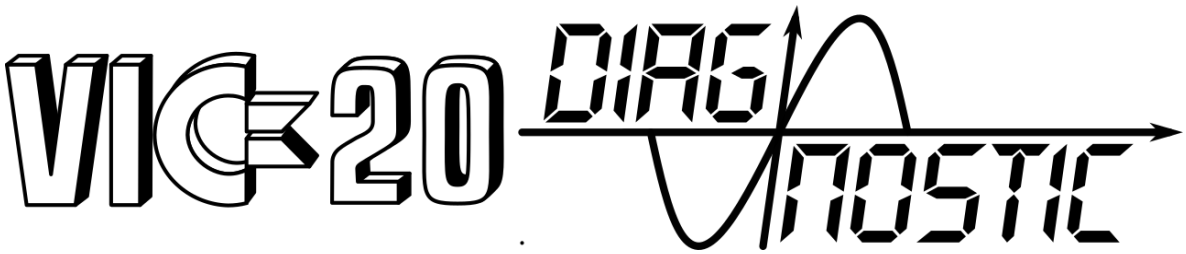
Project Documentation



Commodore VIC-20 Diagnostics (Top-Level Project)

Project number: 161

Revision: 0

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Commodore VIC-20 Diagnostics (Top-Level Project) Rev. 0

Module Description

Abstract

This is the top-level project of the VIC-20 diagnostic harness and cartridge. The whole diagnostics set consists of:

- A Diagnostic Cartridge
- A User Port PCB
- A Keyboard PCB
- A Cassette Port PCB
- A Cable Set

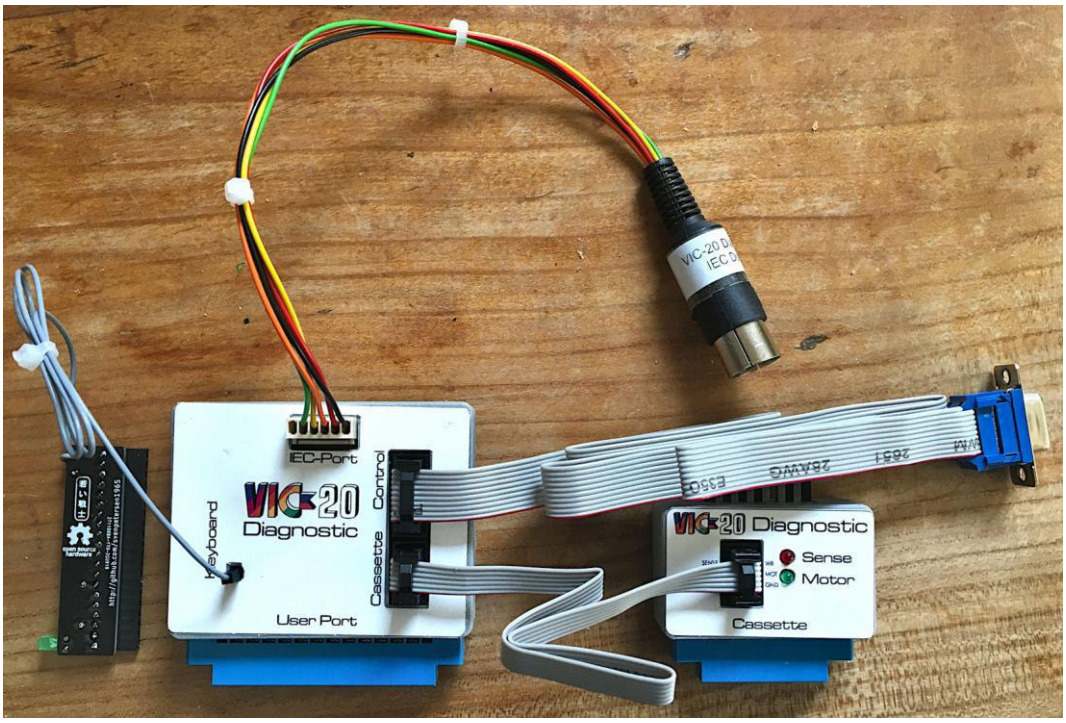

Figure 1: The complete Diagnostic Harness

Diagnostics Cartridge

The diagnostic cartridge is based on the Super Expander II. It contains the diagnostic software in an EPROM and 1kByte of RAM.

