

SD DISK][Emulator V2.44



Introduction

SD DISK][Emulator is a slot type virtual DISK Emulator for APPLE][,][+,][/e and IIGS. It emulates two FDD or two Hard Drives and unlimited working time disk replacement. It doesn't require any physical Floppy drive even diskette. It just requires an SD memory card with a proper disk image; then you can enjoy as if you have two Floppy Drives or Hard Disks. The SD DISK][Emulator has an external dial controller for image selection and other interesting function control. It also provides expert console mode by USB serial connection. And you can use a Bluetooth dongle board, so wireless connection is available with a smart phone or Bluetooth-equipped computer. Install it in your APPLE2 computer and enjoy your APPLE2 as your younger time.

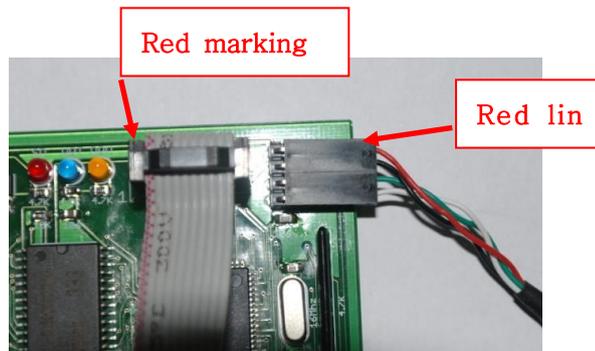
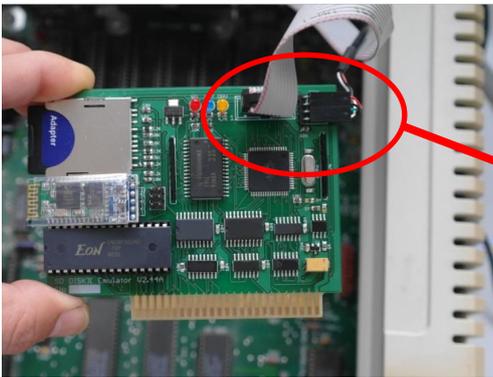
General Functions of the SD DISK[] Emulator

- It emulates two FDD.
- It emulates two HDD.
- Image support NIB,DSK for FDD and HDV,2MG for HDD mode.
(*PO image if that is for FDD, you can rename it to *.NIB then will work but some slower access due to sector order.
If PO image is for hard drive, you can rename it to *.HDV then will work on HDD mode)
800KB 3.5" diskette image need to rename to *.HDV then will work on HDD mode.
- Easy to handle image files by external dial controller.
- All disk images can be replaceable while APPLE2 ON time by terminal and dial.
- Up to 39 tracks accessible (FDD mode).
- Support half tracks (FDD mode).
- Total 512KB Read/Write-back cache integrated.(Each drive reserved to 256KB)

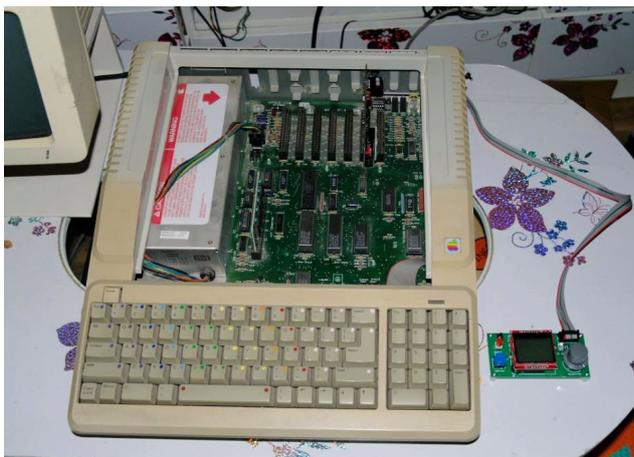
- You can control disk image by APPLE SOFT Basic with simple ASM routine.(On going project)
- Wireless terminal console by the Bluetooth dongle(Optional) and file transfer by XMODEM protocol.
- Easy firmware updates by user.
- Working on some of copy protected NIB images.

How to Start

- 1) Power OFF your APPLE2 and open the cover
- 2) Please connect all given cables on the SD DISK][Emulator(Make sure proper direction must not reversal)



- 3) Insert the SD DISK][Emulator board into the APPLE2 slot (Recommended slot#6) and arrange the cables and external dial controller for your conveniences.



