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tech tips

How The VA62A And VC63 Can Simplify VCR Luminance Circuits

Playback of the recorded signal on the VCR tape for a troubleshooting reference leaves many questions unanswered. You don't know at what point the signal goes bad, or if the signal is even being properly picked up off the tape. Is the problem electrical or is the tape path alignment severely off and not allowing the heads to pick up any signal? Maybe the tracking is completely off or the heads are not switching properly. The answer to these problems is to inject a known good reference signal into the circuits, rather than trying to follow hard-to-trace signals.

With signal injection, you inject a good signal into the circuits. When you inject after the defect, the VCR begins to operate properly, telling you that the circuits from that point forward are working. Then you simply inject into earlier circuits until the symptom reappears. At that point, you are injecting into the defective stage.

In this Tech Tip, you will see exactly where, when, and how to use the VA62A UNIVERSAL VIDEO ANALYZER and the VC63 VCR TEST ACCESSORY when troubleshooting playback VCR luminance problems.

Where To Use The VA62A And The VC63 When Troubleshooting Luminance Problems

VCRs use special FM luminance signals. The VC63 VCR TEST ACCESSORY works with the VA62A to provide these special signals for VCR

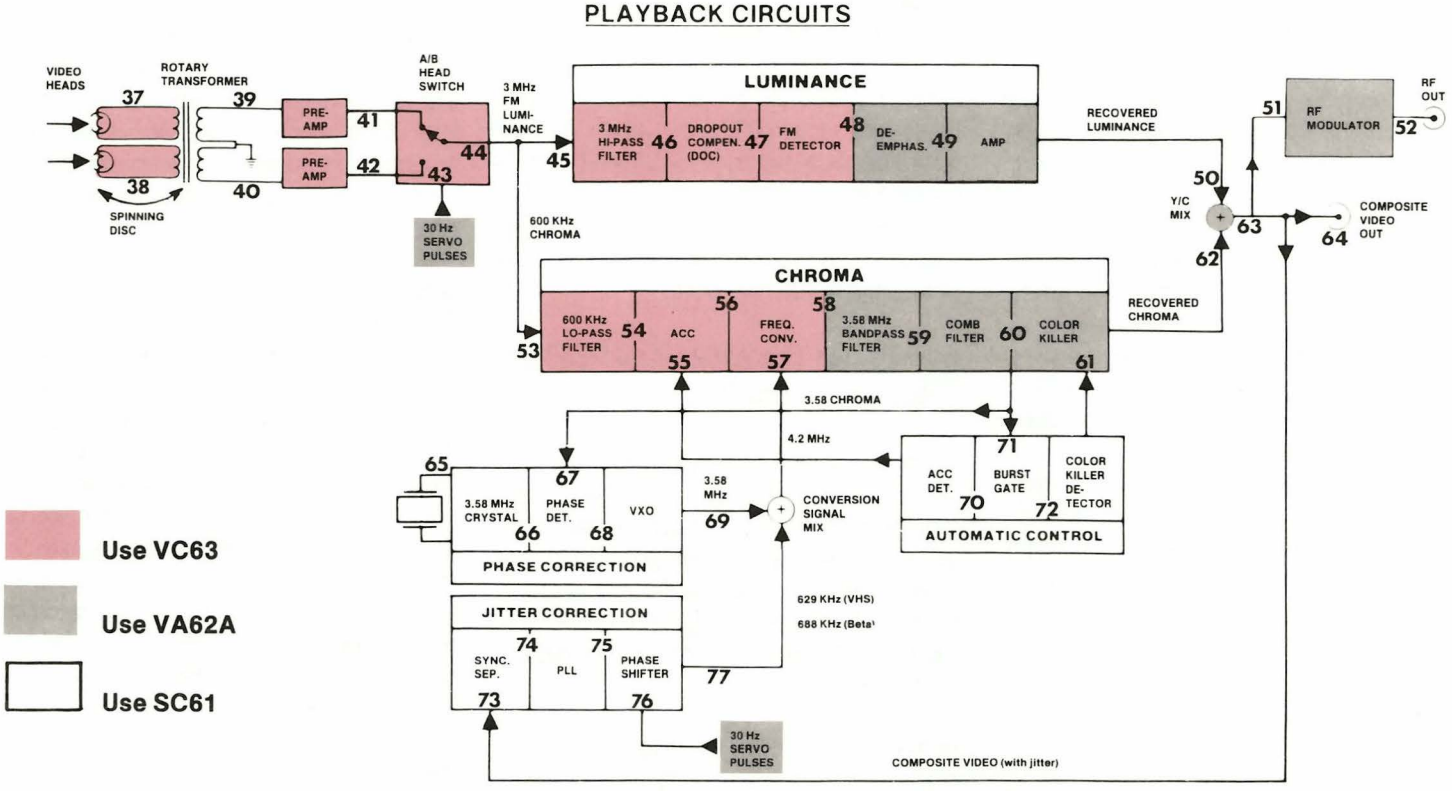

Fig. 1: Use the VC63 on circuits before the FM detector, and use the VA62A on the circuits after the FM detector.

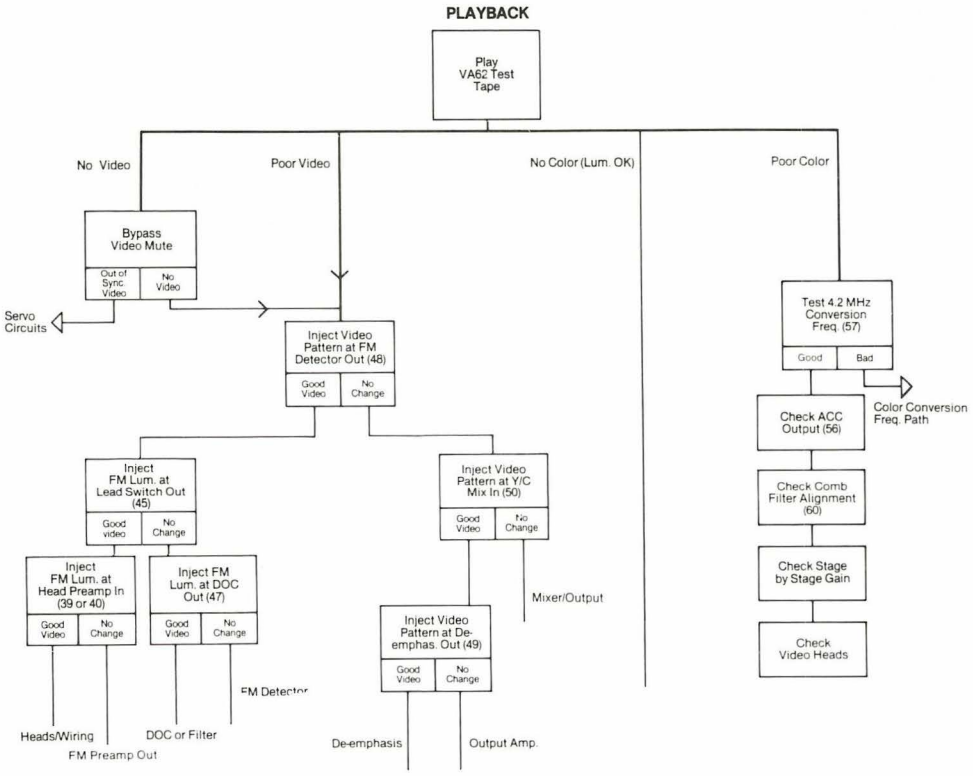

Fig. 2: Use the troubletree and the block diagram when servicing VCR playback problems.

troubleshooting. Not all the circuits in a VCR call for the use of the VC63. The signals after the FM detector are baseband video and are substituted for by using the VA62A. Most of the chroma circuits involve important timing relationships and require the use of the SC61 Waveform Analyzer.

Let's follow through the block diagram for the luminance signal path to re-acquaint ourselves with its operation. The FM luminance and down converted color signals begin at the spinning video heads during playback. The signal picked up by the heads is coupled through a rotary transformer to a head preamplifier. The output from the head amps is switched by the A/B head switcher, so only the signal from the head which is in contact with the tape continues. This keeps the noise picked up by the other head out of the picture.