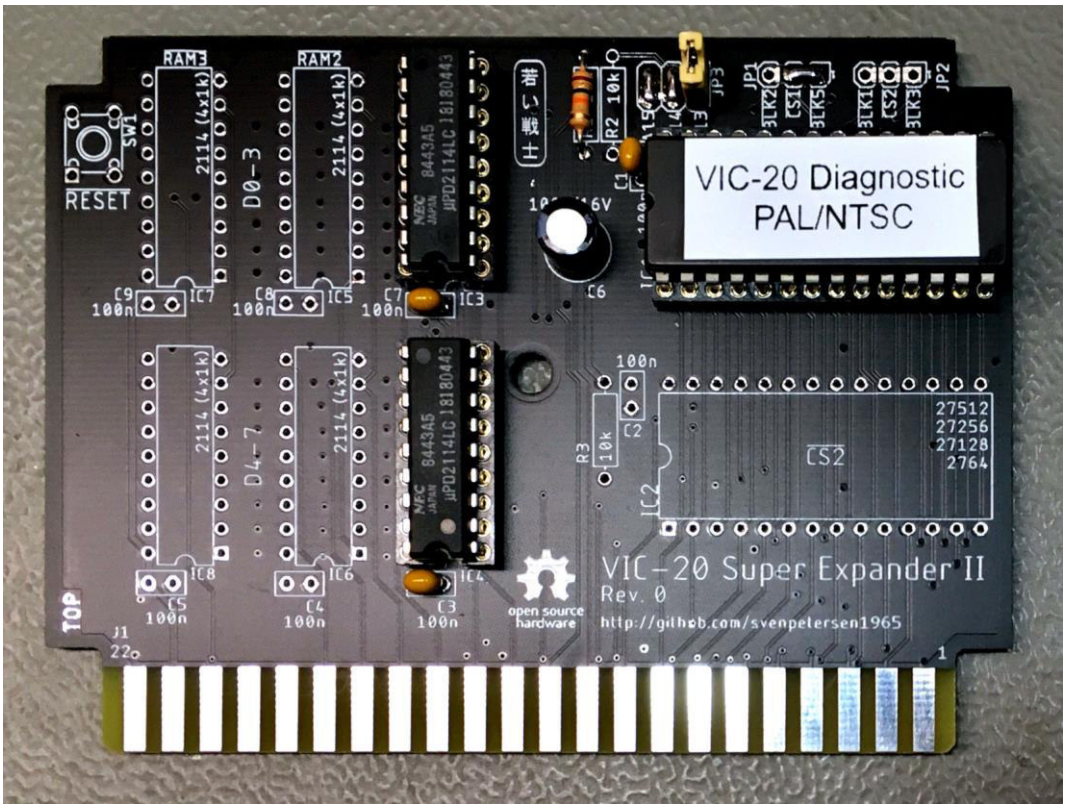

Figure 2: Diagnostics Cartridge

There are two versions of the (original Commodore) test software, which were downloaded from www.zimmers.net. One version is for the PAL VIC-20. It displays "VC-20" (like the name of the computer in Germany). The other version is for NTSC VIC-20 (it displays "VIC-20").

Both software versions work in the IC1 socket, the chip select $\overline{CS1}$ hardwired to $\overline{BLK5}$ (the base address is $A000). Thus, the solder bridge at JP1 as seen in Figure 2.

Since there are only two versions of the diagnostic software, two jumpers (A15 and A14) on JP3 can be hardwired (which is valid for a 27C512 EPROM). A 10k for R1 and a single jumper is required to select one of the two software versions.

EPROM	Solder bridges closed	Resistors placed
27C512	A14, A15	R1
27C256	A15	R1, R2
27C128	-	R1, R2, R3

The EPROM IC1requires a 100n capacitor in position C1.

The RAM is only 1kByte. That are two 2114 (1kx4) SRAM at position IC3 and IC4 (with 100n at C7 and C3).

The Super Expander II cartridge can be found at github:
https://github.com/svenpetersen1965/Commodore-VIC-20-Super-Expander-II

The User Port PCB

The User Port PCB is especially developed for this project. The complete documentation, Gerber data and design files are available on github:

https://github.com/svenpetersen1965/VIC-20_Diagnostics

A 3D printable case is provided in the same repository.

The Keyboard PCB

The Keyboard PCB is especially developed for this project. The complete documentation, Gerber data and design files are available on github:

https://github.com/svenpetersen1965/VIC-20_Diagnostics

The Cassette Port PCB

The Cassette Port PCB is identical to the Cassette Port PCB of the C64 Diagnostic harness. It is available from github:

https://github.com/svenpetersen1965/C64-Diagnostic-Rev.-586220-Harness

A 3D printable case can be found in the same repository.