- 4) Close APPLE2 cover and prepare PC or Smartphone for terminal screen.
 - A. In your PC, it needs to connect USB cable then it will install driver(Windows XP- Windows 7) and will make new one of COM# and need to configure terminal software with proper the number of COM#. (Speed; 115200bps Stop bit: 1 Data bit; 8 Parity; None and No flow control)
 - B. For Smartphone, you need terminal software such as the blueterm for android. After APPLE2 power ON, you can search Bluetooth connection as SD_DISK#n.
 - If you are using the Blueterm, You need set some configuration to accept Enter.



You need to configure the **Blueterm** application.

If you don't change the configuration, Blueterm APP can't send the "Enter" code even if you hit ENTER.

Please change On the **Blueterm -> Preferences -> Set to Replace by CR(0x0D) [x]**

5) Power ON the APPLE2 then

- A. You can see busy LED ON. If LED is ON or blinking, it means SD DISK][Emulator is running.
 - B. Maybe you can see booting program by booting image disk file.
 - C. You can see log and status on your terminal software or Smartphone if you connect Bluetooth terminal.
 - D. PC Terminal software needs to set COM# for proper connection.
 - E. Bluetooth connection needs to search connection and pairing(pin# 0000).
- 6) After configured terminal Software then press RESET button on external dial then you may have see some similar screen as under. (Bluetooth terminal and PC both are the same)

```
[>-----<]
[> SD DISK][ EMULATOR V2.46 <]
[>          by SDKim <]
[>-----<]
MODE: [FDD D053. 3]
-----
02 13-08-29 <DIR> CPM
03 13-09-03 <DIR> APPLE2
04 13-08-29 <DIR> TEST
05 13-08-29 <DIR> TREE1
06 13-08-26 <DIR> HDD
07 13-09-03 <DIR> BUSINESS
08 13-08-28 <DIR> BACKUP
09 13-08-15 <DIR> APPS
10 13-08-15 <DIR> GAME1
11 13-08-12 <DIR> GAME2
12 13-08-14 232960 #D0533.NIB
13 01-01-01 232960 NEWDISK2.NIB
-----
D1:
D2:
-----
1 ..
```

For help press '?' and enter key.

```
=====
HELP for terminal commands V2.590
=====
DIR[/W](=CAT) [*.*];Dir files(Default NIB/DSK/HDV/2MG)
HOME(=CLS); Clear to screen
CD(=PREFIX) [DIR];Change directory
RD [DIR];Remove directory
MD [DIR];Make directory
DEL(=DELETE) [filename.ext];Delete file
LOAD [filename.ext],[D1/D2];Load file
UNLOAD(=EJECT) [All/D1/D2];Unload Disk
MODE [FDD/HDD];Set mode for FDD/HDD
REN [oldfile.ext],[newfile.ext];Rename file
NEWDISK [filename.[DSK/NIB]];Make formatted image file
COPY [file#1.ext],[file#2.ext];Copy file
CONVDSK [filename1.dsk],[filename2.nib];Convert DSK to NIB
LOCK [filename.ext];Lock file
UNLOCK [filename.ext];Unlock file
STAT[=STATUS] ;Driver status
SAVE [D1/D2],[filename.ext];Buffer to file
RESET; Restart SD DISK][ Emulator
RAMTEST; Buffer ram test
BLUESET,[DEVName],[Pin#]; Bluetooth setup
ECHO [ON/OFF]; Terminal echo ON/OFF
FIRMWAREUP; Firmware Update with SDBIOS.ROM file
SETROTARY [0/1] Set rotary configuraion (CW/CCW)
RX(=UP) [filename.ext]; Xmodem128+CHK Receive file
TX(=DN) [filename.ext]; Xmodem128+CHK Send file
SETBAUD [115200/57600/38400/19200/9600]; Set BAUD
MENU [ON/OFF]; Boot menu ON/OFF
POWER ON+EXIT; LCD & Bluetooth baud rate recovery
POWER ON+EXIT+SELECT; Firmware updates with SDBIOS.ROM
도움; Korean help message
Thanks for purchasing the SD DISK][ Emulator
Need more Help? please mail to quick09@gmail.com
=====
```

7) Now, you are ready to use SD DISK][Emulator.