After the switcher, the 3.5 MHz FM luminance signal is separated from the 600 kHz color signal by a filter. Both special VCR signals continue down separate paths until they are converted back to standard NTSC format signals and combined by the Y/C mixer. All these circuits, from the video heads through to the FM detector, require you to use the special signals supplied by the VC63 when signal injecting.

Figure 1 shows the playback portion of the Sencore Universal VCR Block diagram. On this block diagram, all the blocks which need special signals from the VC63 are shaded in red, the blocks which need signals from the VA62A are shaded in gray, and the blocks which are serviced using the SC61 are white.

How To Use The VA62A And VC63 To Solve Luminance Problems

You troubleshoot a VCR by connecting it to a television monitor and playing back a work tape (see Tech Tip 107). Playing back the tape produces one of several important symptoms on the monitor, depending upon the defective stage in the VCR. Carefully analyzing the symptoms tells you if the problem is servo, luminance, or chroma circuit related.

Picture tearing or rolling are symptoms of servo problems. Sound that is "too fast" or "too slow" also indicates a servo problem. Symptoms other that these are called video playback and are caused by any of the non-servo circuits. Video playback symptoms include no video, poor video, no color, and poor color. The trouble tree in figure 2 summarizes these symptoms and possible causes. Use it as a guide for isolating playback problems. The numbers referenced on the troubletree correspond to the numbers on the VCR block diagram in figure 1.

To better understand how to use the VC63, we'll use a common VCR playback symptom of a blank raster as an example. A portion of the actual luminance block diagram supplied by the manufacturer for this deck is shown in figure 3. The numbers from figure 1 are transferred to this block diagram to help you follow along. Always troubleshoot from a block diagram and trouble tree to help keep you on track. We'll use both in the example.

Step 1

Your first step is to bypass the video mute circuit. This circuit, used on many VCRs mutes the video and audio if the servos are not locked in. Bypassing the muting allows you to determine if the problem is servo related or video circuit related. In this example, the monitor remains blank.

Step 2

To determine which way to go, inject a video signal at the output of the FM detector, point 48. The signal here is baseband video, so use the VA62A's DRIVE OUT as the signal source. Select the CROSS HATCH position on the VIDEO PATTERN switch. This pattern is different from others recorded on the work tape. When the injected signal level is increased to the normal level for the circuit, normal video is seen on the monitor. This means the remaining video circuits function correctly and the problem lies in the direction of the heads.

Step 3

Since this is a VHS VCR, set the SPECIAL SIGNALS switch on the VC63 to the VHS LUM position. This setting provides an FM luminance signal without the down converted color signal (the presence of the color under signal could cause misleading luminance symptoms). The LUM & CHROMA position provides the special color under signal for troubleshooting color circuits. Set the VA62A VIDEO PATTERN switch to provide a contrasting signal with those recorded on the work tape (CROSSHATCH), so you can quickly tell if the picture on the monitor is from the tape or the VC63.

Step 4

Now you want to see which of the circuits between the FM detector and heads are working, so inject an FM luminance signal into the output

