

DEC VAXmate keyboard and monitor hacks

Background to the VAXmate computer

In addition to the "original product line" of VAX systems, Digital Equipment Corporation (DEC) also offered a Z80/8088 computer in 1982. This machine was called Rainbow 100, it could run CP/M and MS-DOS. However, the hardware was not IBM compatible, so programs had to be adapted for the DEC machine.

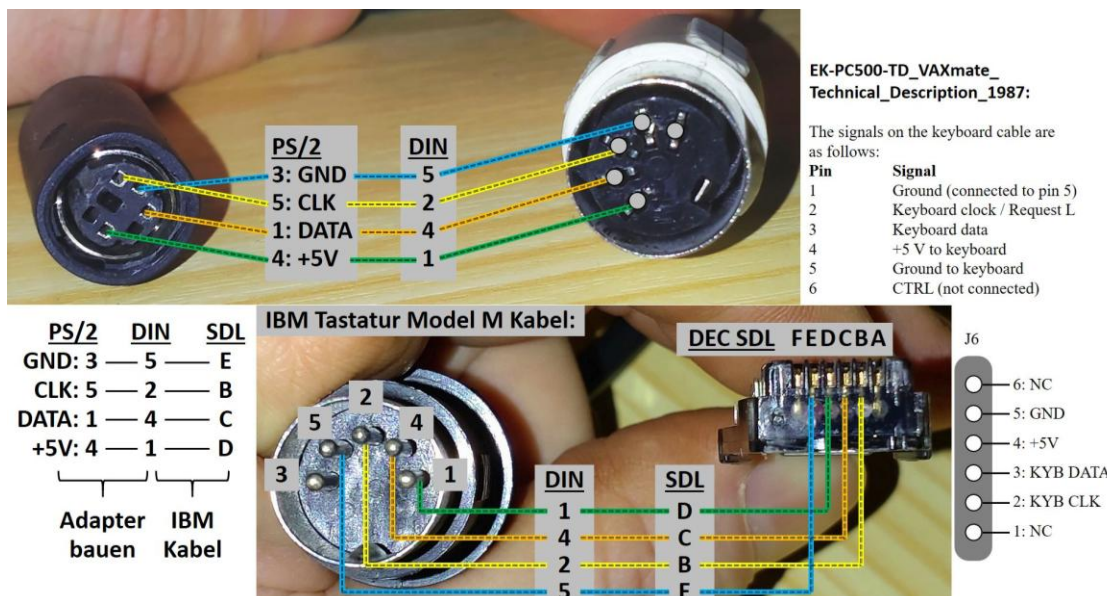
In 1986, the DEC VAXmate was introduced as the successor to this system. This time, an Intel 80286 was used and the computer was largely IBM compatible. The system design was unusual because the computer and floppy disk drive were integrated into the monitor housing like a terminal. This meant that there was only room in the housing for two proprietary expansion slots, which could be equipped with a 2 megabyte memory expansion (PC50X-AA) and a modem (PC50X-MA). There was also an expansion unit (RCD31 Expansion Box) with ISA slots and MFM hard disks (20 MB DEC RD31/Seagate ST-225 or 40 MB DEC RD32/Seagate ST-251). Instead of the usual CGA or MDA/Hercules graphics, DEC used "Doublescan CGA" with 640x400 pixel resolution (CGA 640x200 could be emulated by doubling the image lines). The system keyboard DEC LK250 was derived from the DEC terminals and enabled two operating modes (IBM PC/AT mode and DEC terminal).

My VAXmate with two problems

By chance I got a DEC VAXmate. Unfortunately the keyboard was missing and the built-in monitor was irreparably damaged during transport: the case is quite narrow, so there is little space between the neck of the picture tube and the protective cage. Apparently my computer was hit from the side during shipping, causing the neck of the tube to break. Hence I had to organize a keyboard and a replacement monitor for the computer.

