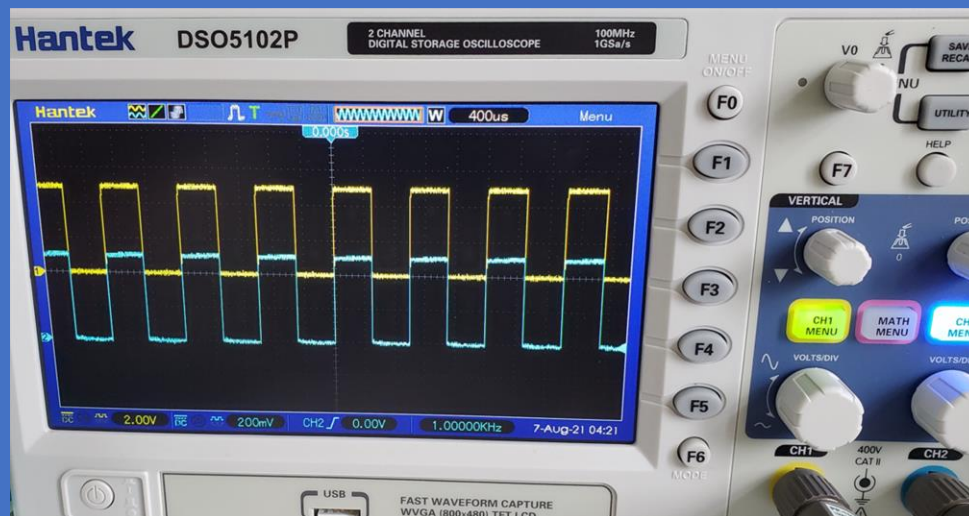


Rudy's Retro Intelligence



**Commodore Super PET - SP9000
3 Board Version Diagnostics Manual**

Version 1.5 Created in September 2024

Created by Rudy's Retro Intel

The purpose of this manual is to help identifying issues and the repair of a Commodore SuperPET (SP9000) computer that has 2 boards along with the 8032 motherboard (3 boards in total). Excluded from this manual is the repair of the 8032 motherboard which is used in the SuperPET. A separate document may be made available soon.

This manual will only cover the **SuperPET with the "3 daughter board version"** The 2 board versions with is not covered in this manual, however you can find that manual on my GitHub here:

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

The SuperPET boards I used to create this manual is the:

SUPER PET BD.BMB 810219 @1981
FAB NO. NA
ARTWORK NO. NA

For the latest version of this document and other diagnostic manuals, use the links below.

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

You can find my videos here.

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

Contributors



Chuck Hutchins - Technical help with his many years of experience on the Commodore computers. Have a look at his collection and knowledge on his YouTube channel: <https://www.youtube.com/@HutchCA>



David Bradley - Provided several SuperPET boards for comparisons which allowed me to take measurement and fix my SuperPET board and several of his boards. See his many Commodore related videos here:

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

*"Sharing knowledge, we can ensure that the Commodore SuperPET 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 Commodore SuperPET (SP9000) computer and is provided "as is". I\we do not take any responsibility for errors and\or damages that may occur when repairing your Commodore SuperPET (SP9000) computer. This information is provided freely to all SuperPET computer owners. Please ensure you know how to perform electronics\electrical work. If not, please contact someone who has these skills before starting. ****

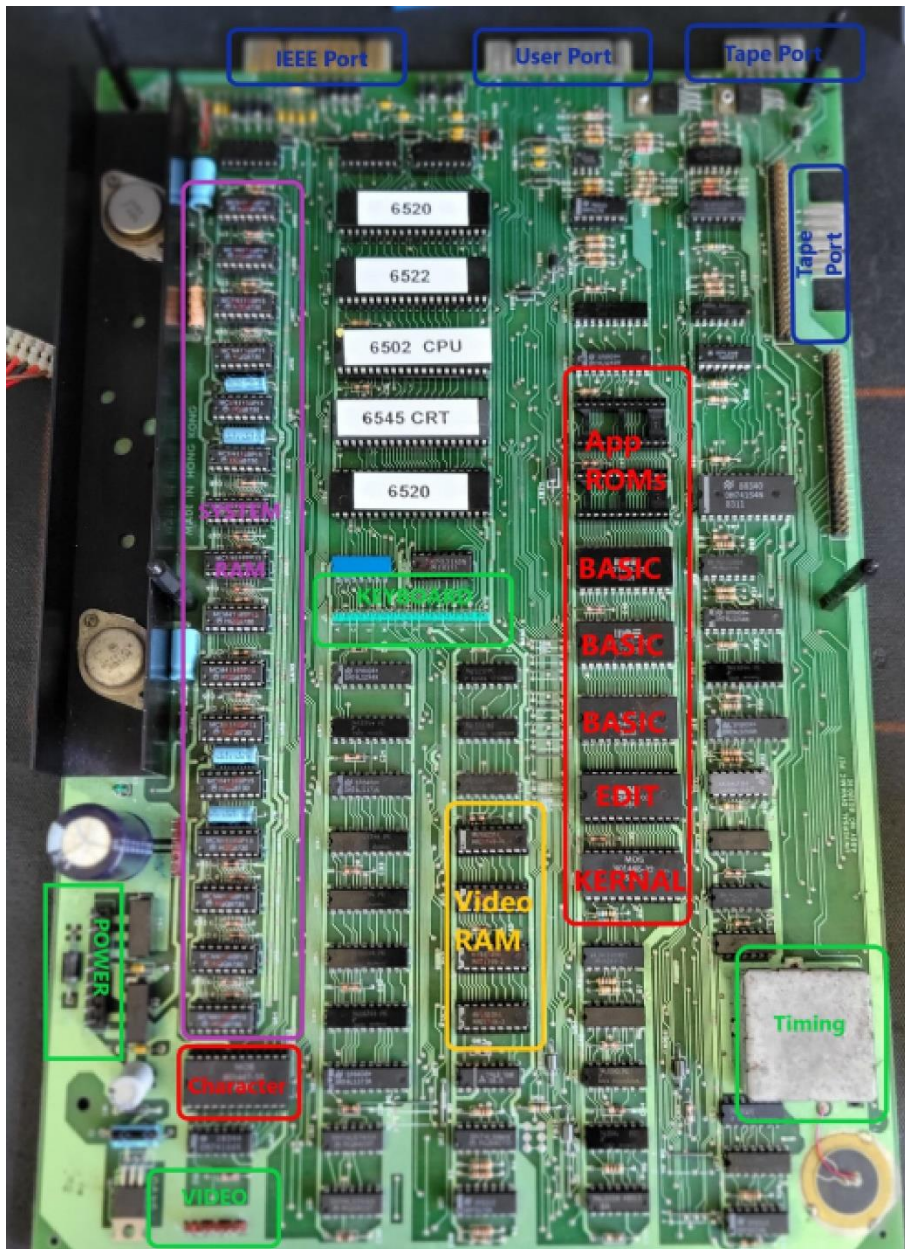
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SuperPET Motherboard Modifications (8032)