You can navigate between directories and can select your favorite old time game and others. ☺

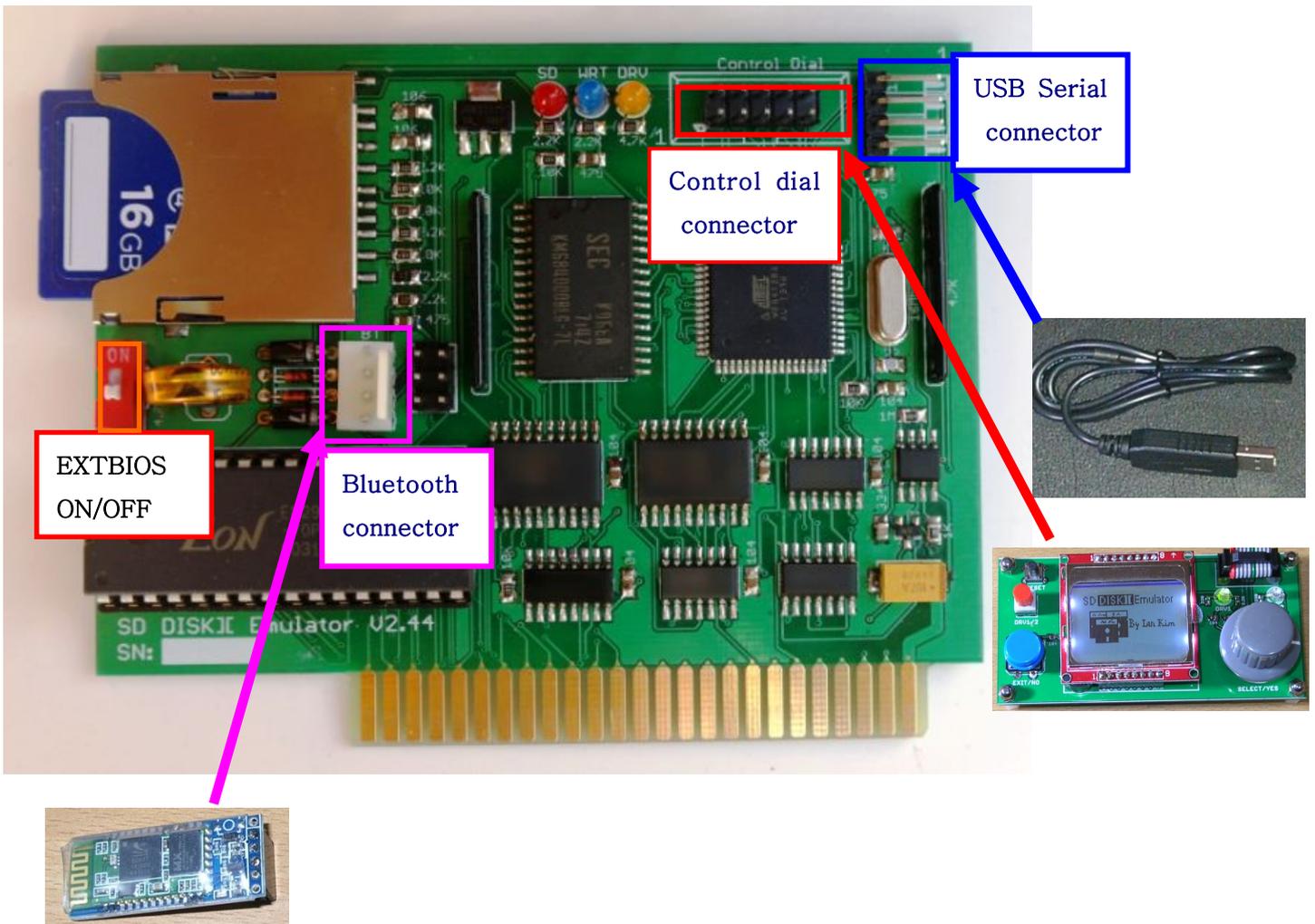
Refer the rest of manual to use external Dial, navigate directory and load file with the external dial controller or terminal commands.

You may need to learn(or remind) old knowledge about APPLE2 DOS commands. Please search on the internet for it. There are lots of and good books there ☺

The terminal commands are prepared for more fun to enjoy this SD DISK][Emulator, you can manage the SD memory card and can do much more than the external dial do. Have a time to enjoy commands what I've prepared for you. ☺

External connectors

SD Disk Emulator provides 2 types of external data connection. One is TTL Serial the other one is for Bluetooth dongle. Serial USB cable is used by terminal emulator on PC. And Bluetooth will allow wireless connection with your Smart phone with terminal software.