PS/2, DIN, SDL - We build a keyboard adapter

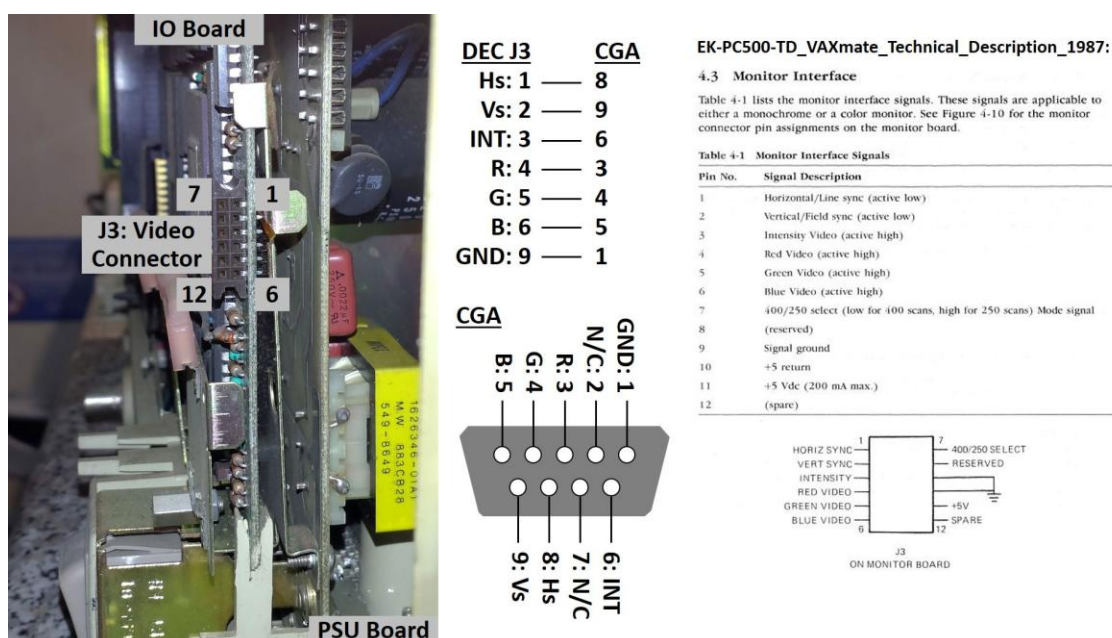
I soon found an LK250 keyboard, but it came with a PS/2 cable. The VAXmate, however, uses an SDL socket. So I needed an SDL plug and an adapter from PS/2 to SDL. Since SDL plugs are not easy to get, I simply repurposed an IBM "Model M" keyboard cable. This cable has a matching SDL plug on the keyboard side, and a DIN plug for connecting to the IBM PC/AT. On the VAXmate, the cable is used "the other way around"; it is connected to the computer with the SDL plug. So I had to make an adapter with a DIN socket (for the IBM cable) and a PS/2 socket (for the LK250 cable). DEC does not use the IBM pin assignment on the VAXmate, of course, so this had to be taken into account in the adapter.



An interesting side effect of this solution was the possibility of connecting a standard PS/2 keyboard. To my surprise, this worked without any problems, so the VAXmate computer normally works with the usual IBM AT keyboard protocol. The DEC mode is only needed for terminal emulation, which of course is not possible when using a normal PS/2 keyboard.

An external screen for the VAXmate

Now there was still the problem with the imploded screen. Since I couldn't find a replacement picture tube, I had to use an external monitor. Unfortunately, the VAXmate doesn't have an external monitor connector. However, I had to remove the internal monitor board anyway to disable the flyback transformer. This allowed me to expose the internal monitor connection J3 on the IO board and attach an adapter cable. I led this out of the side of the case where the original brightness and contrast controls were.



However, the VAXmate does not deliver a normal CGA signal, but rather an image with 640x400 pixel resolution, 26.4 kHz horizontal and 60 Hz vertical frequency. There are several ways to display this signal. The simplest solution for me was to use a passive adapter to convert the digital RGBI signals to analog levels (<https://frank-buss.de/c128/vdc/index.html> or https://www.pcbway.com/project/shareproject/COMMODORE_128_15K_HZ_VGA_ADAPTER_C128_80_COLUMN_ADAPTER_47721a29.html). My TFT monitors from NEC (Multisync LCD1970npx) and Eizo (Eizo S1931) were able to handle the resulting signals without any problems. Finally I was probably the first user in the world to have a color image on the VAXmate!



An internal color screen for the VAXmate

The VAXmate can be used well with the approach described above, but a more elegant solution is of course to repair or replace the internal screen. Since an original picture tube is not easy to obtain, converting to a TFT monitor is a good option. There are a few small hurdles to overcome, in particular a scan doubler (to adapt the line frequency of the DECmate to normal VGA monitors) and a curved plexiglass panel (to optically imitate a classic picture tube) are required.

