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Composite-VGA Encoder/Decoder Eases Display Upgrade

An older computer system fed RGB video and composite-synchronization signals through four 75 Ω coaxial cables to an RGB color monitor 150 feet away. To upgrade it, the replacement VGA video cards could directly drive the 75 Ω loads that the VGA monitors' internal terminations presented. However, the VGA standard uses separate horizontal and vertical positive-going synchronization signals. Adding an extra coaxial cable to the original cables to carry the separate synchronization signals presented a difficult and expensive proposition. An obvious solution would be to combine the separate synchronization signals into a composite format. The combiner circuit in Figure 1 offers simplicity, low cost, and rapid assembly from readily available spare parts.

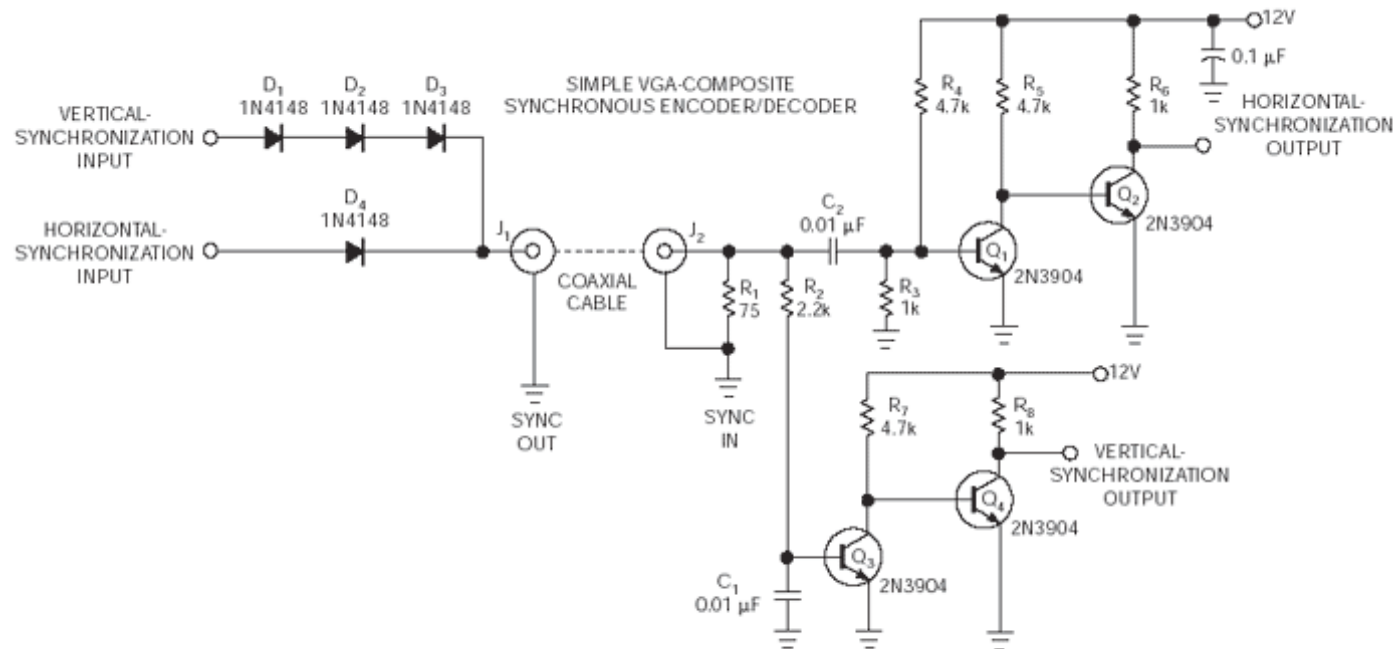
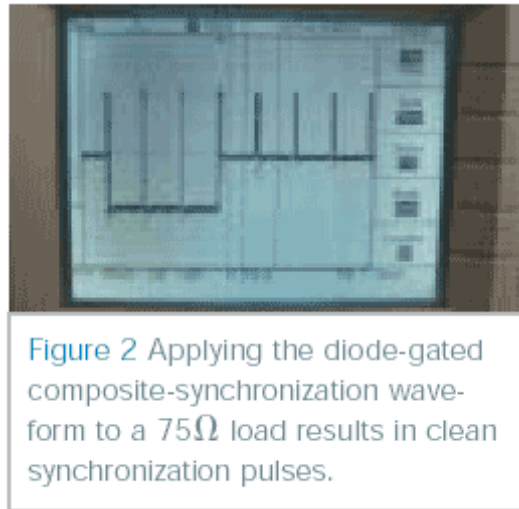


Figure 1 The synchronization-pulse combiner and recovery circuits comprise readily available and inexpensive components.

In operation, two [1N4148 diodes](#), D1 and D2, attenuate the VGA signal's 5 V logic-level vertical-synchronization pulses by

1.4 V, and diodes D3 and D4 form a diode-logical-OR gate to combine the vertical- and horizontal-synchronization pulses. The resultant output signal comprises an approximately 4.3 V horizontal-synchronization signal superimposed on a 2.9 V vertical-synchronization signal.



At the receiving end, a capacitively coupled highpass filter extracts the horizontal-synchronization signal, and a simple RC (resistor-capacitor) lowpass circuit removes horizontal-synchronization pulses from the directly coupled vertical-synchronization signal. Transistors Q1 and Q2 amplify the recovered horizontal-synchronization pulses, and transistors Q3 and Q4 amplify the vertical-synchronization pulses. The circuit's resulting outputs consist of clean synchronization pulses that closely approximate those of the original and provide extremely stable synchronization pulses for a VGA monitor operating at 640×480 -pixel resolution (Figure 2).

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