The SuperPET computer was built on a Commodore PET 8032 computer which helped to reduce cost of designing a completely new computer system.

8032 Motherboard with identifications



Commodore PET 8032

Original

901465-19: BASIC ROM
901465-20: BASIC ROM
901465-21: BASIC ROM
901465-22: KERNAL ROM
Character ROM: 901447-10

BASIC ROM Bug Fix

901465-23: BASIC ROM
901465-20: BASIC ROM
901465-21: BASIC ROM
901465-22: KERNAL ROM
Character ROM: 901447-10

6545 used in 12"inch screen PETs for
H-Sync and V-Sync

6522 VIA (Versatile Interface Adapter)

6520 PIA (Peripheral Interface Adapter)

Video RAM

4 x 2114 RAM ICs

Main System RAM

16 x 4116 RAM ICs

CPU: 6502 (1 Mhz)

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



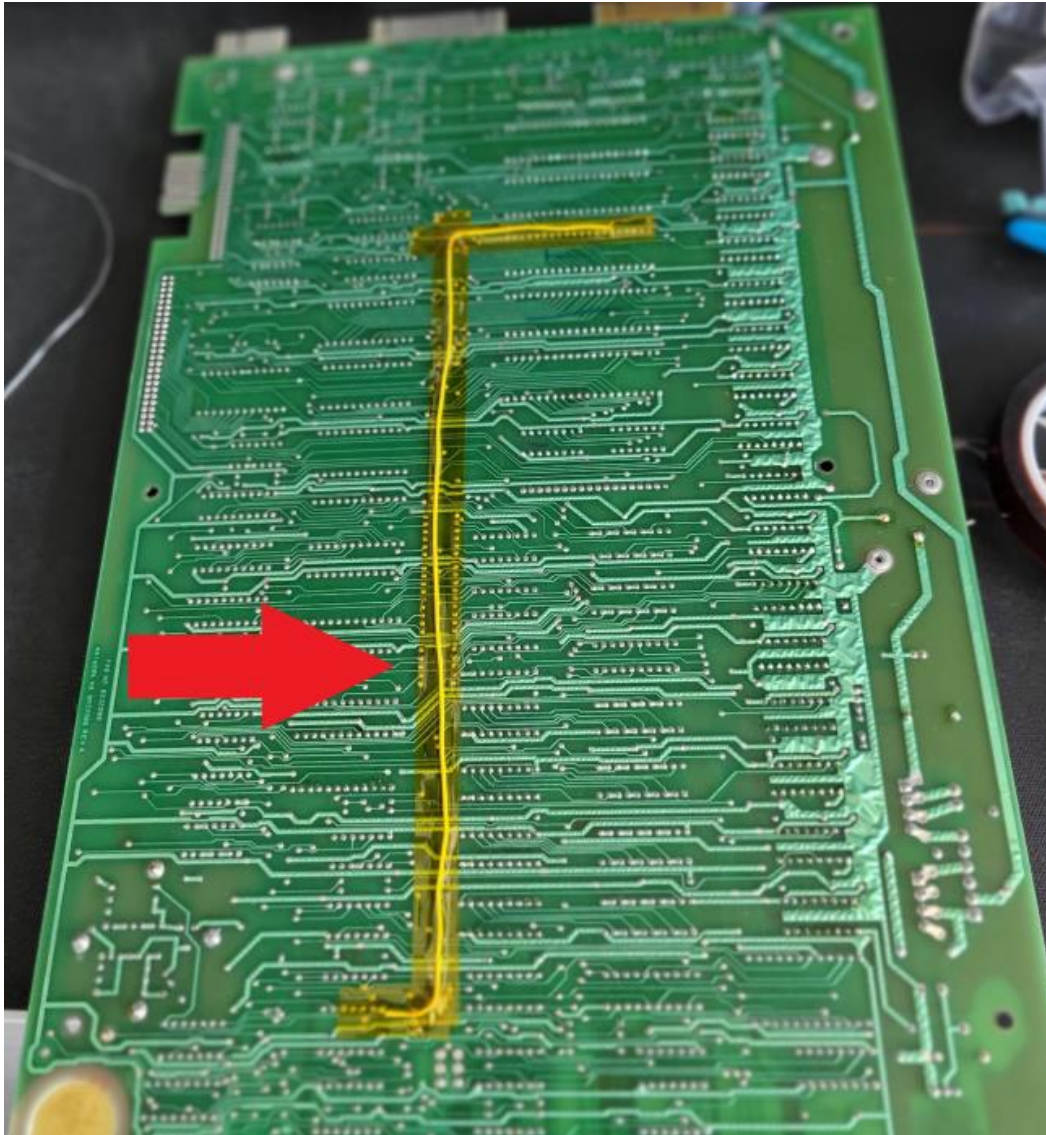
In order to get the PET 8032 (8032) to work as a SuperPET, there are 2 modifications needed so that it will work with the SuperPET daughter board.

