# VDP- 1000 plus User's manual

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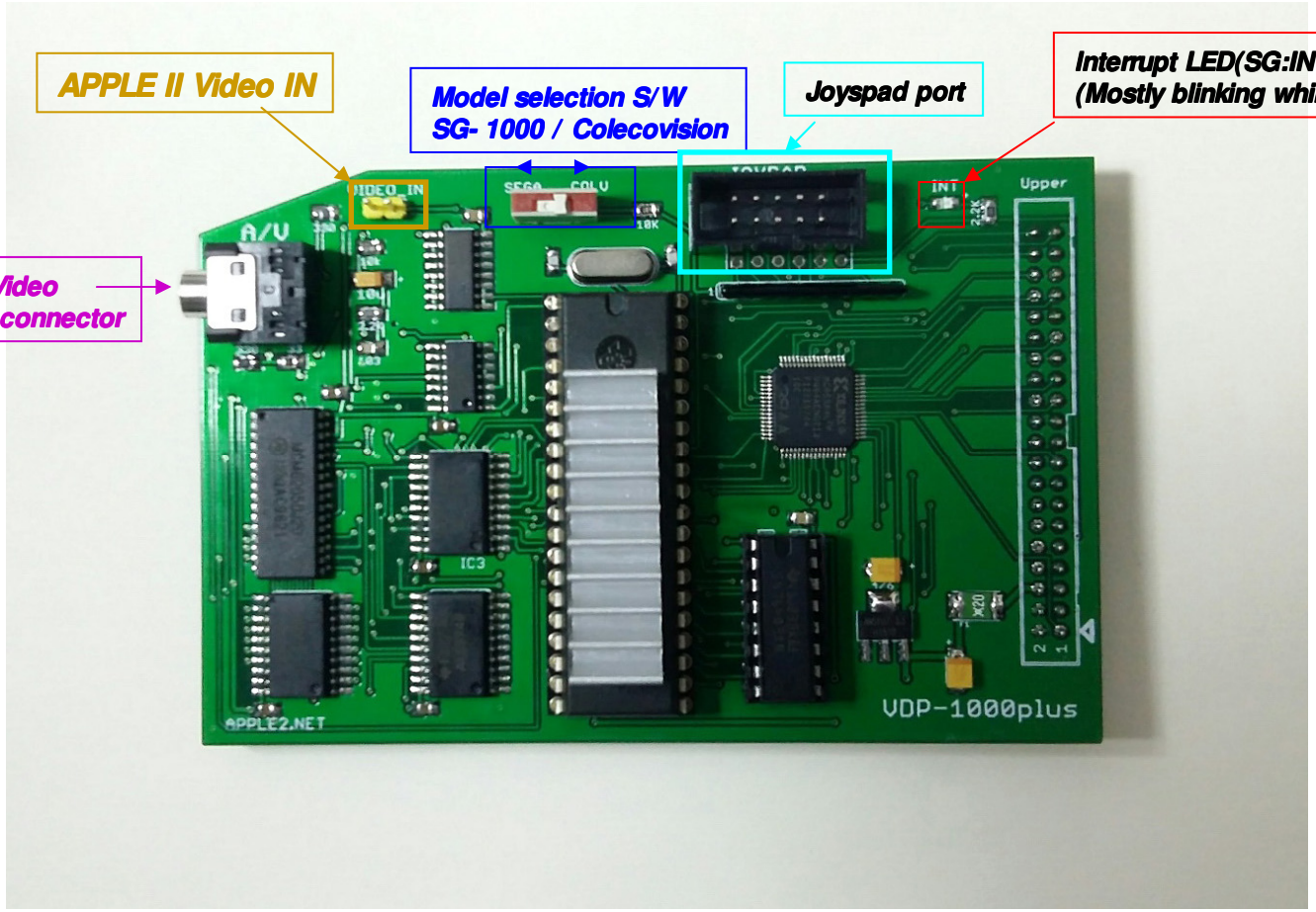
# Introduction