All required feedbacks are realized on the User Port PCB, which connects to the Cassette Port PCB via a ribbon cable. The cassette port PCB is free of any typical feedbacks. Two signals are indicated with LEDs.

The Cable Set

The cable set consists of four cables:

- The IEC Port Cable
- The Control Port Cable
- The Cassette Port Cable
- The Keyboard RESTORE cable

The Control Port cable and the Cassette Port cable are identical to the C64 Diagnostic Harness cables.

The IEC-Port cable connects the IEC port to the User Port PCB, which provides the required feed backs.

The RESTORE cable connects the Keyboard PCB to the User Port PCB. This is a simple DuPont wire, which is soldered to the Keyboard PCB on one side.

The documentation for the Cable Set can be found on github:

https://github.com/svenpetersen1965/VIC-20_Diagnostics

Commodore VIC-20 Diagnostics Rev. 0

Testing

Test Setup

The complete Diagnostics Harness (Rev. 0) and Diagnostics Cartridge (Super Expander II Rev. 0 with the Commodore Diagnostic Firmware) was tested on a VIC-20 ASSY 250403 Rev. D.

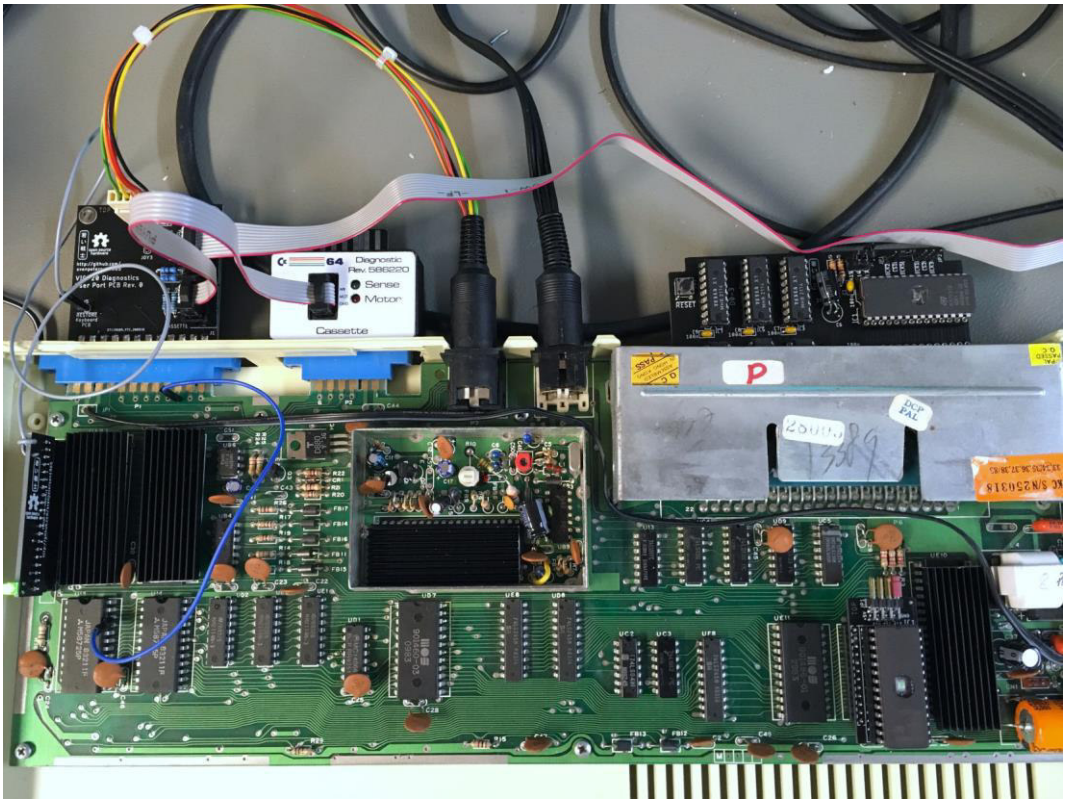

Figure 1: Test Setup

Test Execution

The test was first carried out with a Super Expander II with 3kByte of RAM. The Test was running without any problems. Later, the not required upper 2k of RAM were removed from the board, the execution was without any problem, either.

The (Commodore) Test software stops at the first problem and the screen starts flashing. In case no problem is diagnosed, the software is looping infinitely.

There are two versions of the test software. One is for the NTSC VIC-20, the other for the PAL VIC-20. Both were working without problems on a PAL VIC-20. The position of the active was different, though.