- Motherboard jumper wire installation
- Upgrade the Character ROM

Motherboard jumper wire installation

A jumper wire is needed to pass through a clock signal from the 8032 to the daughter board

Verify\Install a wire from **UD3** pin 1 - 74LS393 connected to **U17** pin 35 – 6502 CPU



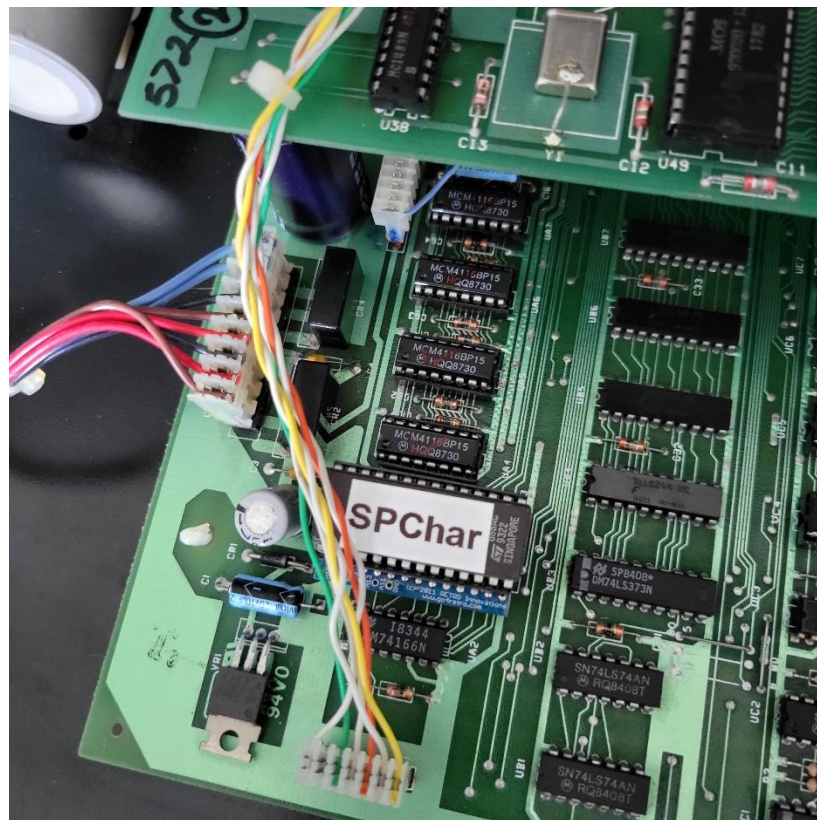
Character ROM modification

The character ROM is the 901340-01 which is different from the original character ROM found on the 8032 motherboards.

SuperPET character ROM, is made of 2 halves. The first half has the original 8032-character ROM and the second half of this ROM contains a true ASCII character set and an APL character set. Without this modified character ROM, the SuperPET board will not work.

You can find the ROM image file here:

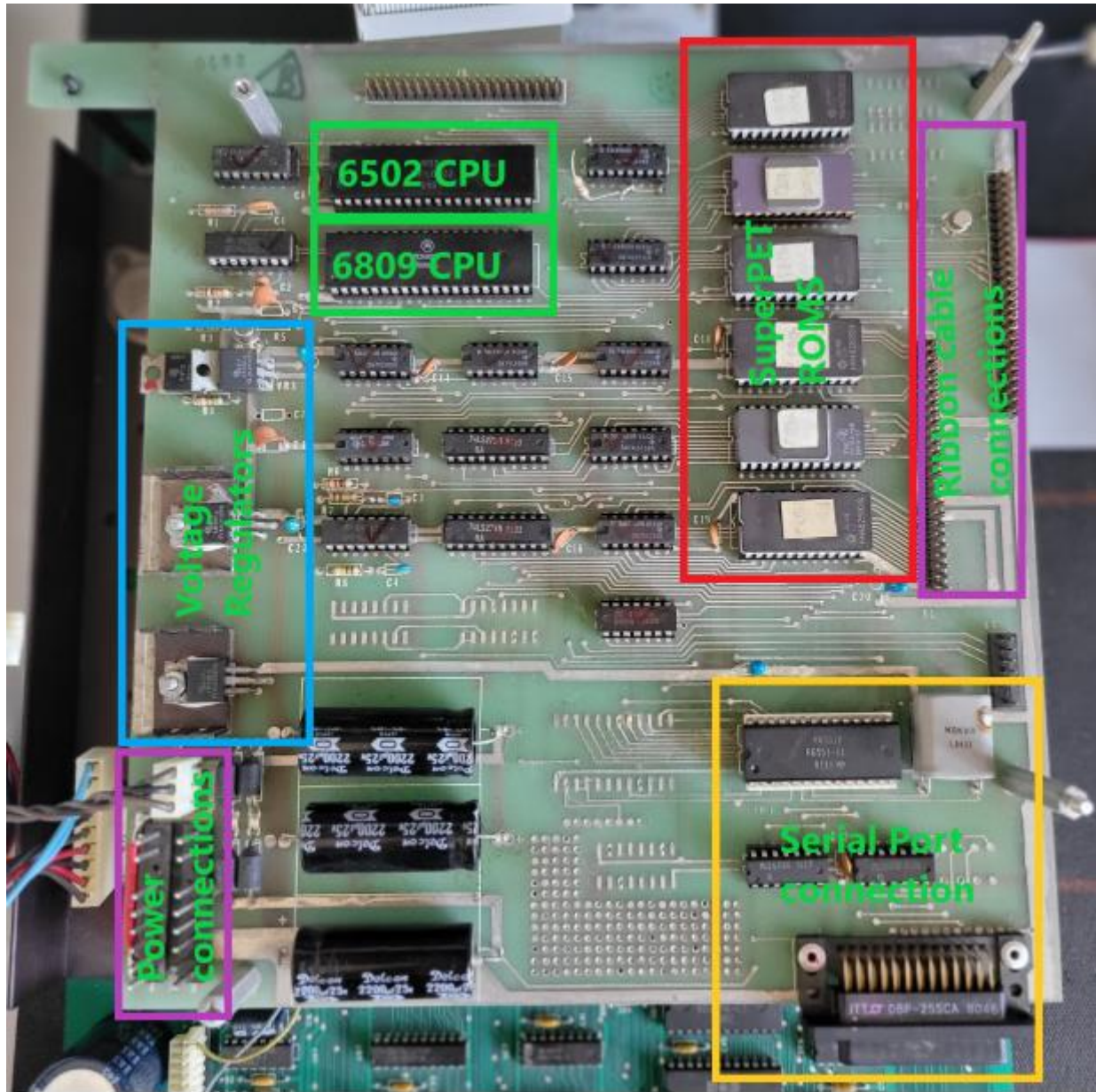
<https://www.zimmers.net/anonftp/pub/cbm/firmware/computers/pet/SuperPET/index.html>