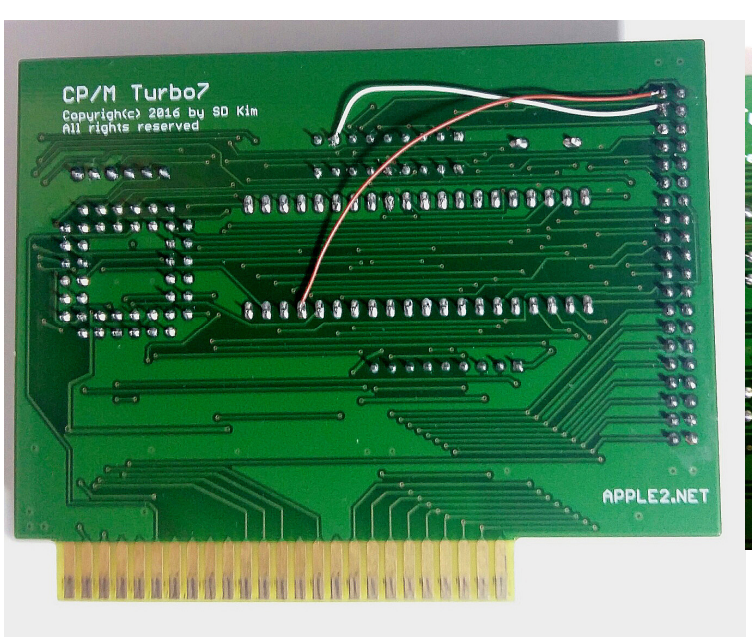
- VDP- 1000plus has a TMS9918(Video Disply Processor)for extra video output and SN76489(DCSG) for multi tone sound, now, we can use sprites and sound as the '80 games.
- This board is an daughter board of CP/M Turbo7 so you need CP/M Turbo7 to use it.
- For more fun, it has same I/O address and structure of the SG- 1000 and Colecovision(machine selectable) and the results are Apple also can run Games of the machine.
- With a joypad port/pad, game would be more fun, This device isn't only for game playing but also can use on program for you.
- It also can control by CP/M 80. You can control Sprites and Sound by ASM80 even other languages are possible to control it.
- You have a way to make own games which is using H/W supported sprites and multi tone sound even APPLE II keyboard and Apple joystick also possible to read. TMS9918 with Z80 have a lots of examples on the internet.
- Please enjoy more games and programming on your APPLE II.

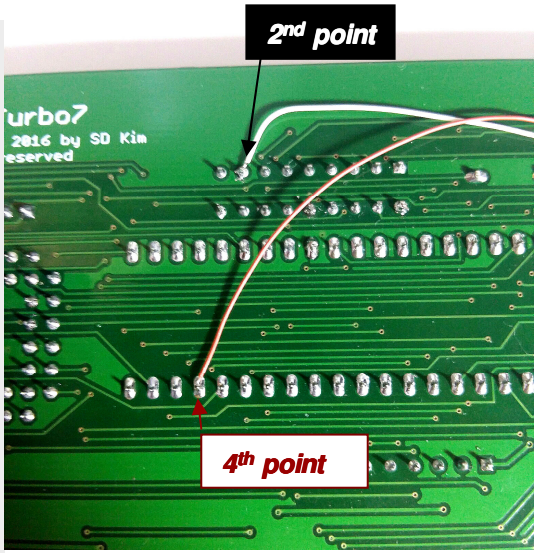
# Connectors

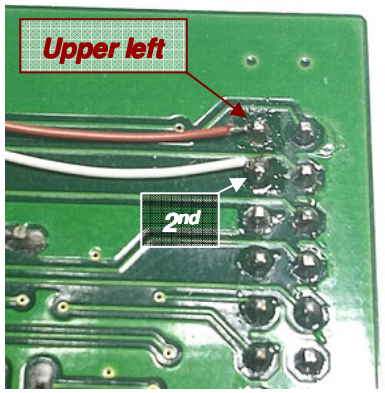

APPLE II Video IN
Model selection S/W
SG- 1000 / Colecovision
Joyspad port
Interrupt LED(SG:INT, Col:NMI)
(Mostly blinking while TMS9918 active)
Audio/Video
Output connector
VIDEO IN
SEGA
COLV
INT
Upper
A/V
IC3
APPLE2.NET
VDP-1000plus

# Preparation on CP/M Turbo7

- CP/M Turbo7 card doesn't have daughter and I just left 40 holes for future possibility.
- We have a daughter board and now we need to combine together. So, we need to solder 40pin connector for both.
- And more we need two signals for Game machine.
- Please solder 40 connectors and two wires on the proper position as under