I used:

- A 12" TFT color screen

Bei diesem Angebot handelt es sich um
**einen kleinen, mit 30 cm Diagonale (12,1") OpenFrame TFT Monitor
inkl. 15-pol VGA Kabel und Netzteil; Arbeitsauflösung: 800x600**

Das Besondere an diesem Monitor: Er verbraucht extrem wenig Energie. Wir haben im unseren Labor nachgemessen, und bei 12V zeigte uns unser Amperemeter den Verbrauch von nur 0,4-0,5A.

Das ist der Stromverbrauch von nur 5-6 Watt!

Wir liefern diesen Monitor mit 12V Netzteil und VGA Datenkabel; Der Monitor kann aber mit einem KFZ-Adapter auch in einem Boot / Flugzeug oder im PKW vom Zigarettenanzünder betrieben werden. KFZ Adapterkabel ist nicht dabei. Abmessungen des Monitors mit

Halterung: 30,2 cm x 22,5 cm x 2,5 cm; Ohne Halterungen 28,4 x 20,8 x 2,5.

Lieferung: Open Frame Monitor, Netzteil und VGA-Kabel. Betriebsbereit.

Rechnung auf Ihren Namen/Ihre Firma inkl. 19%MWSt wird im Paket zusammen mit der Ware versendet



- A Plexiglas front panel from a Sanyo CRT (as used in Alphatronic P2 and P3 computers)



- An Extron video scaler to convert the video signals, since the 12" TFT can unfortunately only handle normal VGA timings (while the NEC also handles horizontal frequencies below 31 kHz)

[Produkte - Startseite](#) / [Skalierer & Signalprozessoren](#) / [Videoskalierer](#) ▾ / [RGB-DVI 300](#) ▸

RGB-DVI 300 AUS DEM PROGRAMM GENOMMEN

RGB-zu-DVI-Skalierer

⚠ Dieses Produkt wurde aus dem Programm genommen.