The Commodore SuperPET is comprised of the following:

- Commodore 8032 motherboard with modifications.
- 2 Daughter board (lower and upper boards) which connects to the 8032 via a ribbon cable and a power cable.

Super PET Lower Board – top view



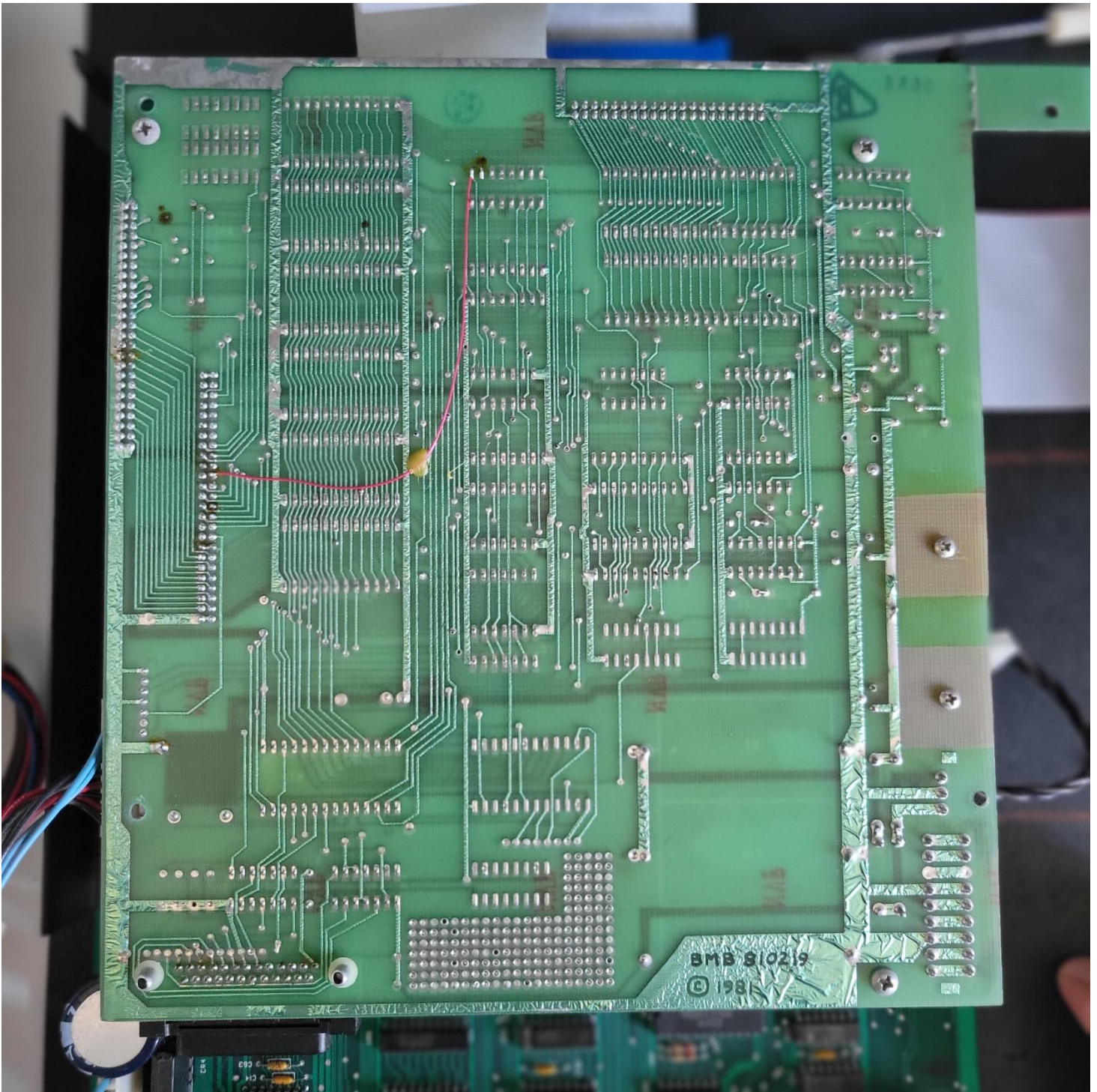
- Check to ensure the ribbon cable is connect into the 6502 socket on the 8032 motherboard and to the SuperPET daughter board.
- Check to ensure the ribbon cable for the extended memory is connect to lower SuperPET board and the 8032.
- Check to ensure the power cable is connected from the 8032 motherboard and to the SuperPET daughter board.