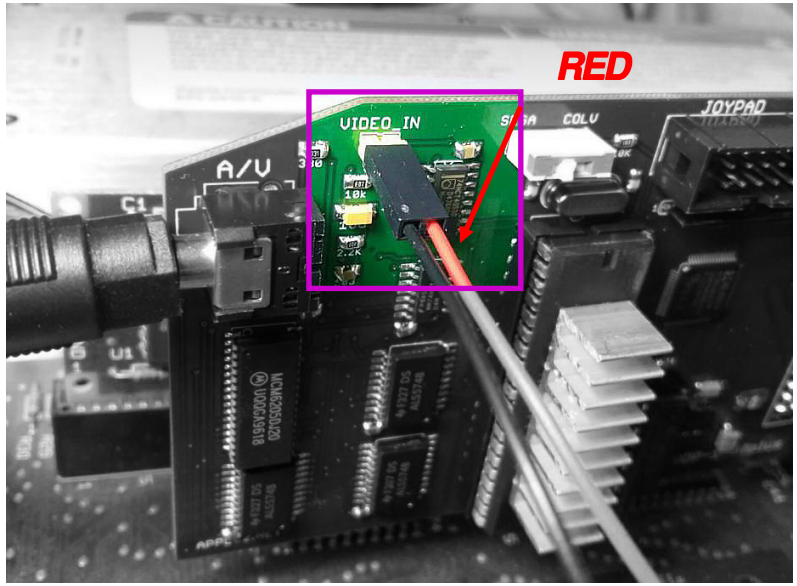



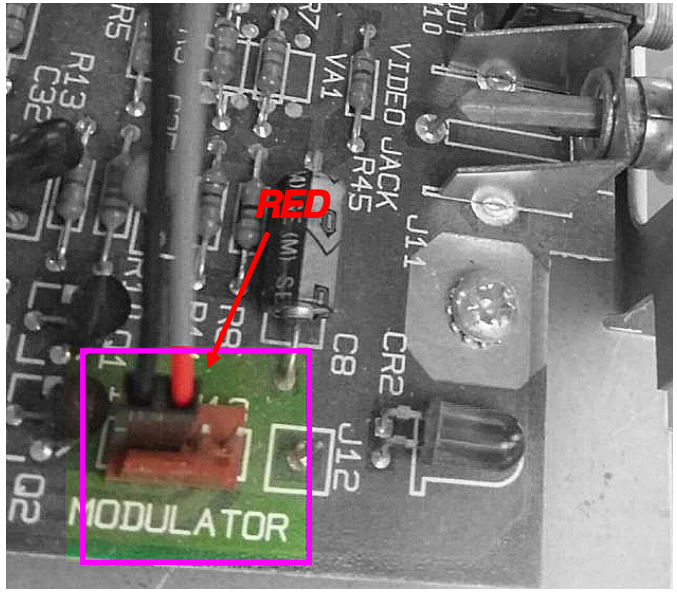




▶ Soldering point should be proper location.  if mistake, it may damage the board.

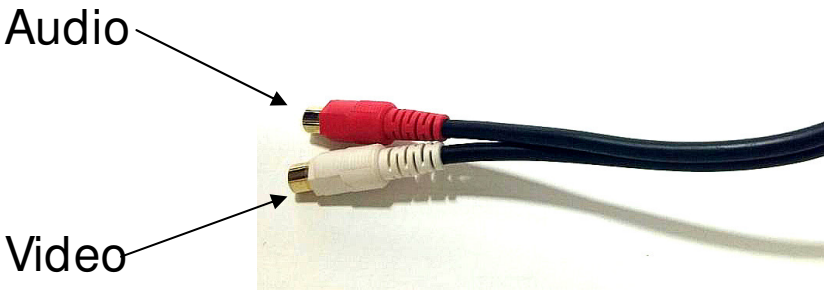
# Connector for Video- in

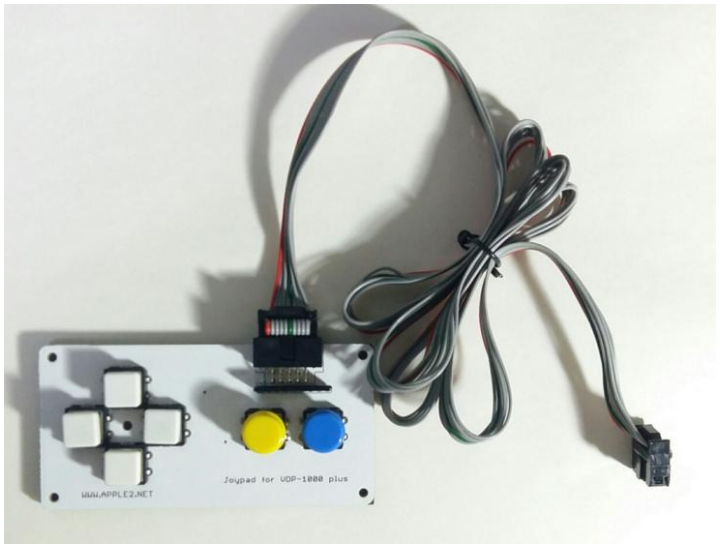
- APPLE //e has a video out on the board named Modulator, VDP- 1000plus can switch between APPLE II screen with VDP- 1000, For this, it need to get APPLE II video signal and need to connect as below.
- Please care the wire color(***Right is red***) and plug in properly.



