

How to Feed an Apple to an IBM Monitor

Feed a digital RGB monitor from your Apple for under ten bucks.

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In the times before PC clones (1980), I bought the Apple II+ and paid a bundle for it. I didn't buy a monitor then because it cost too much. Instead, I bought a little add-on RF modulator so I could feed the computer output into the antenna jack on an old Zenith black and white TV I had sitting around.

The setup worked, but the text on the screen was like a message from Mars. I even had a little static in there with it. What I most definitely needed was a real monitor! But that meant spending more money. . .

When the next hamfest came along, off I went and came back with a pretty little composite color monitor. Wow! Now the text was readable. The colors were great and I was in computer heaven—for about six months. Strange! I noticed that the text still wasn't as sharp as the monitors at work. I was told I needed an RGB job. So I bought one.

Getting In Deeper

Now I was really in for it. In order to feed my Teknika RGB monitor, I needed an RGB adapter card. I'd also need an eight-wire cable with a DIN plug on one end and a DB-15 plug on the other. The salesman at the computer store didn't think his card would match the monitor to my old Apple II+. I'd have to have a special cable made. He knew a guy in the next town that used to make cables, but he

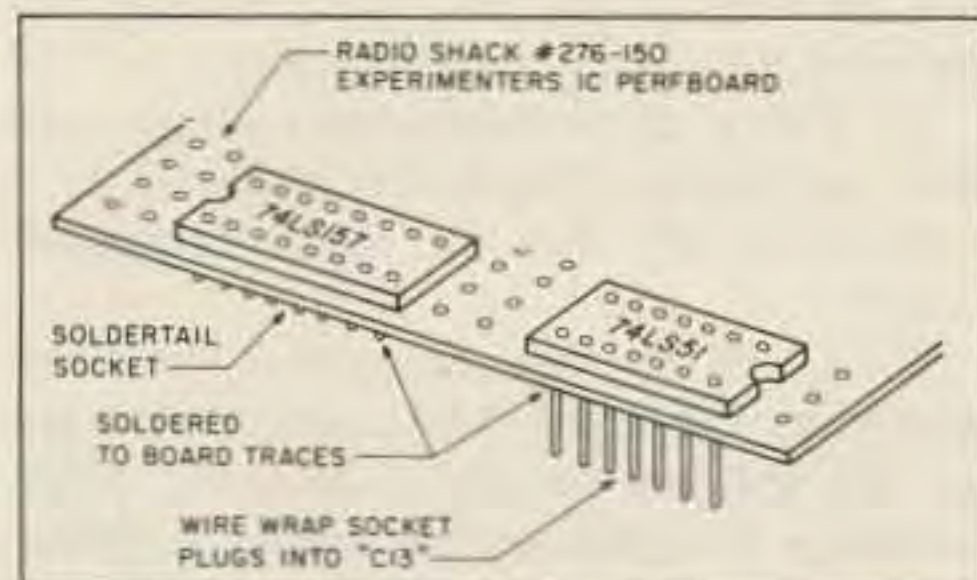


Figure 1. Edge of the Radio Shack #276-150 perfboard, on which the video adapter circuit is wired. Remove the 74LS51 IC from its socket on the motherboard, insert socket plugs, and reinsert the chip into the socket.



The adapter and cable that plugs into the Apple motherboard and an the IBM monitor.

wasn't sure if the guy was still alive. The rut got deeper and deeper.

Ham Ingenuity

Enter the Ham Spirit. I was truly tired of the crude graphics, and was determined to have a good, crisp, single-color display for my word-processing and databasing.

I consulted my Teknika owner's manual and noted which pins on the DIN connector

went where. I then looked over the schematic for the Apple. Duck soup! On the Apple motherboard, the IC at location C13 is a 74LS51. The combined vertical and horizontal synchronizing signals leave the 74LS51 on pin 8 and mix with video at the base of Q3, a 2N3904. If you have an Apple-type monitor, you're already there. You've got your combined negative horizontal and vertical synch. All you need is some positive video from the Apple output jack. In the meantime, I'll show you how to feed an IBM style monitor.