SuperPET ROM Memory Locations



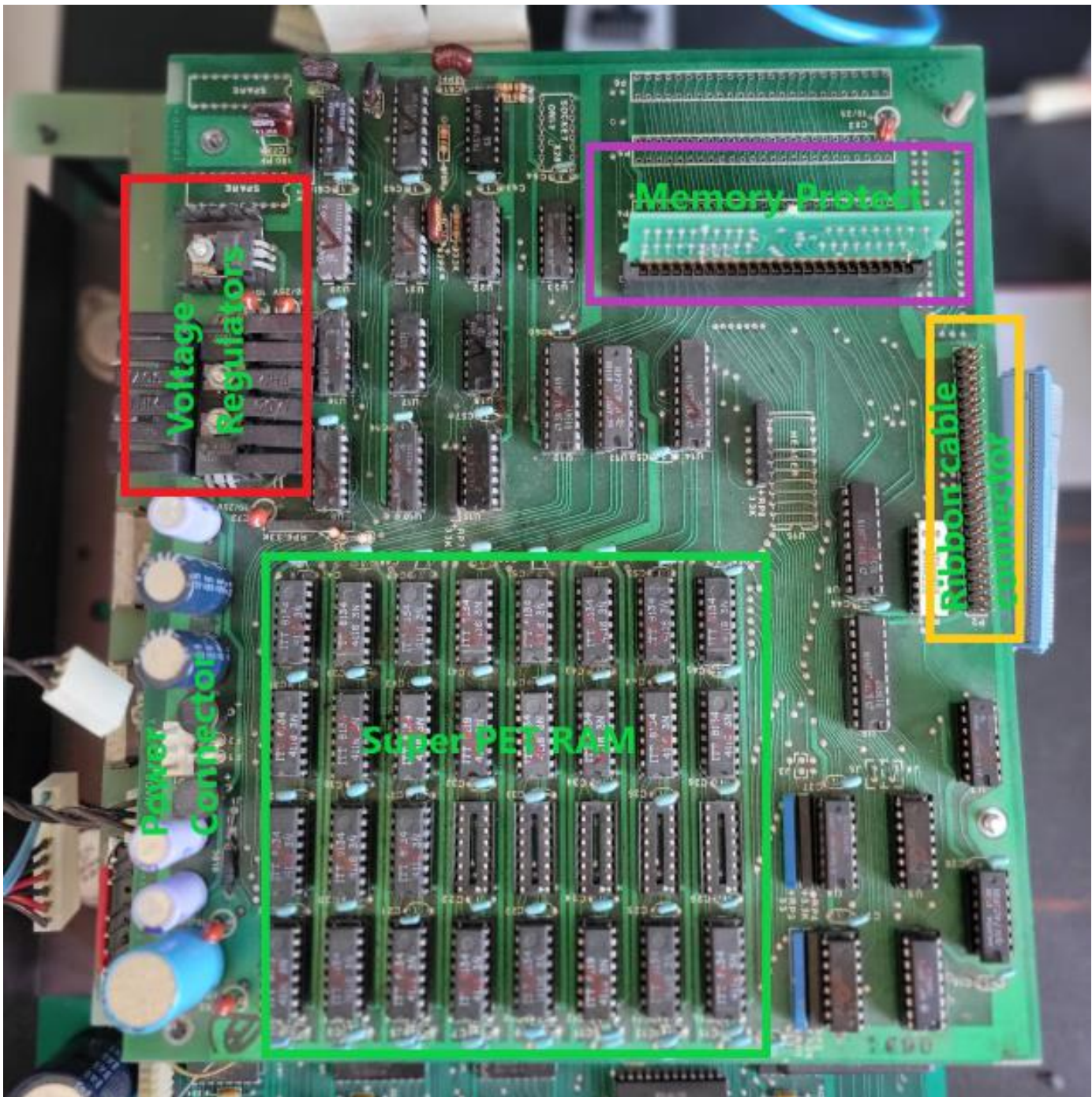
The EPROMs used are 2532 EPROM and has a storage capacity of 4KB

