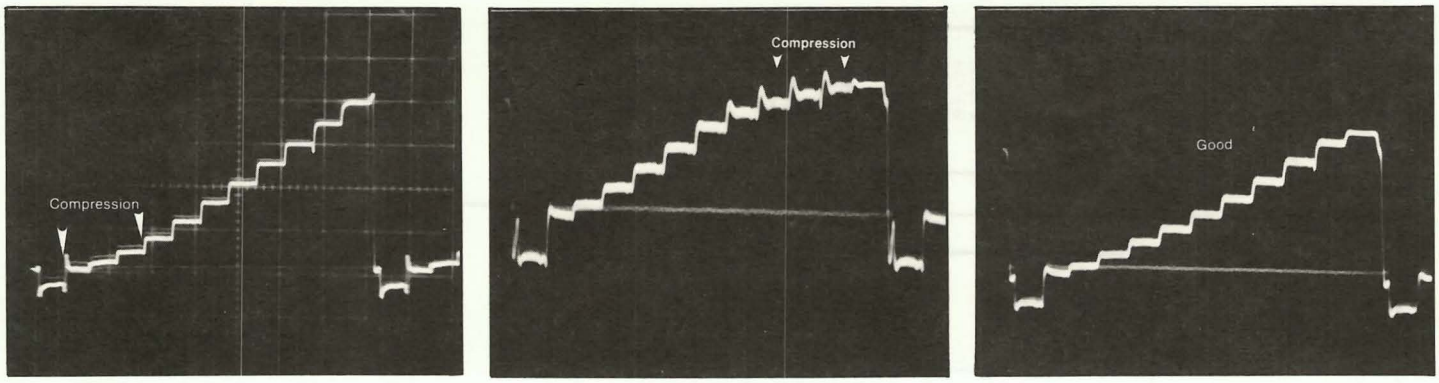


Fig. 6: Linear stair steps of the EIA staircase pattern check linearity of the IF and video amplifiers and check alignment of the synchronous detector.

Use The 10 Bar Staircase To Solve Brightness And Contrast Problems

A closer look at the 10 Bar Staircase Pattern shows its usefulness in solving brightness and contrast problems and in adjusting the synchronous detectors. Use this staircase pattern when working in the luminance stages. It provides exactly the same information as the stair-step part of the industry NTSC pattern. The linear stair steps are used to check linearity of the IF and video amplifiers and for alignment of the reference coil in synchronous detectors.

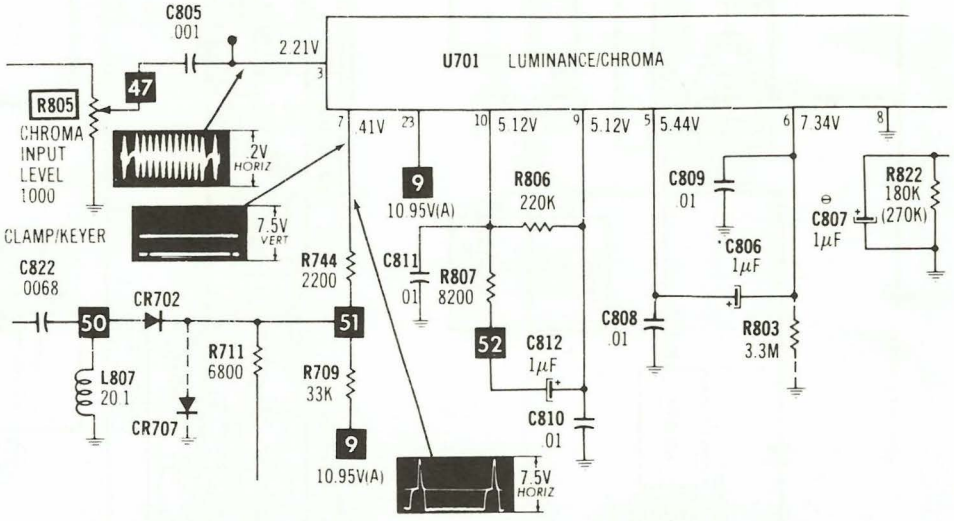
Synchronous video detectors need a linear pattern for testing and alignment. Misalignment (Figure 6) causes poor contrast or brightness, which is especially noticeable on large-screen units. Other video circuits may cause compression at any point of the operating curve (white, gray, or black), which is only found with a test of the full operating range of the system. The staircase test pattern, with its equally spaced steps, aids you in accurately testing or aligning synchronous video detectors or testing the dynamic range of any video amplifier, video tape system or other luminance circuit.