Only Two Ingredients

All you need to do is take the combined synch, separate the vertical from the horizontal, and invert. This is neatly done with a single 74LS157 and a transistor. Grab the video and give it a little boost and you have all the ingredients for your IBM RGB!

I didn't want to dig into the printed circuit motherboard, so I assembled the adapter on a small Radio Shack experimenter's board (RS #276-150). Ninety-nine cents seemed like a good price to pay for an adapter board. My version was hand-wired, but a printed circuit board would look prettier.

The board is about two by three inches with the input leads soldered on one side, and the monitor cable leads on the other side. It plugs into the Apple motherboard, and the cable is wedged into the cable slot at the back of the Apple to give the leads slack. The "case ground" wire in the cable is grounded to the bottom plate with a small alligator clip.

Making the Connections

See Figure 1. We make the necessary connections by pushing a wire-wrap 14-pin socket through the holes on the Radio Shack board and carefully soldering each pin to the board. Try to find a wire-wrap socket with the shortest pins so the assembly won't set so high on the motherboard. While we're at it, solder a 16-pin solder-tail socket on there, too. The wire-wrap sockets are also available at Radio Shack.

Now plug the original 74LS51 into the

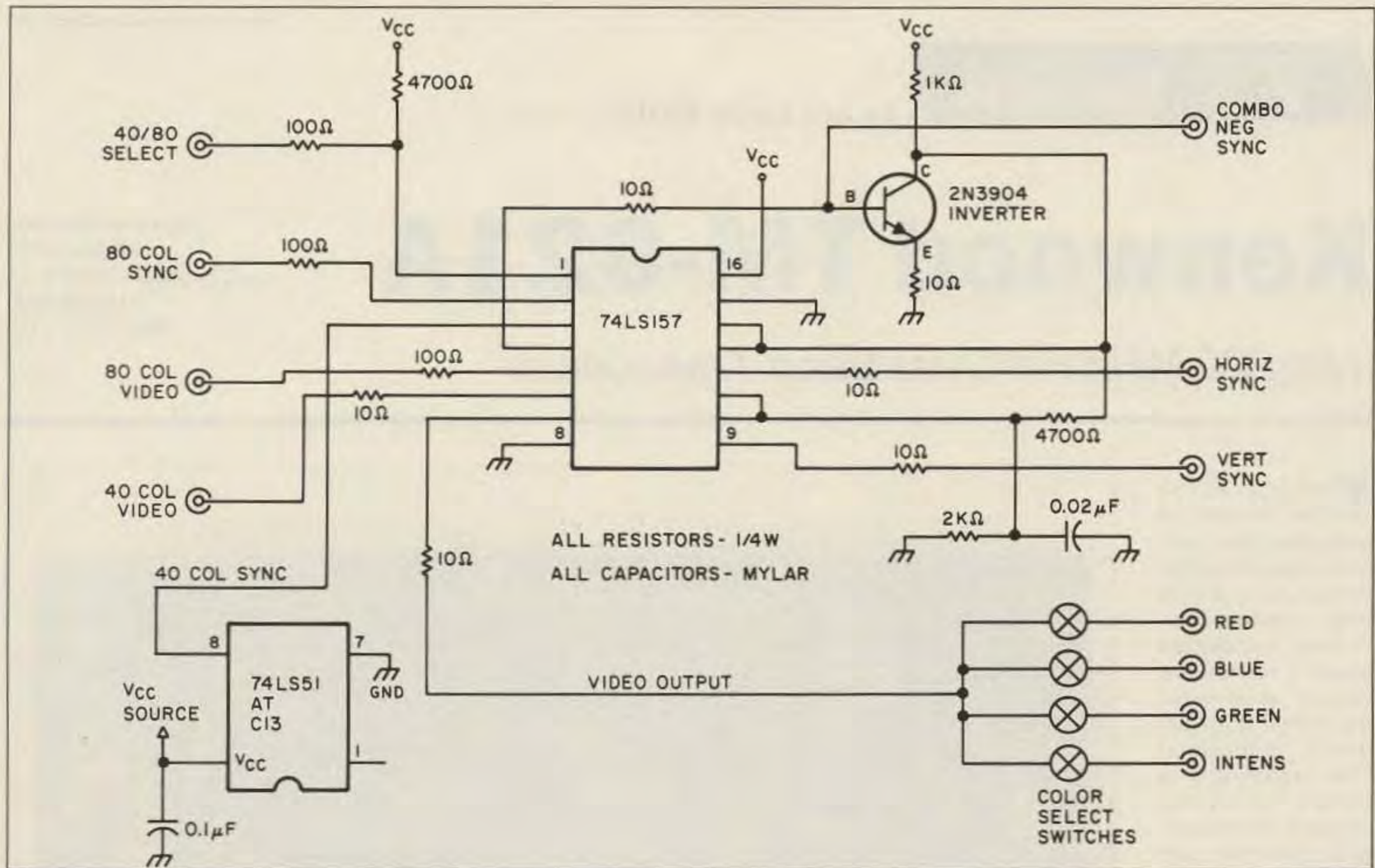


Figure 3. Schematic of the video adapter.

wire-wrap socket and plug the wire-wrap socket into the motherboard socket at position C13. Please note the IC is oriented with pin one facing the keyboard. The pins on the wire-wrap socket are larger than IC pins, so be careful when you ease it into the socket at C13.

To get our signals, we run three wires from the 74LS51 socket to our 74LS157. These furnish ground, VCC, and 40 column synch.

Circuit Operation, In Brief

