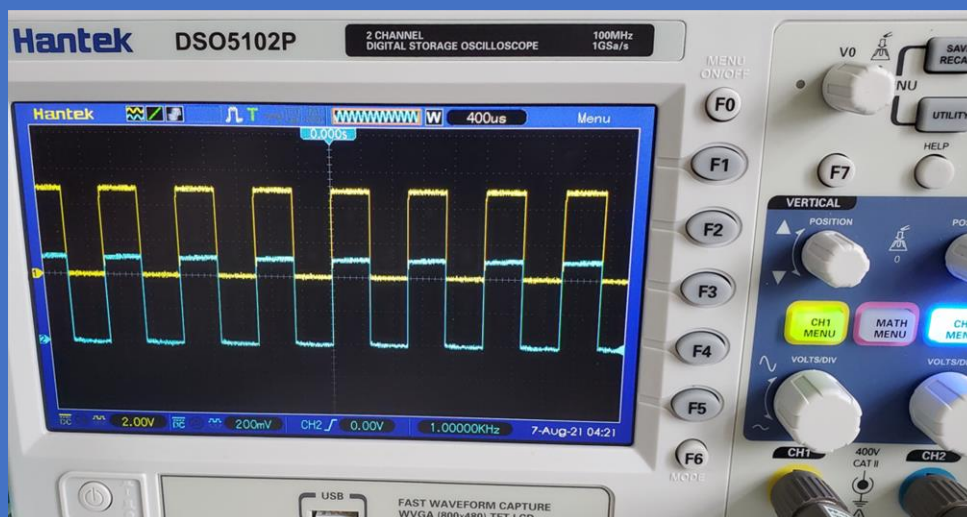


Rudy's Retro Intelligence



Commodore VIC 20 Personal Computer Diagnostics and Repair Manual

Version 1.9.4 Created in June 2024

Created by Rudy's Retro Intel

The purpose of this manual is help diagnose and repair these retro computers and is based on my work from over the years of repairs and input from others. Future versions will be available as more information is collected, tested and verified.

Included is the diagnostic section with suggested repairs based on the conditions present. Diagrams and pinouts may also be provided. Schematics for this computer itself can be found online and are **not** included here as there are some differences between revisions of the motherboard. Diagnosis should work on these computers; however, you need to do some additional research.

For the latest version of this document and other retro computer diagnostics, can be found using the links below.

<https://github.com/RudyRetroIntel/Vintage-Computer-Diagnostics>

You can find my video on the monitoring board here.

<https://www.youtube.com/@RudysRetroIntel>

*"Sharing knowledge, we can ensure that the retro computers can be repaired and enjoyed now and into the future.
Rudy's Retro Intel"*

***** This document is based on the work I have performed on my retro computer and is provided "as is". I\we do not take any responsibility for errors and\or damages that may occur when repairing your retro\vintage computer. This is information is provided freely to all retro computer owners. Please ensure you know how to perform electronics\electrical work. If not, please contact someone who has these skills before starting. *****

Manufacture Commodore 1980, 81 and 82
Processor MOS Technology 6502
Speed PAL = 1.108404 Mhz NTSC = 1.02 Mhz
ROM 20KB
Onboard RAM 3KB, 8KB, 16KB, 24KB
Max RAM 32KB
Number of slots 1

Operating System Commodore BAIC V2.0
Max video resolution 176 x 184 16 colour
Input\Output Serial and Parallel
Speaker No build in speaker

Diagnostic Software Cartridge

Dead Test Cartridge - Needs Kernal ROM to be working!!

When using a VIC20 diagnostic cartridge, remember it will need the Kernal ROM to be good it or it will not work
 If dead test cartridge is a black screen then the Kernal ROM cause be one of the issues

RAM locations base on Penultimate cartridge

Memory Block	VIC20 (2 pin)		VIC20-CR C64 Plug	
	123	4567	123	4567
RAM0	UD2	UE2	UD2	UE2
RAM4	UD3	UE3	U15	
RAM5	UD4	UE4		
RAM6	UD5	UE5	U14	
RAM7	UD6	UE6		
Colour RAM	UE1		UE1	
Character ROM	UD7		UD7	
BASIC ROM	UE11		UE11	
KERNAL ROM	UE12		UE12	

UE1 - UE3 No video - cartridge does not work or no work properly - RAM 0
 UE4 Video ok, bad RAM count - RAM 5
 UE5 Bad RAM - RAM 6
 UE6 and\or UD6 Garbage on screen - RAM 7

Diagnostics of Commodore VIC20 - Symptom(s)	Boot	Power Light	Screen	Floppy Drive	Cassette	Cartridge	Diag	IC	Rev
Earlier version board: ASSY #324003 FAB #324002-01 REV D 1980 - (large black heat sinks and two pin power connector)									
Startup screen normal, but no cursor.	Yes	Yes	Normal but no cursor	NA	NA	NA	Bad VIA interface - Keyboard or Serial - 6522	UAB1	REV D 1980
Startup screen normal, floppy\cassette\joystick access issues.	Yes	Yes	Yes	No	No	No	Bad VIA interface - Joystick, Cassette, Serial - 6522	UAB3	REV D 1980
Blank screen or issues with floppy drive	NA	Yes	Blank	No	No	NA	Serial port buffer - 7406	UB4	REV D 1980
							CPU 6502	UE10	
Will not reset on power up or shows garbage on the screen	No	Yes	Garbage	NA	NA	NA	Bad Timer - LM555	UB6	REV D 1980
white, blank, or solid color screen, garbage or no video, screen full of garbage characters	No	Yes	Blank, white, no video or garbage	NA	NA	NA	Bad VIC chip for audio and video - 6560 (NTSC) or 6561 (PAL)	UB7	REV D 1980
white, blank, or solid color screen, garbage or no video, screen full of garbage characters	No	Yes	Blank, white, no video or garbage	NA	NA	NA	CPU 6502	UE10	
White screen or missing colour\incorrect colors	No	NA	White or colour bad	NA	NA	NA	Bad master clock oscillator 7402 (M53202P) crystal 14.31818 MHz	UB9	REV D 1980
Screen has garbage characters	No	Yes	Garbage	NA	NA	NA	Bad IC 74LS04	UC2	REV D 1980
Screen has garbage characters	No	NA	Blank screen	NA	NA	NA	Bad IC 74LS02	UC3	REV D 1980
Screen has garbage characters	No	NA	Blank screen	NA	NA	NA	Bad IC 74LS138	UC5, UC6	REV D 1980

