

Television Interface

Anyone with a bunch of memory circuits, control logic and a wire wrap gun can whip up a digital video generator with TTL output levels. The problem as I see it is to get that digital video signal into a form that the TV set can digest. The care and feeding of digital inputs to the TV set is the subject of Don Lancaster's contribution to *BYTE 2* — an excerpt from his forthcoming book, *TV Typewriter Cookbook*, to be published by Howard W. Sams, Indianapolis, Indiana.

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We can get between a TV typewriter and a television style display system either by an rf modulator or a direct video method.

In the rf modulator method, we build a miniature, low power, direct wired TV transmitter that clips onto the antenna terminals of the TV set. This has the big advantage of letting you use any old TV set and ending up with an essentially free display that can be used just about anywhere. No set modifications are needed, and you have the additional advantage of automatic safety isolation and freedom from hot chassis shock problems.

There are two major restrictions to the rf modulator method. The first of these is that transmitters of this type must meet

certain exactly spelled out FCC regulations and that system type approval is required. The second limitation is one of bandwidth. The best you can possibly hope for is 3.5 MHz for black and white and only 3 MHz for color, and many economy sets will provide far less. Thus, long character line lengths, sharp characters, and premium (lots of dots) character generators simply aren't compatible with clip-on rf entry.

In the direct video method, we enter the TV set immediately following its video detector but before sync is picked off. A few premium TV sets and all monitors already have a video input directly available, but these are still expensive and rare. Thus, you usually have to modify your TV set, either

adding a video input and a selector switch or else dedicating the set to exclusive TV typewriter use. Direct video eliminates the bandwidth restrictions provided by the tuner, if strip, and video detector filter. Response can be further extended by removing or shorting the 4.5 MHz sound trap and by other modifications to provide us with longer line lengths and premium characters. No FCC approval is needed, and several sets or monitors are easily driven at once without complicated distribution problems.

There are two limitations to the direct video technique. One is that the set has to be modified to provide direct video entry. A second, and far more severe, restriction, is that many television sets are "hot chassis" or ac-dc sets with one side of their chassis connected to the power line. These sets introduce a severe shock hazard and cannot be used as TV typewriter video entry displays unless some isolation technique is used with them. If the TV set has a power transformer, there is usually no hot chassis problem. Transistor television sets and IC sets using no vacuum tubes tend to have power transformers, as do older premium tube type sets. All others (around half the sets around today) do not.

Direct Video Methods

With either interface approach, we usually start by getting the dot matrix data, blanking, cursor, and sync signals together into one composite video signal whose

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Fig. 1. Standard video interface levels. (Source impedance = 72 or 100 Ohms.)