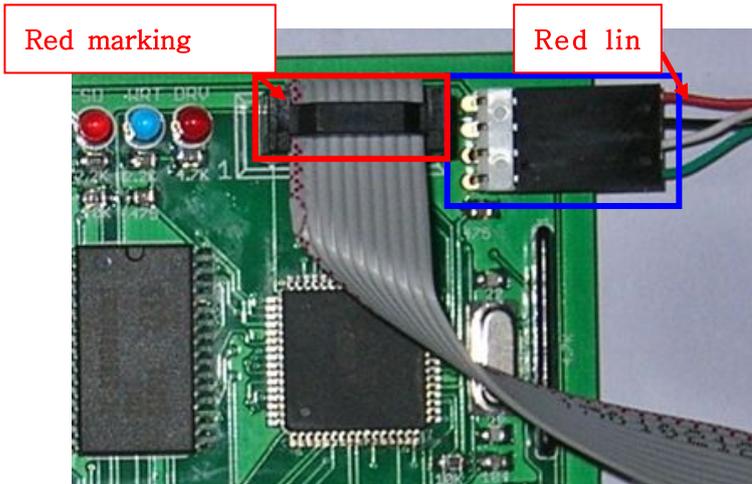
How to connect cables

Before to insert emulator in your APPLE2, you must connect cable properly.

Please refer the below and connect cable properly and prepare one PC or Bluetooth connection for display terminal for configure the board.

Cable connect

1. USB Serial cable must connect red wire to upward
2. Control Dial cable must connect red mark to left side.
3. Connect Bluetooth board(option)



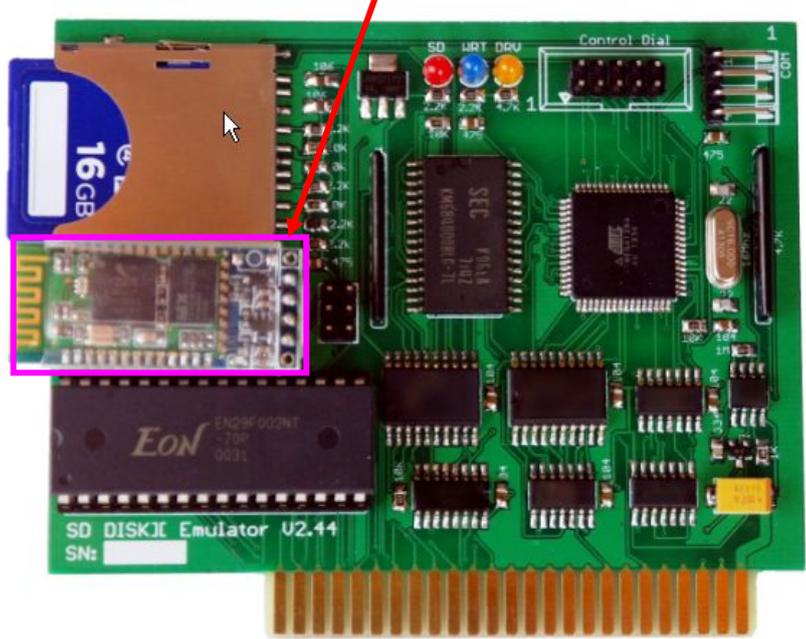
USB serial cable red wire must be up side



Control disk cable red marks must be left side

USB Serial cable required PC and terminal emulator software. You can this port for your own a nother type of cable as TTL to RS232 converter but signal much be correctly connected..

Bluetooth option board must be inserted properly must check all pins are properly connected!. if not, it may kill the Bluetooth option board.



USB serial dongle



- Connect 4pins connector to emulator
- Insert Emulator board into the APPLE]
- Plug it to USB port and Power **ON** your APPLE2
- It will start to install proper driver otherwise you need to install proper driver. You can find driver on <http://quick09.tistory.com/1189>
- Set proper COM#n and parameter on your terminal software.

Speed; 115200bps

Stop bit: 1

Data bit; 8

Parity; None

No flow control

Bluetooth option board for Smart phone

It is option dongle for bluetooth wireless connection.



Please install terminal software on your Smart phone.(ex [Blueterm](#))

And Set the [Blueterm](#) application as

[Preferences -> Set to Replace by CR\(0x0D\) \[x\]](#)

Terminal screen

```
[>-----<]
[> SD DISKII EMULATOR V2.46 <]
[>                by SDKim <]
[>-----<]
MODE: [FDD DOS3.3]
```

Mode: it shows present emulation mode ;

```
02 13-08-29 <DIR> CPM
03 13-09-03 <DIR> APPLE2
04 13-08-29 <DIR> TEST
05 13-08-29 <DIR> TREE1
06 13-08-26 <DIR> HDD
07 13-09-03 <DIR> BUSINESS
08 13-08-28 <DIR> BACKUP
09 13-08-15 <DIR> APPS
10 13-08-15 <DIR> GAME1
11 13-08-12 <DIR> GAME2
12 13-08-14 232960 *DOS33.NIB
13 01-01-01 232960 NEWDISK2.NIB
```

FDD DOS3.3 and HDD mode

Reference file Number, Data, Size and File/DIR

```
D1:
D2:
```

D1: Drive A loaded image file name

D2: Drive B loaded image file name

```
-----
1 ..
```

You can key in commands

If you want help , '?' and enter key

For user conveniences, I added lots of commands and similar with APPLE2 commands such as CAT, PREFIX etc..