Synchronous detector output is picture quality, it doesn't get any better (it only gets larger) after it leaves the detector. This is one reason the detectors are adjusted first in most alignment procedures. Some manufacturers recommend that you don't touch the synchronous detector alignment, however, even minor misalignment produces adverse effects in the picture. Many TV sets have been adjusted by other technicians and some have simply drifted out of alignment through aging and vibration. With the EIA staircase pattern, you are assured of getting the best output from the detector.

Color Patterns (Chrominance)

Chroma Bar Sweep White Level

A white level is provided in the Chroma Bar Sweep pattern to cause the non-keyed AGC circuits found in VCRs to operate properly. Chroma Bar Sweep bars at 3.0, 3.5, and 4.0 MHz allow fast, accurate, color bandpass checks and adjustments. When the three Chroma Bar Sweep bars are turned off with the 3.0, 3.5, and 4.0 MHz interrupt buttons, the VA62A produces a pure-white, snow-free pattern for purity tests, brightness limiter adjustments, and high voltage regulation tests.



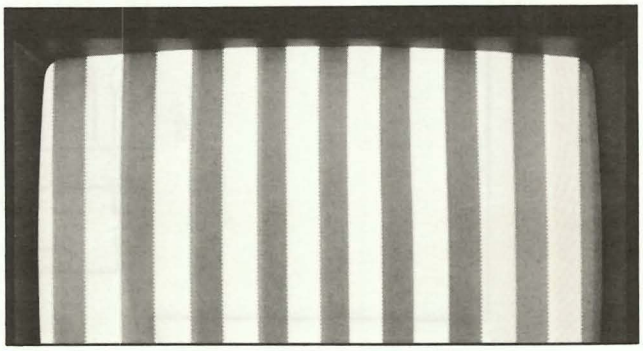
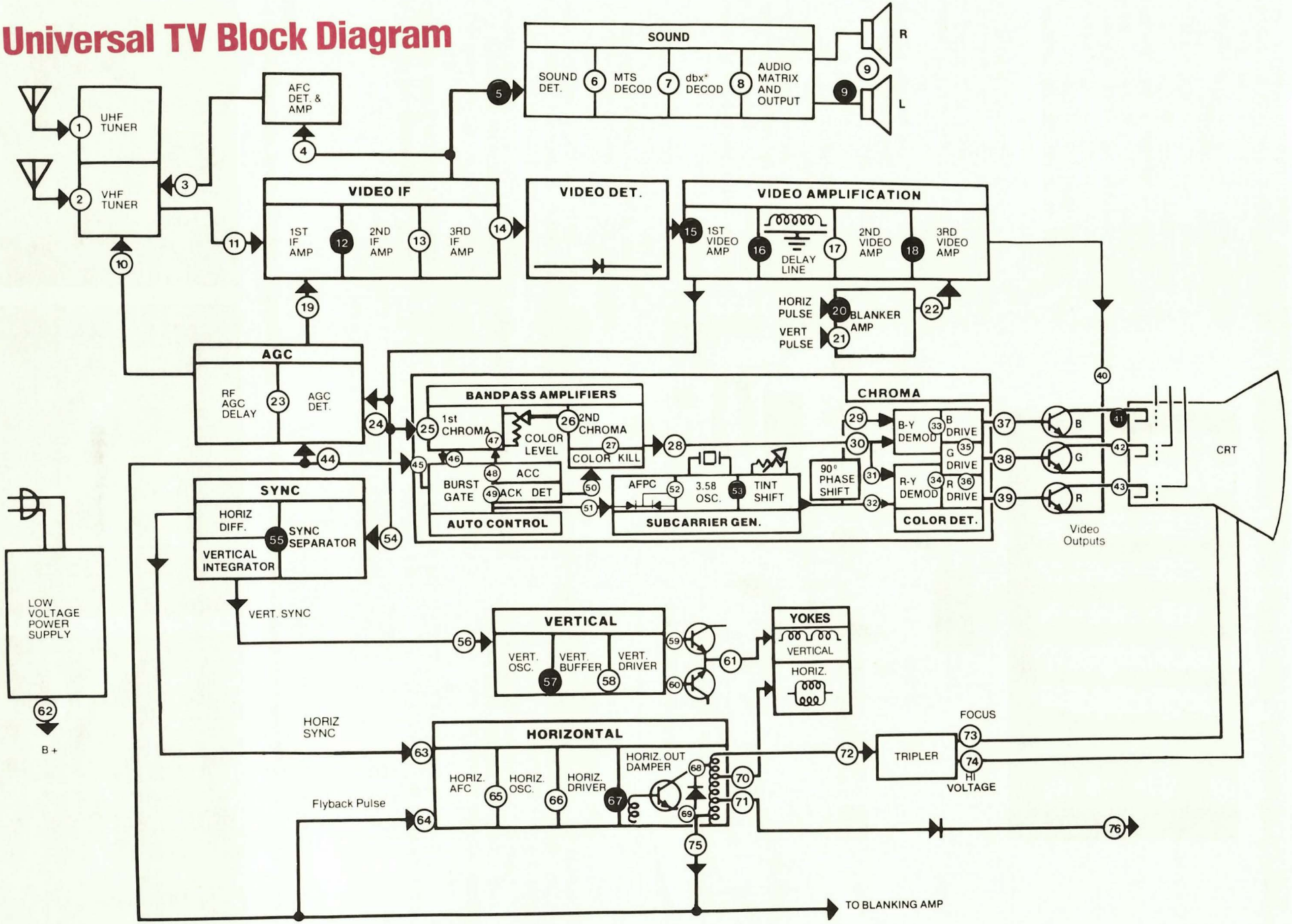
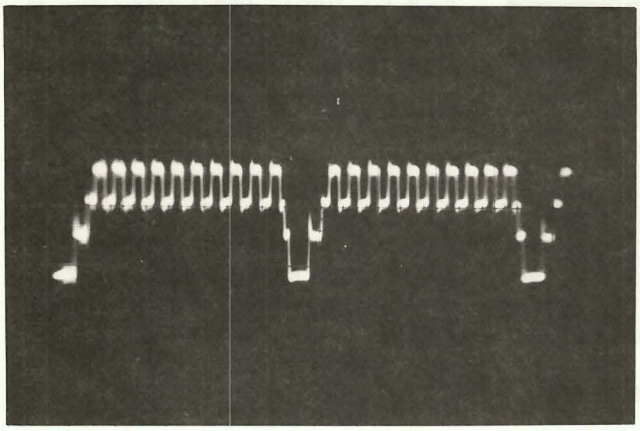


Fig. 7: The VA62A supplies standard color-bar patterns that agree directly with service literature for TV receivers or VCRs.

Universal TV Block Diagram





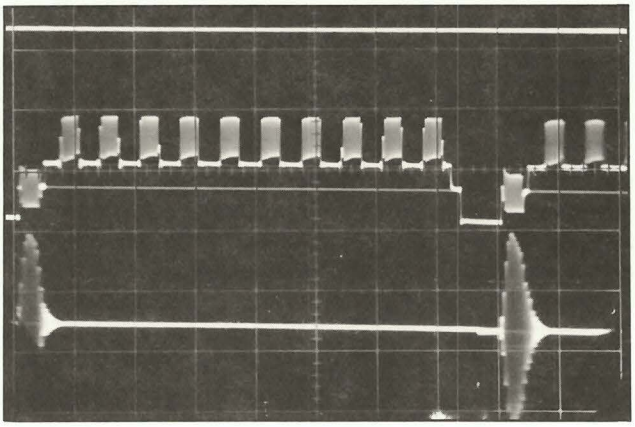


Fig. 8: Phase-locked gated rainbow pattern.