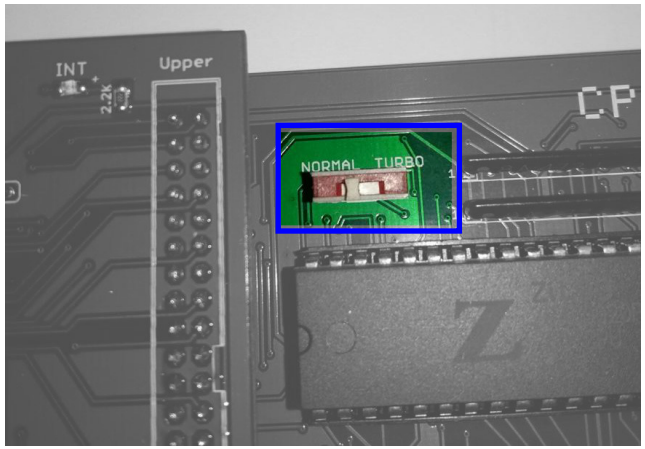
# Connect A/V cord and Joypad



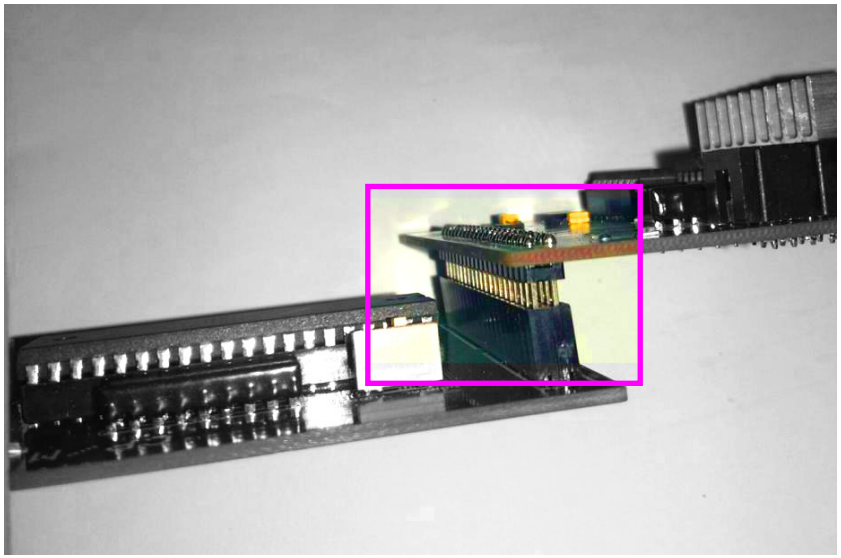

- A/V Connector
  - ***Red***; ***Audio***
  - ***White***; ***Video.***
- Please tie/fix it some where on APPLE II (maybe power supplier is good location) to prevent moving and short circuit on APPLE II.
- Connect a Joypad on VDP-1000plus board.

# Set to normal on CP/M card and combine two boards



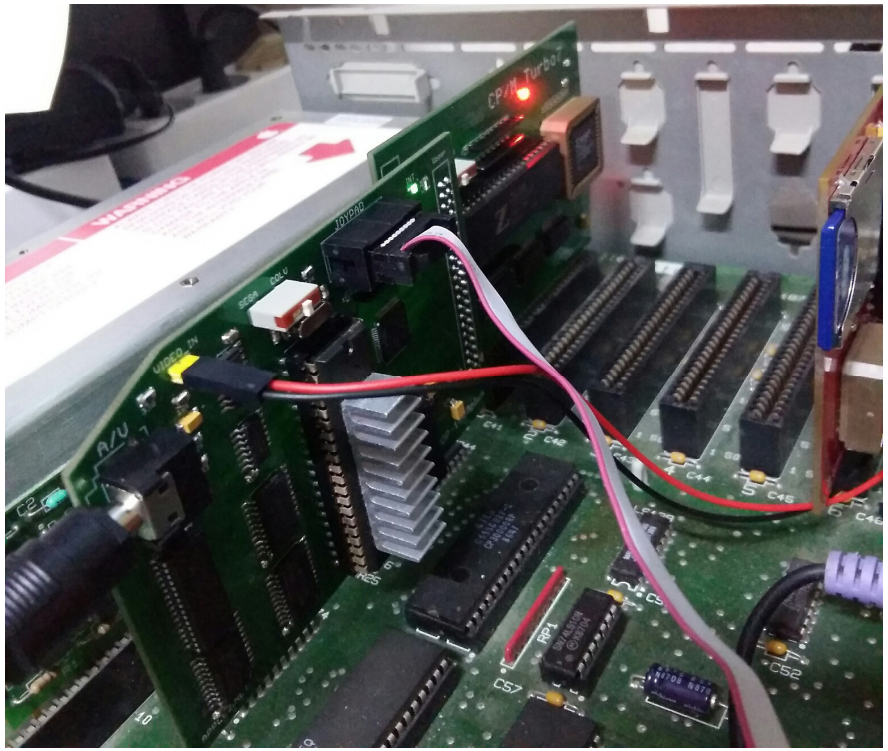

- VDP- 1000 Plus works only on ***Normal*** position (2Mhz) of CP/M card please set it on Normal position