External Dial Controller



Old type



New type

There are three buttons and one dial.

it assigned as **Exit**, **Reset** and **DRV1/2** selection.

You can control SD DISKII Emulator with those buttons and dial combinations.

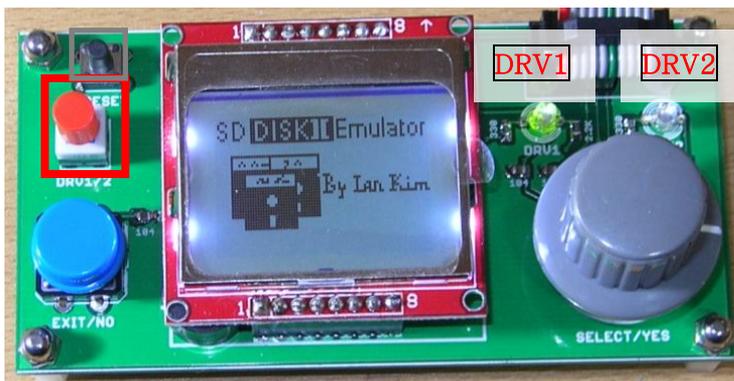
You can use it for below functions,

1. Select(load) image files
2. Navigate directories
3. DRV1/DRV2 drive select
4. Create blank FDD image
5. Select Emulation mode (FDD and HDD)

[How to change LCD Contrast](#)

Push **EXIT/NO** (keep press) and turn **Dial** and then LCD screen will be changed contrast when it done, simply release the **Exit/No**.

It may interfere function so please do it when SD DISKII is not busy.



- DRV Green LED indicates the location of DRV1/2 push switch.
- If Drive is Busy, RED light also will ON the location.

(Reset); Reset the SD DISKII Emulator

Exit/ No; Assigned answer such as 'No' and directory 'Exit'.

DRV1/2; Select image for DRV1 or DRV2, you need to check before to push the confirm dial button to put Drive1 or Drive2. LED will show where is Switch position.

SELECT/YES; Select file, Pushing dial is mostly assigned a positive answer such as 'Yes' or 'Confirmed'.

LCD; It will display serial data of SD DISKII Emulator(21col x 6row text).

LCD terminal is serial terminal and it can be changed the baud rates by SETBAUD command, please refer the terminal command for more details.

Speaker; It will generate some sound when activate drive. The sound volume can be changed by 'AT+SVOLn'(n is number 1-9) command on the terminal.

Select image file

SD DISK[] Emulator support easy file selection. One is using this Dial board other way is using terminal commands.

For easy navigation between directories and select a file for load, you need to refer this.

Select a image file and Shoot(Press Select) it. This is the concept of using way.

See below how to select image file for loading.



When you spin rotary dial then you can see present directory or image file name on the LCD and terminal screen.



To select the file or directory just push button. SD Emulator will go into the directory or load the image file.

***Tip;** if selected a file root directory file plus 1 level lower, It will be next time power on booting disk. This function works with root directory and next level of files only. To activate it, SD memory card must have any **Label** name.

Navigate directories

When it located on directory then push the dial button it will go into the directory.

For example, pushed here t **2 \CPM** hen will see files of the CPM directory.

(Directory name shows ' \ ' prefix)

```
[>-----<]
[> SD DISK] EMULATOR V2.46 <]
[>                by SDKim <]
[>-----<]
MODE: [FDD DOS3.3]
-----
02 13-08-29 <DIR> CPM
03 13-09-03 <DIR> APPLE2
04 13-08-29 <DIR> TEST
05 13-08-29 <DIR> TREE1
06 13-08-26 <DIR> HDD
07 13-09-03 <DIR> BUSINESS
08 13-08-28 <DIR> BACKUP
09 13-08-15 <DIR> APPS
10 13-08-15 <DIR> GAME1
11 13-08-12 <DIR> GAME2
12 13-08-14 232960 *DOS33.NIB
13 01-01-01 232960 NEWDISK2.NIB
-----
D1:
D2:
-----
2 \CPM
```

```
02 13-08-28 232960 CPAM51A.NIB
03 13-08-28 232960 CPAM51B.NIB
04 11-09-03 232960 CPM60K.NIB
-----
D1:
D2:
-----
1 ..
```

To exit the present directory(to parent directory), simply push **Exit/Cancel** or push dial button on **1 ..**



Every push **Exit/Cancel** button, will move to upper level.

