Test Equipment Scene

TUNING THE VITS

By Leslie Solomon

PEOPLE in the TV servicing business as well as many interested hobbyists, take pride in knowing what makes up the standard TV signal because this knowledge, coupled with some decent test equipment, enables them to keep their receivers working properly. Until recently (the last few years, actually) one of the best pieces of service information was the test pattern that TV stations transmitted at odd times. These were the "real" signals that permitted checking the working order of a receiver and its antenna system. Watching the "wedge" come down to the center of the bulls-eye was a sure test of frequency response that left no doubt as to the picture quality that could be expected with the regular television transmissions.

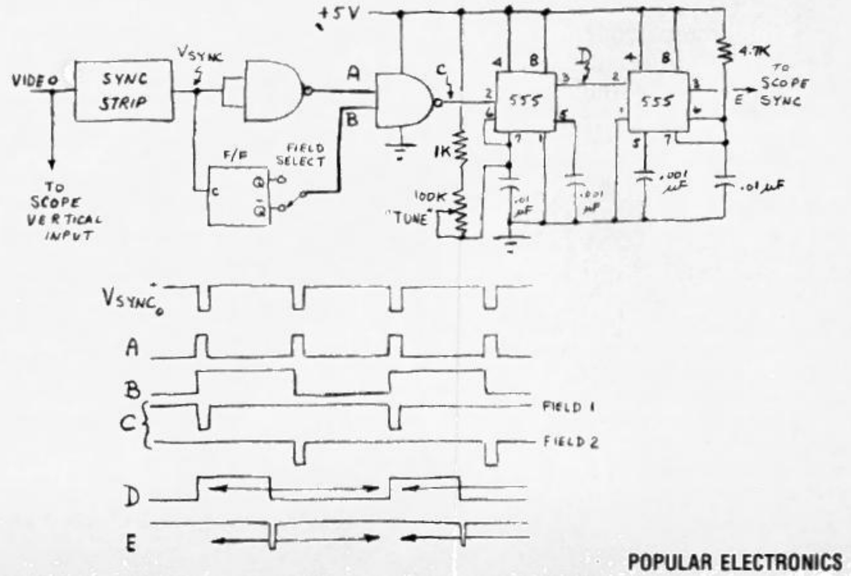
Unfortunately, test patterns are a thing of the past in most localities —though occasionally you will find a station that uses one. However, all is not lost. Unknown to most people there is a test pattern being transmitted—along with the regular TV picture—all the time! But, where is this test pattern? Why doesn't it interfere with the conventional programming?

The TV picture as seen on a standard receiver covers the area between the horizontal and vertical sync pulses. If you roll down the vertical control so that the thick black (horizontal) bar comes into view, you will note that there are a number of unused horizontal lines. Then, if you look closely at those couple of lines just above the actual video, you will see some white dots and bars. These carry what is known as the vertical interval test signal (VITS) transmitted by the TV station.

The circuit, as shown, is not really a construction project. It is meant to be of educational benefit to anyone interested—and we think a number of people will be when they realize what it will do. They will be able to examine the structure of the TV signal in either of the two interlaced fields, from the equalizing pulses that follow the vertical sync, through the VITS, the "half-line" in field 1, to the video within the picture.

About the Circuit. The NAND gates can be any type of TTL device (such as the 7400). The flip-flop can also be any TTL unit. (We used a 7473 because it was handy.) The two 555 timers could be replaced with a dual unit.

The purpose of the circuit is to produce a 65-microsecond (one horizontal line) "window" that can be "tuned"



to any line on either field within the range of the circuit. The result is displayed on an oscilloscope. The video signal from a receiver is applied to the vertical input of the scope, while a sync stripper removes the vertical pulse, from which all timing derives. You can extract the vertical pulse from the receiver if desired.

The vertical sync pulse is applied to the A input of the two-input NAND gate, with the other input supplied by signal B from a flip-flop triggered by the vertical sync pulse. By selecting either the Q or not-Q output of the flip-flop, you can choose either field for examination. A 0.22-μF capacitor connected from point A to ground clears up the fine extraneous pulses that may be present on the line.

The sync pulse from the selected field (waveform C) is used to trigger a variable-delay monostable using a 555 timer. As shown in waveform D, the trailing edge can be positioned anywhere between two successive vertical sync pulses of the same field. This is accomplished by varying the time constant with the 100,000-ohm potentiometer. This signal is then used to drive another 555 acting as a 65-microsecond monostable. The output of this circuit is then used as the scope trigger pulse.

System Setup. To set the system up, the composite video from the receiver is applied to the scope's vertical input and the scope's vertical gain is adjusted for the desired viewing height. Set the scope sweep for external triggering, and set the sweep time for one or two horizontal lines (65 microseconds per line). It is best to use a triggered sweep scope. Because of the high writing speeds involved, it will be necessary to increase the beam brightness on the scope.

If everything is working properly, you will see a couple of lines of video, including the horizontal sync pulses. By adjusting the 100,000-ohm potentiometer, you should be able to "tune" the scope up and down the horizontal lines from the equalizing pulses near the vertical sync, down past the empty lines with just the horizontal sync displayed, through the VITS and the half-line used for interlace, down into the picture video. You can now tune the scope until the VITS is displayed; and by flipping the field-selector switch, you can check on either field. Without the flip-flop, you will see the TV signal go into interlace. ◈