- Set the mode on VDP- 1000 for testing..



- Please combine two boards proper way. No missing or bias,

# So you are prepared as this



- No LED ON yet, but, your board may be similar as this.
- You may need to arrange cables.
- So, now hardware is ready to run, but, you need a software to operate it.

For softwares, please refer the rest pages..

# How to get ROM files and transfer to APPLE II

- ***The ROM files are not APPLE II one and we need to send ROM files for APPLE II.***

- ***I suggest you have a HDD emulator for easy cause ROM files are a lots on the Net.***
  ***Please refer this link then you could download Games of the SG- 1000***
  ***https://www.emuparadise.me/Complete_ROM_Sets_(Full_Sets_in_One_File)_ROMs/Sega_-_SG-1000_(No_Intro)/182741***
  ***also you can find games for the Colecovision***
  ***http://colecovision.ca/roms_classic_0-9.php***

## *How to transfer ROM files to APPLE II*

- ***If you have a FDD only (No any DISK Emulator), it isn't easy to transfer APPLE II DISK.***
  - 1) please download ROM file from internet.
  - 2) Put it into FDD Image(APPLE one) by the Cider press (You need blank FDD image to put the ROM file )
  - 3) Change attribute of ROM file type to ***BIN***
  - 3) Transfer it to APPLE II by the ADT Pro (You need super serial card)
  - 4) Use the DISK and start the ROM file by BASIC loader.

- ***If you have HDD Emulator***,
  - 1) Please download ROM file from internet.
  - 2) Add ROM file to proper directory in HDV file by the Cider Press.
  - 2) Change attribute file type to ***BIN***
  - 3) Copy the HDV file for your DISK Emulator.
  - 4) Load the HDV image file for HDD Emulation and load the ROM by BASIC loader.

## *BASIC loader*

- I'm providing starting program. Please refer this link for download.
- There are two types. one is for FDD, the other is for HDD.
- Image are made by Prodos 2.0.3.
  (if you want you can use another boot disk for booting and just run the loader)

# You are ready to start VDP- 1000 Plus

***How to start with ROM file***

1) Boot your APPLE II with FDD or DISK Emulator(My provided HDV image also good for boot)
2) Select 1 for SG- 1000 (It's depend on the Switch position on VDP- 1000Plus)
3) And keyin '***SG1000.CHECK.SG***' (just for testing)

Then it will run as SG- 1000.
If no sound, please check AV Cable and volume of your amplifier speaker.
If working with sound and video output properly, Please also test the Joypad.
If everything OK, your VDP- 1000plus works and set up properly.
Now, You can run your favorite ROM files.

Reboot the APPLE II and 3) select your favorite ROM file.

* Try to play game and let me know if you have any problem.
* Not all of games runs on this board. Cause it have little different memory location with the original machine.
* Select machine ***SEGA <> COL*** and select proper ROM file.

# BASIC Loader for ROM images

- The BASIC program has simple procedure.
- SG1000
  - Load the ROM file from $1000..
  - Set RW on APPLE II Bank RAM.
  - Start Z80 and will start on $1000…
  - ** Loader isn't very efficiency, if you can use APPLE IIe Aux memory, you can load more than 32KB(Now It doesn't load above 32K ROM). *MAX:24KB*

Colecovision is using higher

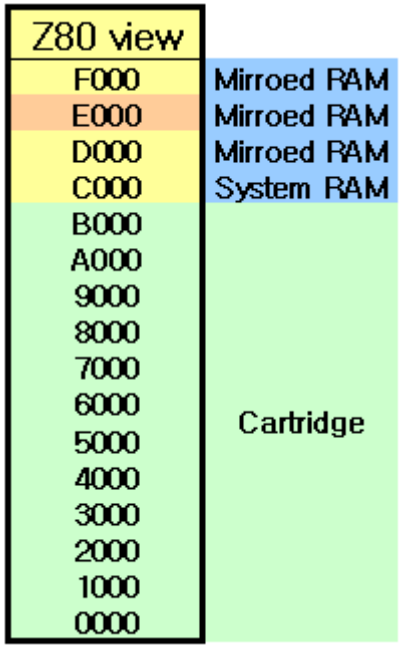
# Memory address of Z80 vs 6502

- VDP- 1000 is following the Softcard memory structure,
  Memory address are not the same Z80 with 6502.