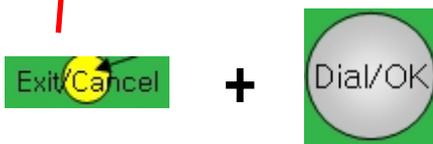
Create a Blank image (FDD mode only)

It may useful when you need to copy from physical disk.

It will create a blank image disk of DOS3.3 formatted structure. If you use terminal command, you can also make DSK image or NIB type. After create it, you need to load to use.



To create blank image, first, Push Dial (OK) then second, Push EXIT button together.
(Push order is important)



Then you can see as this

```
New DISK#  
NEWDISK22.NIB
```

Then turn the dial to select file number. You can make max 99 free disks.

Press dial for YES, Exit button for No

* Refer the NEWDISK command

Emulation mode change between HDD <-> FDD mode.

SD DISK][Emulator can emulate FDD DISK][and HDD.

Unfortunately it doesn't emulate at the same time,

The mode will be keep before to change again.

After change the mode you need to reboot with PR#n command on the APPLE2 or power off and on.

*Reference

HDD only work under the PRODOS8 and Maximum capacity is 32MB. And you may need 65C02 processor for higher version of PRODOS8.



For this plea long push **Exit/No** button then If will ask for another emulation mode.

HDD mode(Y/N)? or **FDD mode(Y/N)?**

Push dial is 'YES' exit button is 'No'

* Refer the **MODE** command

Terminal commands

```
=====
HELP for terminal commands V2.590
=====
DIR[/W](=CAT) [*.*];Dir files(Default NIB/DSK/HDV/2MG)
HOME(=CLS); Clear to screen
CD(=PREFIX) [DIR];Change directory
RD [DIR];Remove directory
MD [DIR];Make directory
DEL(=DELETE) [filename.ext];Delete file
LOAD [filename.ext],[D1/D2];Load file
UNLOAD(=EJECT) [All/D1/D2];Unload Disk
MODE [FDD/HDD];Set mode for FDD/HDD
REN [oldfile.ext],[newfile.ext];Rename file
NEWDISK [filename],[DSK/NIB];Make formatted image file
COPY [file#1.ext],[file#2.ext];Copy file
CONVDSK [filename1.dsk],[filename2.nib];Convert DSK to NIB
LOCK [filename.ext];Lock file
UNLOCK [filename.ext];Unlock file
STAT(=STATUS) ;Driver status
SAVE [D1/D2],[filename.ext];Buffer to file
RESET; Restart SD DISK[ Emulator
RAMTEST; Buffer ram test
BLUESET,[DEVName],[Pin#]; Bluetooth setup
ECHO [ON/OFF]; Terminal echo ON/OFF
FIRMWAREUP; Firmware Update with SDBIOS.ROM file
SETROTARY [0/1] Set rotary configuraion (CW/CCW)
RX(=UP) [filename.ext]; Xmodem128+CHK Receive file
TX(=DN) [filename.ext]; Xmodem128+CHK Send file
SETBAUD [115200/57600/38400/19200/9600]; Set BAUD
MENU [ON/OFF]; Boot menu ON/OFF
POWER ON+EXIT; LCD & Bluetooth baud rate recovery
POWER ON+EXIT+SELECT; Firmware updates with SDBIOS.ROM
도움; Korean help message
Thanks for purchasing the SD DISK[ Emulator
Need more Help? please mail to quick09@gmail.com
=====
```

As followed version, Terminal commands will be added for user conveniences.

Please Enter for simple command help.