For our project the 74LS157 is a fancy four-pole double throw switch. Two of the "switches" switch from 40 column to 80 column synch with video to match. The 2N3904 inverts the signal, and the other two 'LS157 sections are wired to separate the horizontal from the vertical synch.

Switching from 40 to 80 Columns

Your 80 column card, if you have one, makes it possible for you to switch from 40 to 80 column mode. If you don't have one, then ignore all the 80-column connections. Just run a wire from your 40 column video, "V40" to an RCA plug, and plug it into your Apple video output jack.

Figure 2 shows samples of ALS Smarterm II and Videx control sockets. The ALS card switches your adapter board automatically when you type "PR#3." The Videx compatible board has six solder pads for a control socket. There is a miniature 2-pin connector on the top two pads. The first is ground, the second one down is video. The

third one is VCC. Install another miniature 2-pin connector on the fourth and fifth solder pads. Pin four will be our 80 column control wire (it's a ground). Run a small wire from pin five (formerly unused) to the top of the 2200Ω resistor located in the top right hand corner of the Videx board. That's where you'll find the 80 column synch. We don't use pad six.

The Video Adapter Board

On the Videx board, you automatically go to 80 column mode when you plug your cable into it. A high on the control line gives you 40 columns, and a ground or low, switches you to 80 columns. If your 80 column board doesn't have a control signal, then use a miniature switch to ground the control line for 80 column mode.

Video output on the adapter board is divided up between Intensity, Red, Blue, and Green output. The output impedance for the 'LS157 is mismatched to the cable line, but since my monitor cable is only three feet long, there is no apparent degradation of the signal. See Figure 3.

Note that in IBM monitor mode, you would use the horizontal and vertical synch outputs. For an Apple monitor, use the combo synch output and don't use the HORIZ or VERT outputs at all!