| Z80 view | 6502 view | |
|---|---|---|
| F000 | 0000 | |
| E000 | C000 | I/O of APPLE II |
| D000 | F000 | |
| C000 | E000 | |
| B000 | D000 | |
| A000 | B000 | |
| 9000 | A000 | |
| 8000 | 9000 | |
| 7000 | 8000 | |
| 6000 | 7000 | |
| 5000 | 6000 | |
| 4000 | 5000 | |
| 3000 | 4000 | |
| 2000 | 3000 | |
| 1000 | 2000 | |
| 0000 | 1000 | |

# Memory map of the SG- 1000

All address is Z80 based
$0000- $bfff; Cartridge (ROM/RAM/etc)
$c000- $c3ff; System RAM
$c400- $ffff; System RAM (mirrored every 1KB)
$E000- $EFFF is overlapped on APPLE II I/O



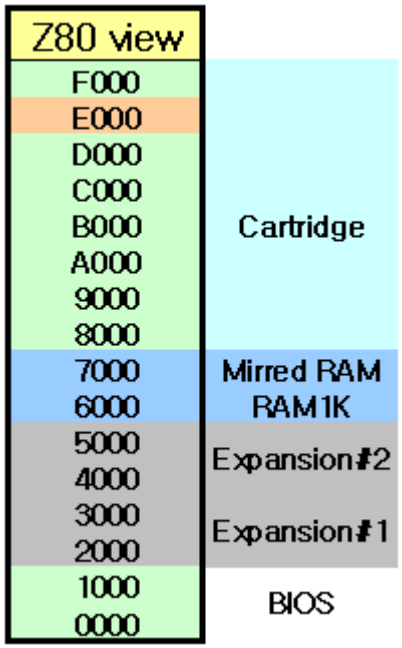

IO Ports
- - - - - - - -
0xDC / 0xC0 : Joypad Port 1 (read- only)
bit 0 : Joypad 1 Up
bit 1 : Joypad 1 Down
bit 2 : Joypad 1 Left
bit 3 : Joypad 1 Right
bit 4 : Joypad 1 Button 1
bit 5 : Joypad 1 Button 2
bit 6 : Joypad 2 Up
bit 7 : Joypad 2 Down
Low logic port. 0 = pressed, 1 = released

0xDD / 0xC1 : Joypad Port 2 (read- only)

0x7E : 0x7F : Programmable Sound Generator Output (write)
0xBE : VDP Data (read/write)
Use to read and write to VRAM (not VDP Registers).
0xBF : VDP Address (write)
0xBF : VDP Status Register (read)

# Memory map of the Colecovision

- All address is Z80 based
- $0000- $1FFF; BIOS ROM
- $2000- $5FFF; Expansion #1,#2
- $8000- $FFFF; Cartridge
- $E000- $EFFF is overlapped on APPLE II I/O




***IO:***
***(ABC lines of decoder go to /WR, A5, and A6 respectively /E1 - > /IO_request***
***/E2 - > Reset; E3 - > A7)***