Firmware Version is depends on your firmware built time

If key in '도움' then can see Korean help message

```
도움
-----
터미널 명령어 도움말

DIR(=CAT) [*.*];화일및 디렉토리 표시(기본NIB/HDV) 합니다
;기본적으로 예물 모드에 따라 NIB나 HDV만 나옵니다
;모든화일을 보시려면 DIR *.* 하시면 됩니다
HOME(=CLS);화면 지우기 (Terminal모드가 VT100이어야 됩니다)
CD(=PREFIX) [DIR];디렉토리 들어가기
RD [DIR];디렉토리 삭제(화일이없어야 동작)
MD [DIR];디렉토리 생성
DEL(=DELETE) [filename.ext];화일 삭제
LOAD [filename.ext],[D1/D2];화일을 디스크에 넣기,
;HDD 모드에서는 넣지 않고 지정만 합니다
UNLOAD(=EJECT) [All/D1/D2];화일을 디스크에서 빼기
;HDD모드는 저장을 해제합니다
MODE [FDD/HDD];하드디스크나 플로피 디스크 모드로 설정
REN [oldfile.ext],[newfile.ext];화일 이름 바꾸기
NEWDISK [filename.ext];신규 이미지화일(공디스켓) 만들기,포맷 필요함
COPY [file#1.ext],[file#2.ext];화일 복사하기,LOAD후 SAVE 하는것을 추천
LOCK [filename.ext];화일 Read Only로 설정, 이미지 화일은 변경되지 않습니다
;단,하드 디스크에서는 효과가 없습니다
UNLOCK [filename.ext];화일 Read Only 해제, 이미지 화일이 변경될수 있도록 합니다
STAT(=STATUS) ;드라이브 상태 보기
SAVE [D1/D2],[filename.ext];버퍼를 화일로 저장하기(FDD모드에서만 유용)
RESET; SD DISK[ Emulator를 재시작
RAMTEST; 내부 버퍼 메모리 시험
BLUESET [DEVName],[Pin#]; 블루투스 설정; [장치명],[블루투스페어링용 암호]
ECHO [ON/OFF]; Terminal에 입력시 Echo ON/OFF 설정

SD DISK[ Emulator를 구입하여 주셔서 감사합니다.
도움이 더 필요하세요? Email은 quick09@gmail.com
=====
```

Terminal commands ;

(Please update to latest firmware version, Some of additional commands may added)

DIR(=CAT); Show present directory and files and but usable mode files only such as *.NIB or DSK and directory names. It also accept limited '*' for file selection.

HOME(=CLS); Clear screen. your terminal should emulate VT100 to do it.

CD(=PREFIX); Change directory. **CD..** is upper directory.

RD; Remove directory, should not have any file in the directory.

MD; Make directory

DEL(=DELETE); Delete file. Need full file name include file extension.

LOAD; Load image file. Need full file name include file extension default drive is D1 if you want Drive 2, add D2

UNLOAD(=EJECT); unload image and clear the file buffer,

MODE; change emulation mode ex) MODE FDD

REN; Rename file name (Need full file name)

NEWDISK; Create new image, it will create a NIB or DSK formatted image.

COPY; Copy a image NIB file but slow. Load and save command is recommended to do same function.

CONVDSK; Convert DSK file to NIB format and but use 2nd DISK buffer so, 2 drive will lost

LOCK; Lock the image file it will make image file Read only. It stop to be updated from that time. Hard disk image must not lock.

UNLCOK; Unlock image file. make image file to be updated.

STAT(=STATUS); Show SD DISK[status.

SAVE; Save buffer memory to file. You can save many time buffers to disk image.

RESET; Reset SD DISK[Emulator. It acts same as pressing reset button on dial controller.

RAMTEST; Testing buffer RAM.

BLUESET; Configure Bluetooth dongle. You can change Bluetooth name and pairing password.

You should be careful to use this command. Apple II must be idle status to perform properly. And serial speed will go to 115200bps.

RX(=UP); You can send a file to SD DISK[Emulator(XMOEM128 checksum protocol)

TX(=DN); You can receive a file to your PC (XMODEM128 Checksum protocol)

115200baud rates may have difficulty to Send a file, I recommended to reduce speed to 57200bps, to change speed, Please refer SETBAUD command.

ECHO; Command echo on/off for Terminal.

SETBAUD; You can change serial port speed, to do it, you have to little care, Bluetooth connection should be disconnected condition and should be blinking LED condition.

MENU; You can ON/OFF the Power-ON Boot menu. If ON, you can see File selection menu on the APPLE II.

*Some command may change or added as followed firmware version.

File Transfer

If you need to get a file or want to send a file, you have to open your APPLE II and take the SD memory card and then can copy on your PC.

But, It could make bother you if you Just need a few files for copying.

Hence, I prepared very useful commands, You can get a file or copy file on the terminal.

SD DISK][Emulator support XMODEM file transfer protocol, XMODEM is old time protocol, Who may know it these days? Anyway, With the commands, you can get a file or copy a file of the SD memory card without open the APPLE II case.