Improved Gated Color Bars

Switch to the color bar pattern to see the fully saturated standard phase locked color bars on the CRT. The color modulation levels of this pattern are higher than on most other color generators. This causes richer colors in the color bars. The levels in the color circuits agree directly with the amplitudes of the color signals on a schematic referenced to the 75% Saturated EIA Color Bar pattern.

Make color tests and adjustments faster and more accurately with the VA62A. The demodulators (29), (30), and (31) are a good point to begin analyzing because they call for two phase-locked reference signals. The color signals from the TV station or color generator need the TV's 3.58 MHz oscillator locked to the color burst signal, and the same 3.58 MHz signal shifted 90 degrees, for proper demodulation. Defects in the color oscillator (53), frequency and phase correction circuits (52), tint circuits (53), demodulators (23) and (24), matrix (35) and (36), and CRT drivers (37), (38), and (39) are isolated using the chroma phase-locked substitute signals.

The phase-locked, gated rainbow color pattern will remain the industry standard for troubleshooting and aligning TV receivers and VCRs. It is the pattern that service technicians are familiar with. The gated rainbow pattern serves you well for troubleshooting and allows tests on any video system.

Chroma Bar Sweep

The phase locked Chroma Bar Sweep pattern tests the full frequency response of the color circuits (For proper color reproduction, color signals of 3.08 MHz and 4.08 MHz should arrive at the demodulator with near equal amplitude.) White reference levels appear on either side of the chroma frequency bars. The chroma amplitudes agree directly with the amplitude of the "NTSC" cyan bar. Manufacturers use cyan for reference because it has the highest amplitude of all the colors. Color circuits must be able to pass this amplitude correctly, to prevent clipping or limiting. VCR schematics directly reference these color signals. The pure white reference levels lock the VCR AGC circuits.

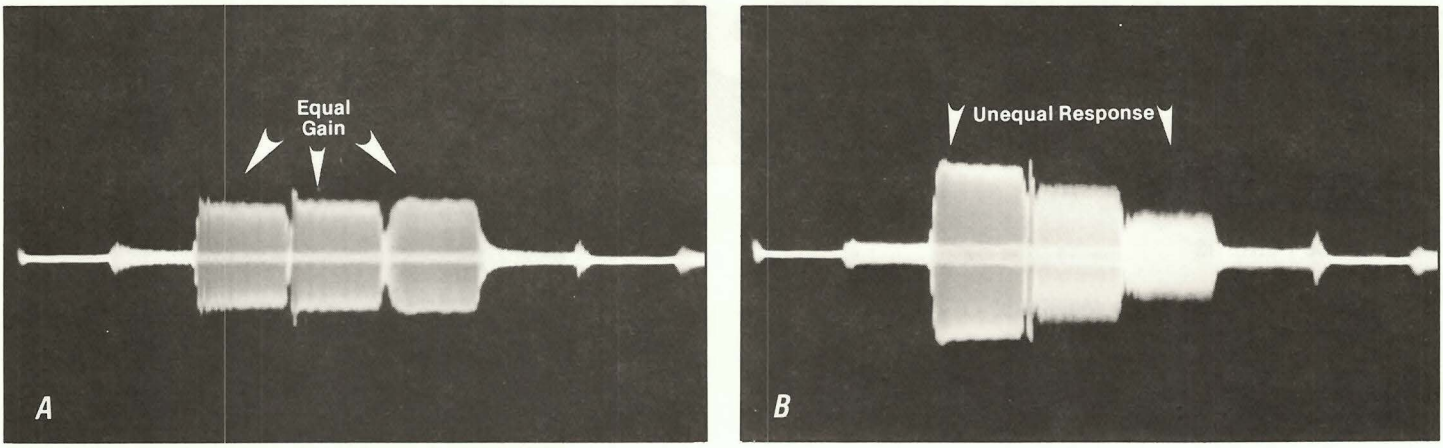


Fig. 9: In a chroma bandpass amplifier system (25), the three Chroma Bar Sweep bars should have the same amplitude when injected at the input to the first video amp stage (15) and monitored at the input to the color demodulators (30). (A) Properly aligned chroma amplifier. (B) Unequal response caused by misalignment or less than optimum circuit designs.