Screen has garbage characters	No	NA	Blank screen	NA	NA	NA	CPU 6502	UE10	REV D 1980
Screen shows characters but colour is wrong	Yes	Yes	Wrong colors on characters	Yes	Yes	Yes	Bad IC CD4066	UD1, UD2, UD6	REV D 1980
Blank screen, less than normal "3583 BYTES FREE" at startup, sometimes will produce "garbage" screen or screen freeze after warm up	Yes	Yes	Garbage	NA	NA	NA	2114 or TMM314A -RAM	UE1-UE6 and/or UD6	REV D 1980
Blank screen, less than normal "3583 BYTES FREE" at startup, sometimes will produce "garbage" screen or screen freeze after warm up	Yes	Yes	Memory count less	NA	NA	NA	RAM IC chips	U14, U15	
Screen characters missing\blocks or flashing lines	Yes	Yes	Characters missing	NA	NA	NA	ROM Character	UD7	REV D 1980
Blank screen or garbage video or audio	NA	Yes	Bad video or audio	NA	NA	NA	MPS65245 or MOS65245 or 74LS245	UD8, UE8, UB7 and UF8	REV D 1980
Blank screen or garbage video or audio	NA	Yes	Bad video or audio	NA	NA	NA	CPU 6502	UE10	
Blank screen	No	Yes	Blank screen	NA	NA	NA	Bad 74LS133	UD9	REV D 1980
Blank screen	No	Yes	Blank screen	NA	NA	NA	CPU 6502	UE10	
Serial port problems or blank screen	Yes	Yes	Yes	NA	NA	NA	Bad 7406	UE3	REV D 1980
Computer may run for a while then freeze	Yes	Yes	Yes	Yes	Yes	Yes	Bad CPU - 6502	UE10	REV D 1980
Screen with borders but no characters	NA	Yes	No characters	NA	NA	NA	ROM BASIC	UE11	REV D 1980
Blank screen on startup, no floppy drive access, game carts don't work	NA	NA	NA	NA	NA	NA	ROM KERNAL	UE12	REV D 1980
Blank screen on startup, no floppy drive access, game carts don't work	NA	NA	NA	NA	NA	NA	CPU 6502	UE10	
Cassette motor will not run	Yes	Yes	Yes	NA	No	NA	Transistor 2SD880	Q3	REV D 1980

Computer appear dead, no power indicator, wavy picture with hum in sound	No	No	NA	NA	NA	NA	5 Volt Regulator - LM323K	VR1	REV D 1980
Computer appear dead, no power indicator, wavy picture with hum in sound	No	No	NA	NA	NA	NA	Bridge Rectifier- 5 Amp at 50 Volts	KBPC802	REV D 1980
Computer appear dead, no power indicator, wavy picture with hum in sound	No	No	NA	NA	NA	NA	Fuse - 3.15 AMP	F1	REV D 1980
LATEST VERSION CR BOARD: ASSY #250403 FAB #251040-01 REV D 1981/2 (this model can use the same power pack as a Commodore C64)									
Screen normal, but no cursor. Keyboard doesn't work	Yes	Yes	Yes	NA	NA	NA	VIA, Keyboard or serial port - 6522	UAB1	REV 3 1981/8 2
Screen normal, but floppy or cassette access issues	Yes	Yes	Yes	No	No	NA	VIA, serial port or joystick port- 6522	UAB3	REV 3 1981/8 2
Blank screen or serial port (floppy drive) access issues	Yes	Yes	Blank screen	No	No	NA	Bad IC 7406	UB4	REV 3 1981/8 2
Blank screen or serial port (floppy drive) access issues	Yes	Yes	Blank screen	No	No	NA	CPU 6502	UE10	
Does not reset on power up. Produces garbage or random screen	No	Yes	Garbage	NA	NA	NA	Bad Timer LM555	UB6	REV 3 1981/8 2
Screen white, blank, solid color, garbage or no video, screen full of random garbage characters	No	Yes	Garbage	NA	NA	NA	VIC video and audio - 6560-101	UB7	REV 3 1981/8 2
Screen white, blank, solid color, garbage or no video, screen full of random garbage characters	No	Yes	Garbage	NA	NA	NA	CPU 6502	UE10	
White screen, missing color or incorrect colors, or diagonal lines, sounds play at incorrect pitch. Symptoms may only appear after warm up	Yes	Yes	White or colour bad	NA	NA	NA	Master clock oscillator 7402 (M53202P)	UB9	REV 3 1981/8 2
Screen has incorrect colors, garbage on screen or blank (vertical lines)	NA	Yes	Incorrect colour, garbage or blank	NA	NA	NA	Bad 74LS04	UC2	REV 3 1981/8 2

[illegible]

[illegible]

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