The Feedbacks were tested by removing the feedback cables, one by one. The missing feedbacks were detected for the IEC-Bus, the Cassette Port and the Control Port. Removing the Keyboard PCB does not report and "open" like in the C64 Diagnostics Rev. 586220. It did not look like the feedbacks were diagnosed, so, one feedback (not all) was opened. The problem was properly detected.

The Keyboard PCB is detected by the feedbacks and if it is found, the feedback for the RESTORE key is tested. This way, the diagnostic software can be run on a VIC-20, that has the keyboard still connected.

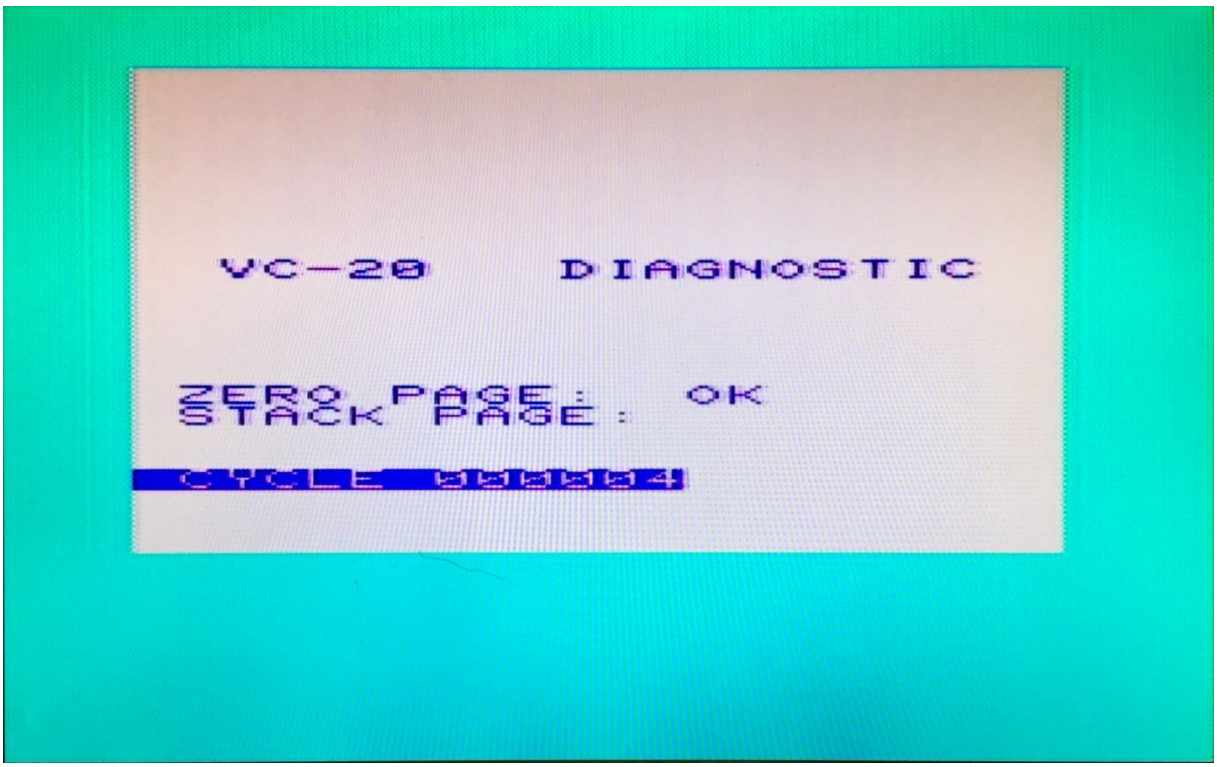

Figure 2: First page of the PAL diagnostic software

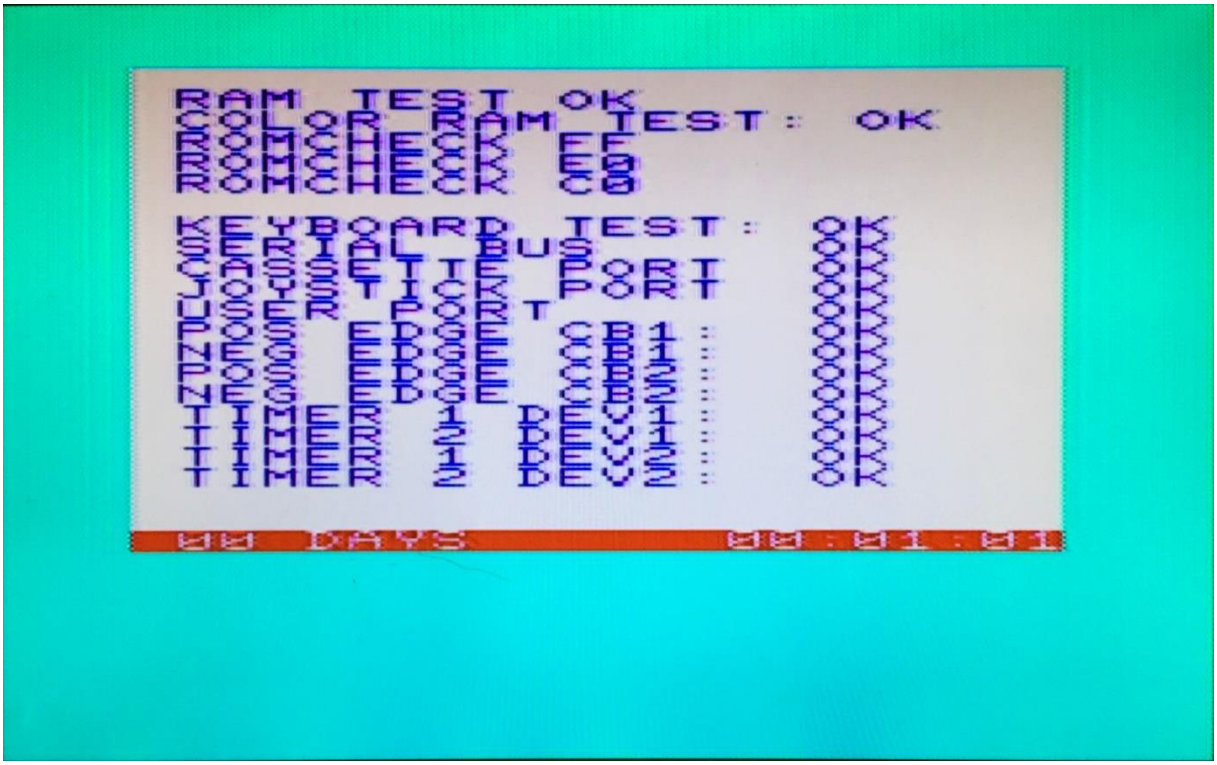

Figure 3: 2nd page

A JiffyDOS EPROM will not pass the ROM test. It requires to have the original Kernal installed on the VIC-20 to execute the diagnostics properly.