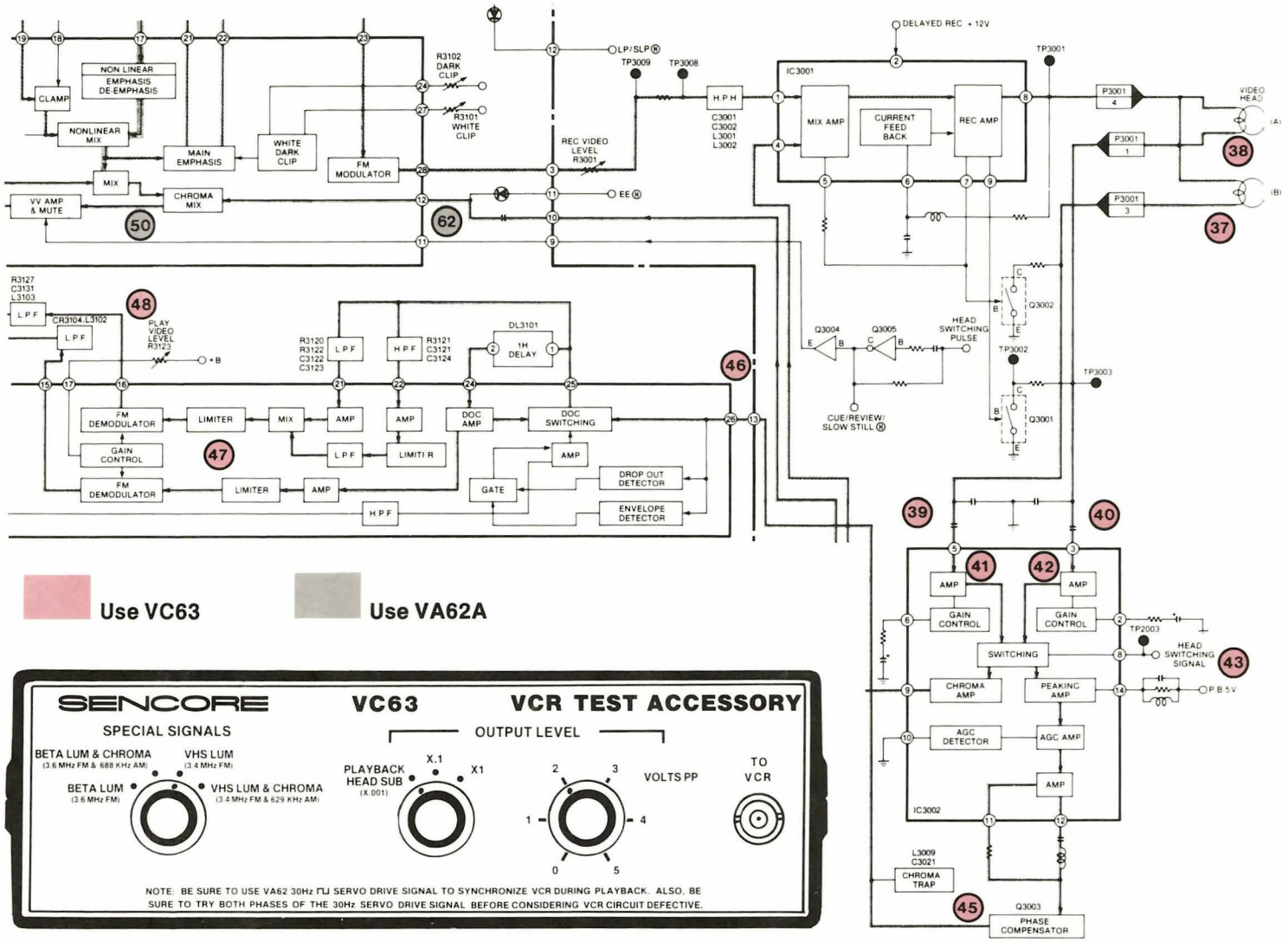

Figure 3: Use the manufacturer's block diagram and Sencore's block diagram to isolate problems.

of the A/B head switcher, point 45. Inject here to cut the remaining stages in half. Point 45 is the combined output of both video heads after the preamplifier. The substitute signal is supplied by the VC63 with an OUTPUT LEVEL control setting of X.1. Increase the output level vernier between 1 and 2, in this example, to bring a pattern onto the monitor. Now you know that all the stages between point 45 and 48 are also working.

Step 5

As the trouble tree shows, the next logical step is to inject a signal into points 39 and 40. These points are the outputs of the video heads. The signal level here is unamplified and very small. The PLAYBACK HEAD SUB (X.001) setting of the VC63 OUTPUT LEVEL switch provides this low level signal. With the X.001 setting, some setting of the OUTPUT LEVEL vernier should produce a picture. In this example, increasing the vernier all the way to 5 mV does not produce a picture on the monitor. This means the problem lies between points 39, 40 and 45.

You could further isolate the problem to either the preamps or the A/B head switch by injecting a signal into points 41 and 42, but as the block diagram for the particular VCR shows, the preamps and the head switch in this and most VCRs are part of the IC. Before you replace the chip, double check that it is receiving B+ and the 30 Hz head switching signal.

If the picture returns when injecting at point 39 and 40, you should suspect the video heads, rotary transformer, or associated connections of causing the defect. (Refer to Tech Tip 107 "How To Test Video Heads With The VC63" for procedures on testing video heads and rotary transformers.)

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