Super PET Lower Board – bottom view

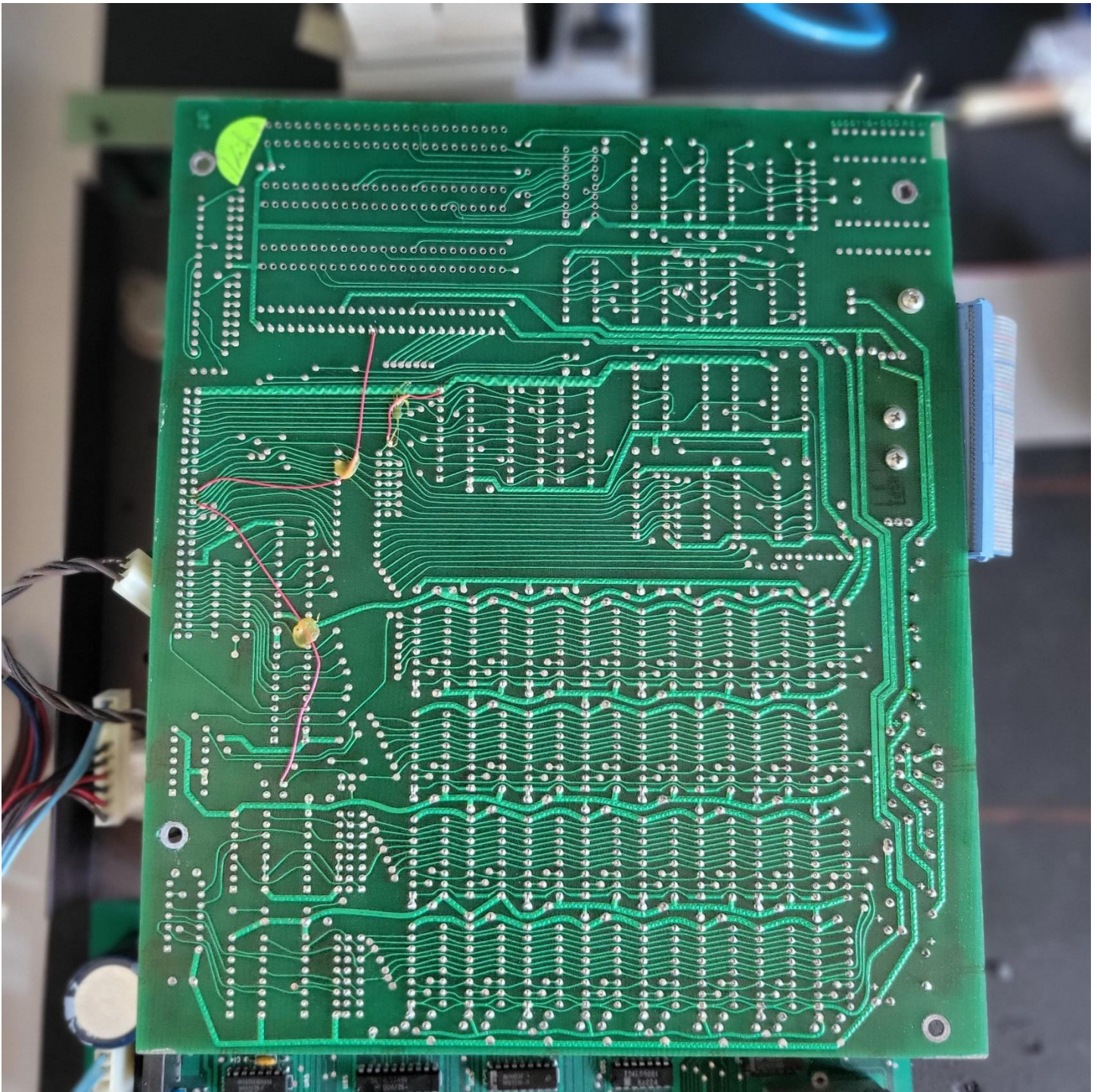


Verify that these jumper wires are in place.

Super PET Upper Board – top view



Super PET Upper Board – bottom view



Verify that these jumper wires are in place.

REVISIONS

LT#	SUM#	DESCRIPTION	DATE	APPROVE
		SEE SHEET 1		

POWER SUPPLY ASSY
8050051

PCB ASSY,
COMPU-THINK

PCB ASSY
BMB BRD

PCB ASSY,
CPU BRD

WELDMENT, BASE

PCB ASSY,
CPU BRD

SWITCH
CLIP-ON ASSY

SECTION A-A

commodore

HARDWARE
ACCESSORY ASSY

SIZE
C 324052

SCALE NONE SHEET 3 OF 3

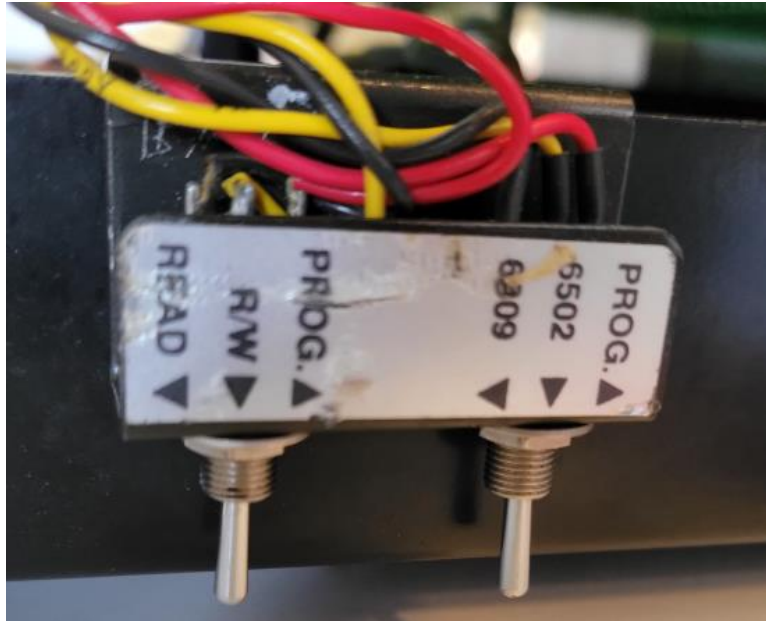
ADVANCE RETRO

www.commodore.ca

- RAM: 4116. Can be replaced with **4164 RAM ICs** as a substitute, with a few modifications.
 1. Bend pin 1 and pin 8 upwards so they no longer go into the socket's connectors.
 2. Connect pin 8 and pin 9 with a short piece of wire.
- EPROMS: HN462532G (2532 EPROM) with 4KB of capacity
- Voltage regulator replacements
 - **TIP 30 8129** can be replaced with **TIP42A**
 - **LM340-5** can be replaced with **LM340T-5 or 7805**
 - **7812C** can be replaced with **LM340-12 or 7812**