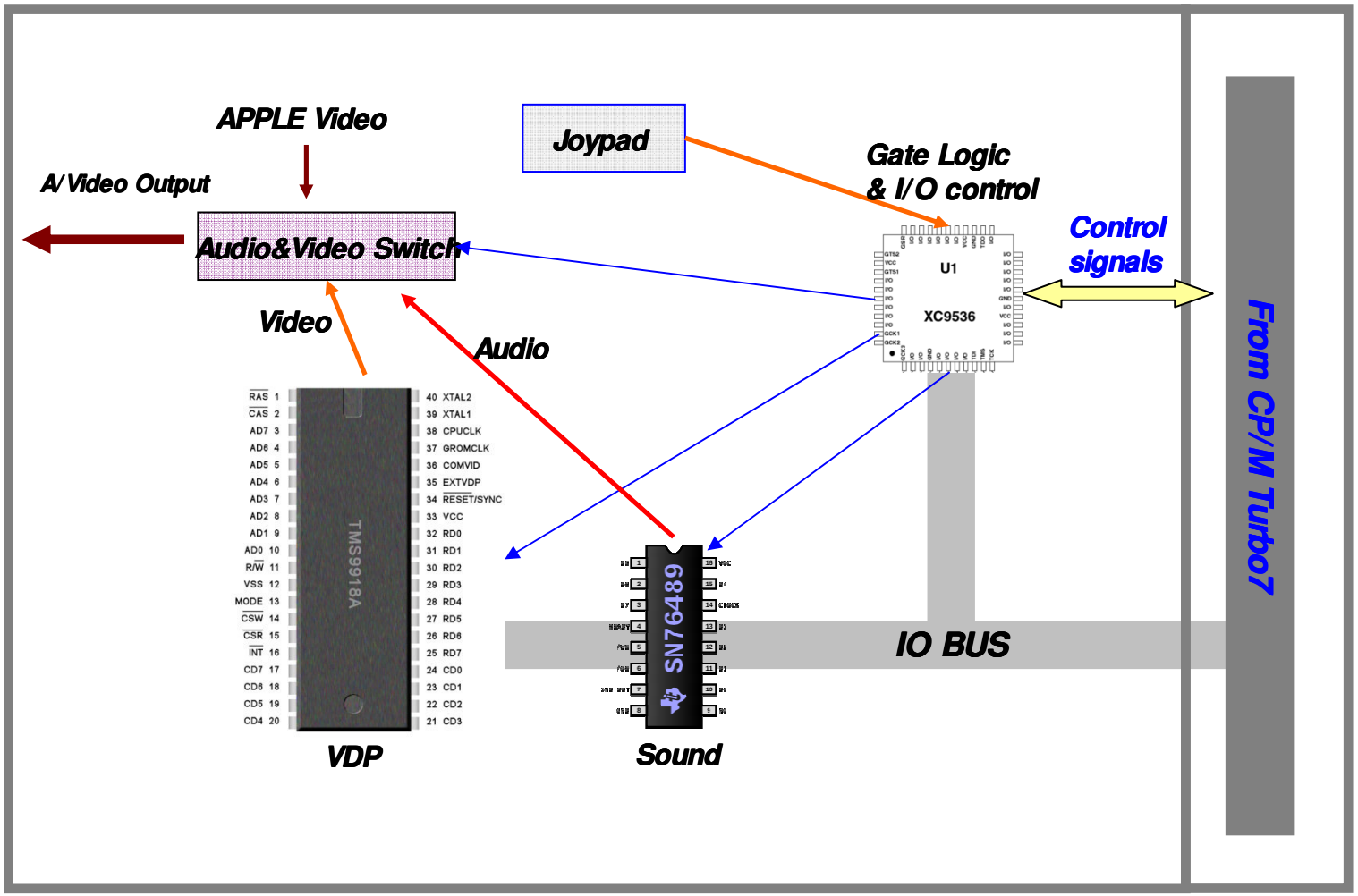
***80- 9F (W) = Controls _ Set to keypad mode***
***80- 9F (R) = Not Connected***

***A0- BF (W) = Video \ ___ A0 also decoded by video chip***
***A0- BF (R) = Video /***

***C0- DF (W) = Controls _ Set to joystick mode***
***C0- DF (R) = Not Connected***

***E0- FF (W) = Sound***
***E0- FF (R) = Controls _ A1 also decoded by chips (A1=0 ctrl 1; A1=1 ctrl 2)***

# Diagram of VDP- 1000plus board



# Video/audio switching and Joypad port

- VDP- 1000 plus will switch between APPLE II with TMS9918 video. If you have only one monitor you can use only VDP- 1000Plus video output for TSM9918 output and APPLE II, for this need to connect cable for APPLE II video. On the APPLE ][+ and //e, there is video output for modulator, VDP card is using this signal for APPLE II display.
- But, APPLE IIgs doesn't have modulator output, Hence, you can not connect, for this you have to make RCA connector to take the video signal.
- Audio switching also working internally, in fact, the SN76489 make a sound since power ON, I surprised at this annoying.. Anyway, I've used switching as video output. Now the sound will be switched when TMS9918 video started.
- VDP- 1000puls support one Joypad port and the 2nd Joypad ignored.
- Colecovision keypad is not supported.
- If you want to connect a handled joystick, please refer the the pin- out.

# How to switch Z80 <> 6502

- Maybe it is for programmer guide. If you want to control chips direct, please just refer this I simply described how to switch 65C02 to Z80.
- One of major reason to develop this card, It can be started by APPLE II also can stop.
- If it is in SLOT# 1, you can start Z80 as **`*C100:00`**(any) on monitor.
  Then it will start Z80 as powered ON and start to run ***$1000*** of APPLE II memory addres(&h0000 of Z80 is $1000 of APPLE II).
- If you want to switch for 6502 from Z80, Simply Press CTRL+RESET. Z80 will be stop and you can back to APPLE II '**]**' (If didn't break other memory area)
  (Hard reset back)
- So, you can put your program from the $1000 and you can run it then the control will hand over to the Z80 from 65C02 and if you Z80 want to hand over the control, Z80 also need to write to ***C100*** but, the address of Z80 isn't the same as ***$C100*** it must be ***&hE100.*** please refer Memory address of Z80 vs 6502.