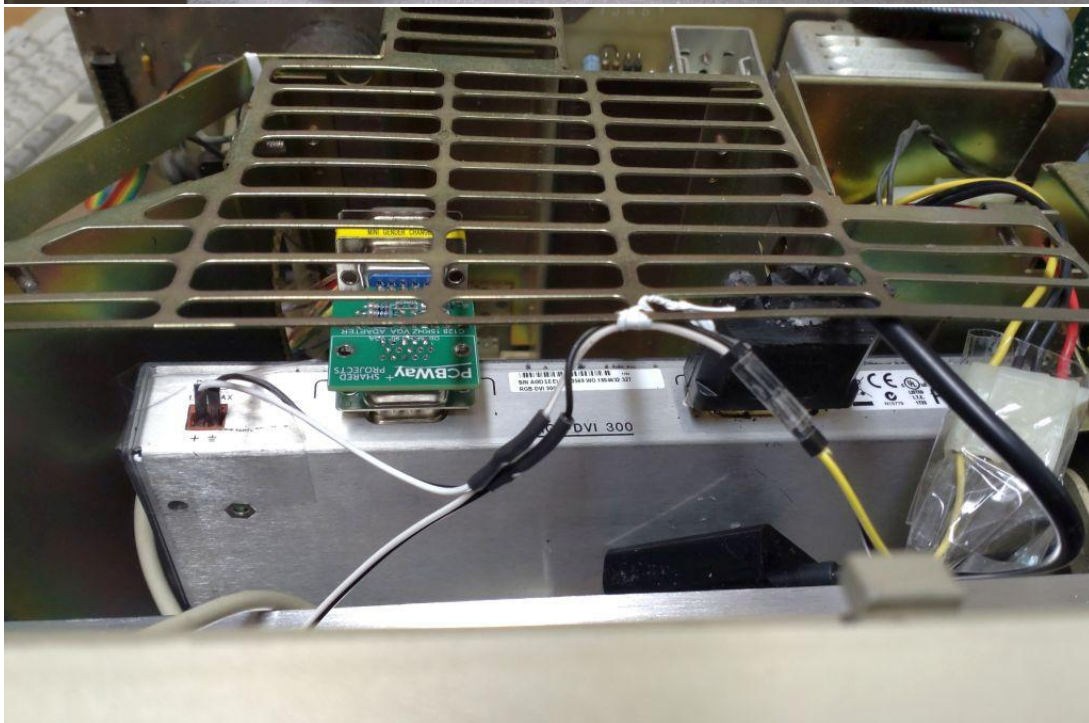
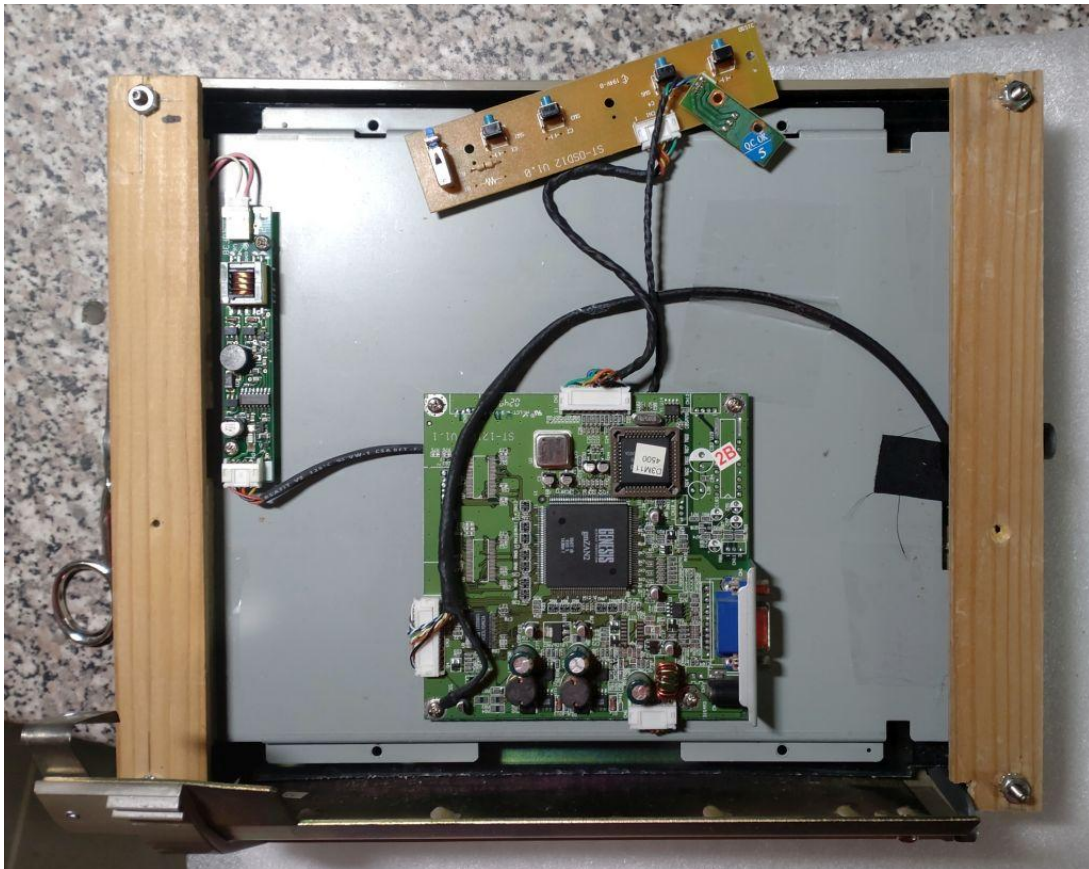
Hauptmerkmale

- Skalierung von RGB und HDTV-Komponenten-Video zu DVI
- 80 wählbare Auflösungen bis 1920x1200, einschließlich HDTV 1080p/60
- Auto-Image™-Funktion
- Auto Input Memory
- Einstellmöglichkeiten für Helligkeit, Kontrast, Detail, horizontale und vertikale Positionierung, Größenänderung und Zoomfaktor
- [Alle Merkmale](#) >



- A no-name DVI-D to VGA converter to connect the Extron DVI output to the 12" VGA TFT

All parts fit easily into the housing of the VAXmate computer.





So now I have a VAXmate with an internal color screen, and an external VGA monitor can also be connected. Of course, the internal TFT is not original/contemporary, but visually everything looks pretty original (when turned off).



In addition, the conversion is completely reversible; an original picture tube could be reinstalled at any time.

A note at the end

I have checked all circuits carefully, but errors may have crept in. Any attempt to replicate something is therefore always at your own risk. In any case, it is advisable to check the contacts (for example the +5 volt supply for the keyboard) with a multimeter ahead of connecting the actual devices.