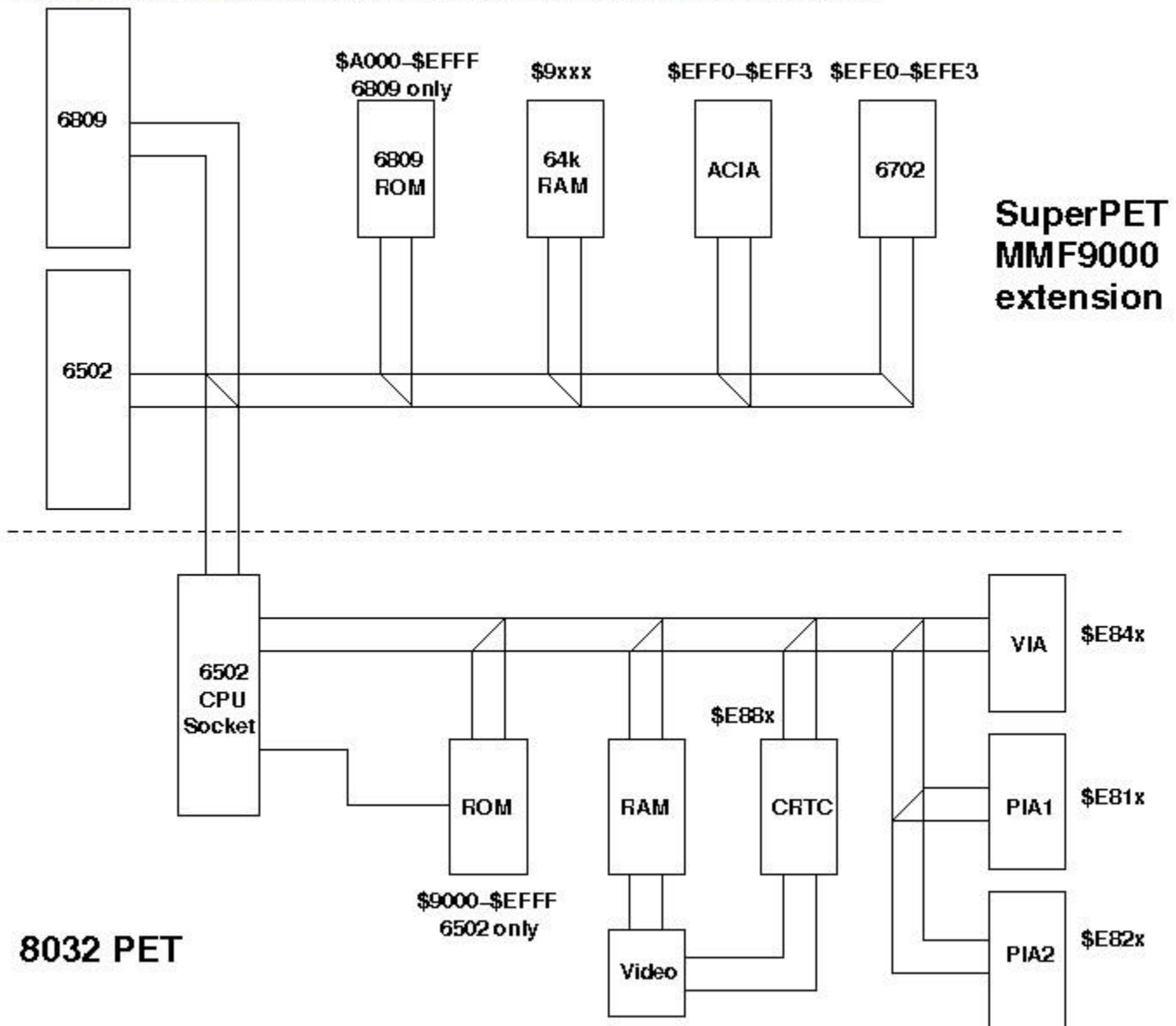
Switch Setting and Usage

For general purposes, leave the 2nd switch to **R\W** (Read and Write). The usage of these switches will not be covered in this manual. You can find the programming language manuals or SuperPET user manual for details on how\when to use these switches. The only switches used to repair a SuperPET is 1) leaving the memory switch to **R\W** and 2) switching between 6502 (8032 PET) and the 6809 (SuperPET) modes.



Basic Operation of the SuperPET

The following diagram shows an overview on the SuperPET extensions



*Original diagram was found randomly on the internet. If you know who created this diagram, please let me know so that I can credit them in this document.

SuperPET Schematic

Full schematics which can be found here:

<https://www.zimmers.net/anonftp/pub/cbm/firmware/computers/pet/SuperPET/index.html>

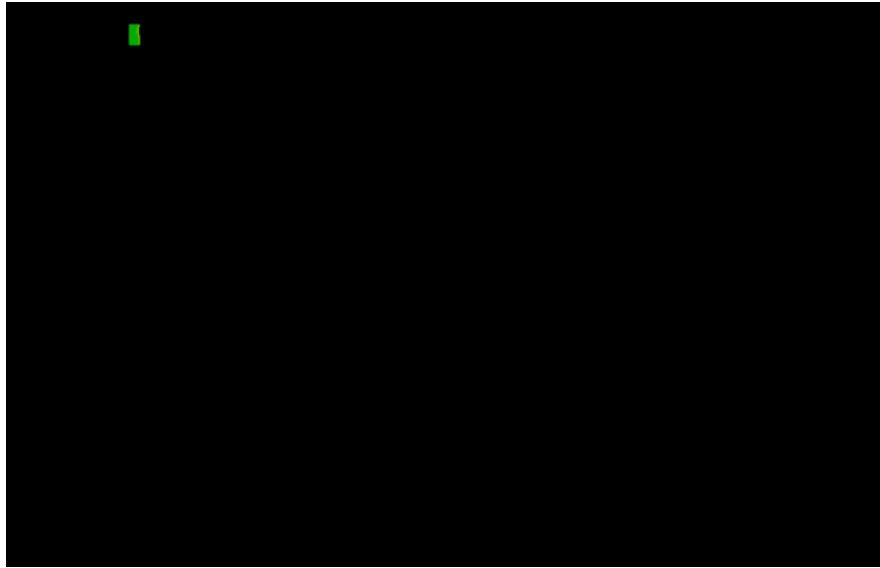
SuperPET Symptoms and Diagnostics

In the following sections, symptoms are presented and diagnoses. Please note that there could be several faulty\failed ICs.

1. Ensure you remove all ICs in sockets and clean the sockets with an electronic cleaner before starting.
2. Check to ensure the ribbon cable is connect into the 6502 socket on the 8032 motherboard and to the SuperPET daughter board. Verify that the ribbon cable is good. With multimeter, check both ends of the ribbon cable for breaks and\or shorts.
3. Check to ensure the ribbon cable is connect from the lower SuperPET board to the upper board. Verify that the ribbon cable is good. With multimeter, check both ends of the ribbon cable for breaks and\or shorts.
4. Check to ensure the connector with 3 wires is connected from the lower board to the upper board. This is for power. Verify that the ribbon cable is good. With multimeter, check both ends of the ribbon cable for breaks and\or shorts.
5. Check to ensure the power cable is connected from the 8032 motherboard and to the SuperPET lower board. Ensure power is coming into the daughter board.
6. Check to ensure the power cable is connected from the 8032 motherboard and to the SuperPET lower board. Ensure power is coming into the daughter board.
7. Check voltages on all 7 voltage regulators.