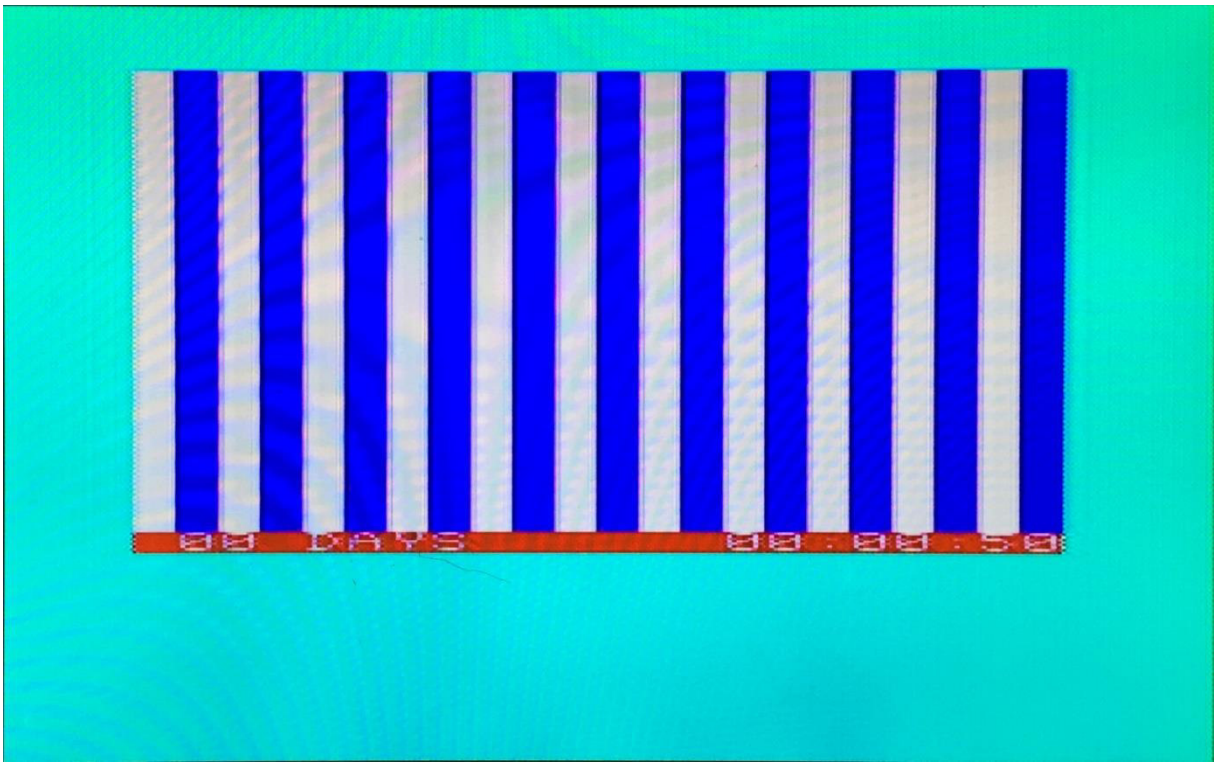

Figure 4: 3rd screen of the diagnostic test – a display test pattern

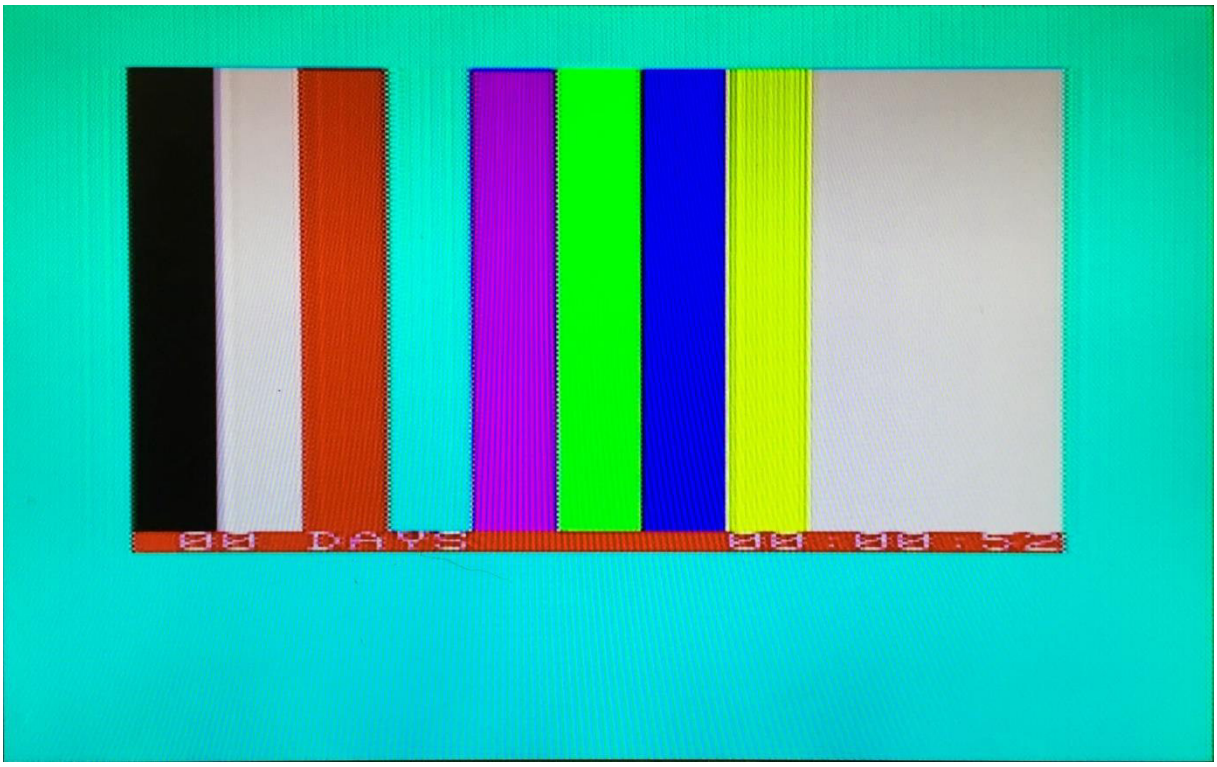

Figure 5: 4th screen of the diagnostic test - another display test pattern

A sound and display test is part of the diagnostic software.

Conclusion

The diagnostic harness and cartridge are fully functional.