On my version, I mounted a small DIP switch in series with the red, blue, green, and "intensity" outputs. This allowed me to have an all-green or all-amber text screen, as desired. As it turns out, I didn't like the green-

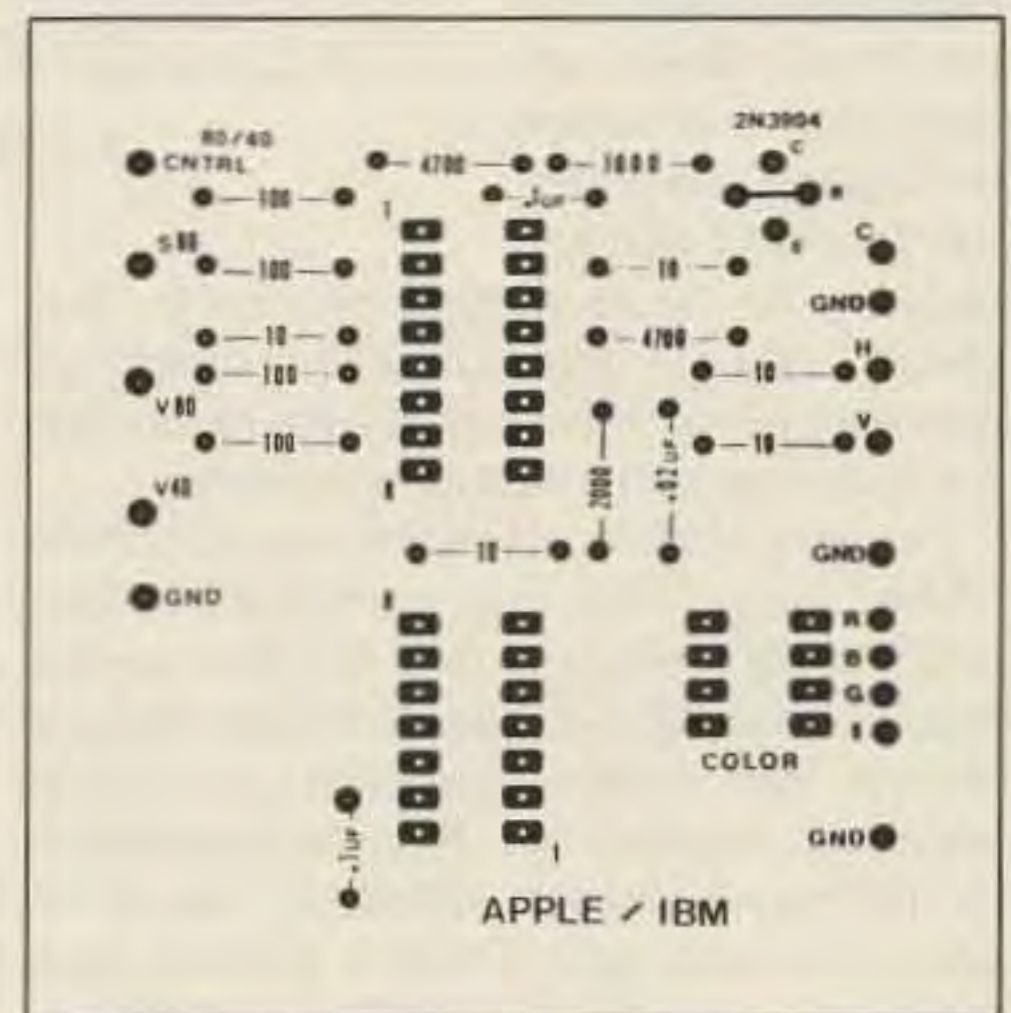


Figure 4. Suggested perboard parts placement for the adapter.

screen effect, but there may be some people who do, so I'm including that circuit in the diagram. Juggle the switch settings to get any single color, or white, as you want.

The adapter, as shown, runs perfectly on my Teknika MJ-22 in IBM mode. There isn't any reason why it shouldn't work equally well on any other make of RGB monitor. If one is willing, or if one is Scotch (as I am!), just check the users manual that comes with the monitor, and prepare a cable. The adapter board schematic shows where the wires go. If one exercises the Ham Spirit, one can build it. If one builds it, one saves much money! 73