The steps above are basic troubleshooting and will not be covered in this manual.

Symptoms: 6502 boots up, switching to 6809 mode produces a blank screen



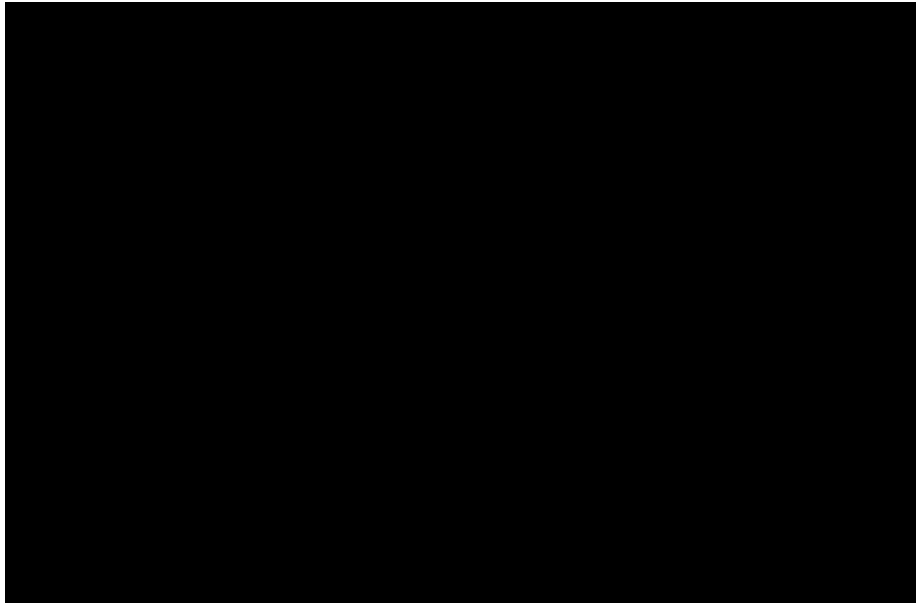
Diagnoses: Check\replace A000 ROM at **U17**

Symptoms: 6502 works but when switching to 6809 you get the same screen or garbage. Keyboard not responding.



Diagnoses: Check\replace B000 ROM at **U18**, C000 ROM at **U19**, D000 at **U20**, E000 at **U21**,
74LS123 at **U2**, 6809 CPU at **U4**, 74LS00 at **U8** and check the ribbon cable at **J2**

Symptoms: 6502 works but when switching to 6809 you get a black screen.



Diagnoses: Check\replace F000 at U22

Symptoms: In both 6502 and 6809 modes, screen is full of garbage characters and screen is flashing



Diagnoses: Check\replace CD4049 at U1

Symptoms: Green screen is produced on boot up in both modes



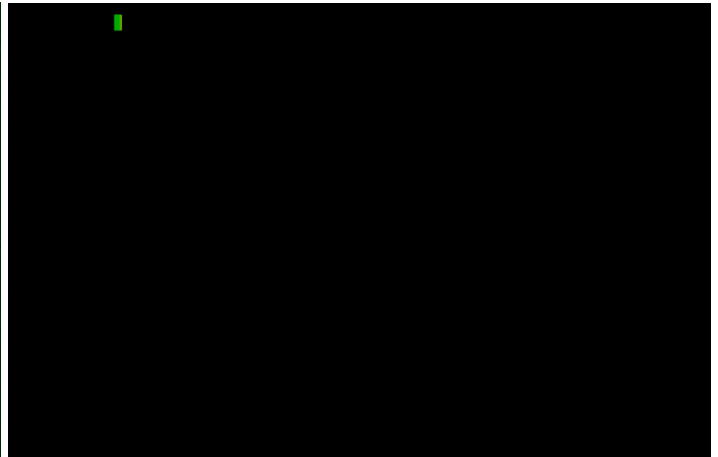
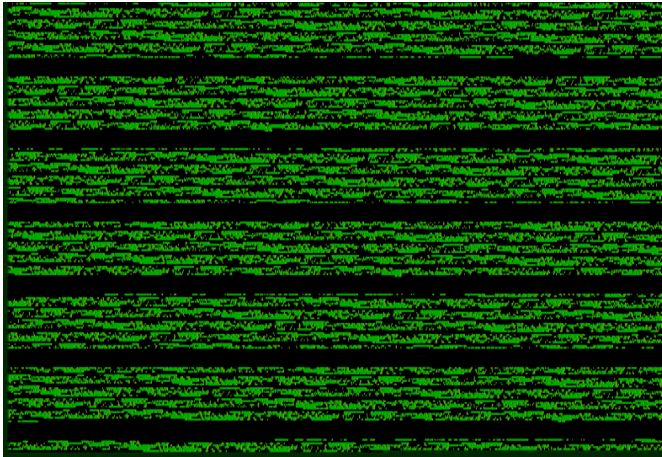
Diagnoses: Check\replace 74LS138 at **U12**, 74LS08 at **U6**

Symptoms: Green screen when booting into 6502 mode but get the menu in 6809 mode.



Diagnoses: Check\replace 6502 CPU at **U3**

Symptoms: 6502 mode produces vertical static lines, 6809 produces block cursor.



Diagnoses: Check\replace 74LS04 at U13

Symptoms: Initial boot into either mode works but when switching between them the computer freezes

- No image shown for this error

Diagnoses: Check\replace 74LS123 at U7



Commodore Super PET - SP9000 3 Board Version Diagnostics Manual