- So, if you put any data into ***&hE100*** then Z80 will give the control to 65C02 then Z80 will wait until you give it back. when you back the control to Z80, Z80 will continue the next command of stop location.
  With this structure, you can make 65C02 program and Z80 program and can run when you want.

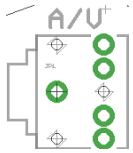
* VDP and Sound chip are controlled only by Z80 so you need to short Z80 routine to use VDP and sound chip.

# Something more fun idea..

- You can make some of fun game(APPLE II and SG1000/Coleco mixed mode) which could alternate on APPLE II 6502 and TMS9918 video by Z80.
- Also you could use APPLE II device from the (***&hExxx*** APPLE II I/O address) by Z80 even APPLE II keyboard, joystick even mockingboard also possible to be used.

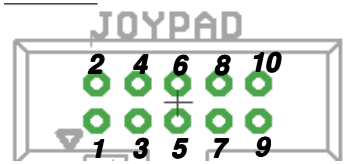
- You can use VDP- 1000plus under the CP/M 80, you can make some of game which also RUN under the CP/M 80 and using APPLE II keyboard and apple II joystick and joyport for competitor… even try to use APPLE II speaker. ☺ You just need fun idea.

# Pin- outs

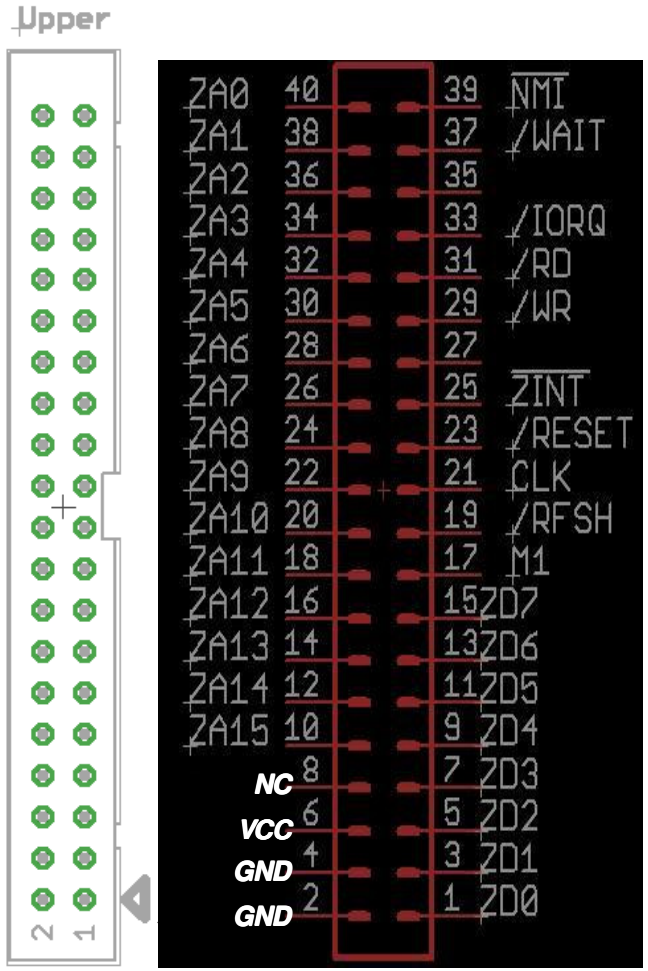



| |
|---|
| ***LEFT; Video ouput*** |
| ***RIGHT: Audio output*** |


| |
|---|
| ***1; GND*** |
| ***2; Video- IN*** |




| |
|---|
| ***1;UP*** |
| ***2; Down*** |
| ***3; Left*** |
| ***4; Right*** |
| ***5; VCC (+5V)*** |
| ***6; Button A*** |
| ***7; Button B*** |
| ***8; NC*** |
| ***9; GND*** |
| ***10;NC*** |

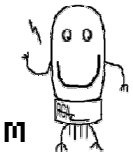


# Other information

- Thanks for purchasing this VDP- 1000plus board.
- 3 Months limited warranty(Shipping cost not covered)
- If disassemble, soldering or modify the board, it may expire the warranty.
- If you have any question or need help, please send email me. I will do my best to solve your issue.

You may find some of interesting stuffs on my web site
***http://www.apple2.net***

Thank you very much

Contact information; Ian Kim  (quick09@gmail.com)