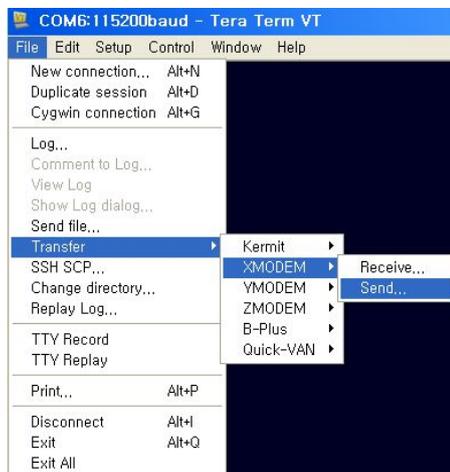
of course you need terminal connection with dongle.

RX; Receive a file to Emulator

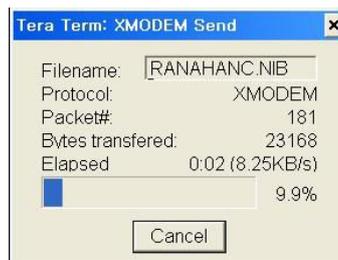
```
dir
-----
Volume ID SD_TEST
01 #
02 15-09-04 <DIR> DCIM
03 14-04-12 259584 *CPS.NIB
04 14-11-19 259584 *FDDTST.NIB
05 14-02-19 232960 TETRIS.NIB
-----
D1: *FDDTST.NIB
D2:
rx test.nib
```

SD Memory card will receive a file and save as 'test.nib' on the SD memory card. (Be careful, It doesn't use your sending file name)

On the Teraterm, go to 'XMODEM Send..'



Select a file to send.
Then will start Send



```
dir
-----
Volume ID SD_TEST
01 #
02 15-09-04 <DIR> DCIM
03 14-04-12 259584 *CPS.NIB
04 14-11-19 259584 *FDDTST.NIB
05 14-02-19 232960 TETRIS.NIB
06 14-11-19 232960 TEST.NIB
-----
D1: *FDDTST.NIB
D2:
```

After completed, You can see the new file.
(Anyway date isn't true)

TX; Send a file to PC

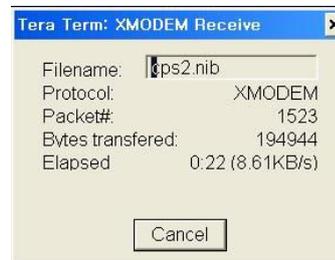
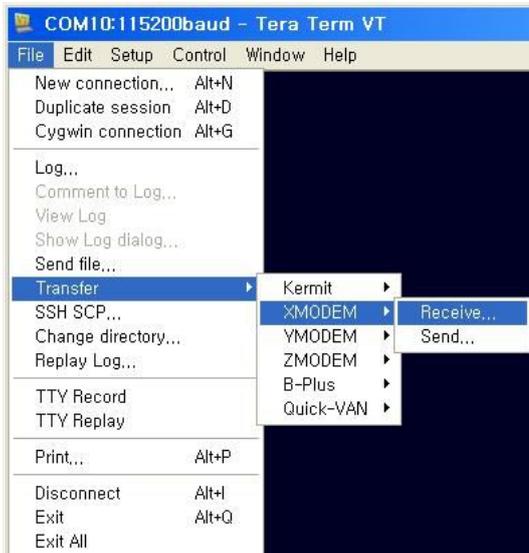
```
dir
-----
Volume ID SD_TEST
01 #
02 15-09-04 <DIR> DCIM
03 14-04-12 259584 *CPS.NIB
04 14-11-19 259584 *FDDTST.NIB
05 14-02-19 232960 TETRIS.NIB
06 14-11-19 232960 TEST.NIB
-----
D1:*FDDTST.NIB
D2:
tx cps.nib
Starting Xmodem128-Chksum
Sending file:CPS.NIB
Ctrl-D;Abort
```

If you want send a file to your PC.

You can enter the TX command. On the example, you will receive **cps.nib** file to your PC

'tx cps.nib' it means that you will send 'cps.nib' file to your PC.

On the Teraterm, go to 'XMODEM Receive..'



Make your own name of file. then it will start to send data.

```
dir
-----
Volume ID SD_TEST
01 #
02 15-09-04 <DIR> DCIM
03 14-04-12 259584 *CPS.NIB
04 14-11-19 259584 *FDDTST.NIB
05 14-02-19 232960 TETRIS.NIB
06 14-11-19 232960 TEST.NIB
-----
D1:*FDDTST.NIB
D2:
tx cps.nib
Starting Xmodem128-Chksum
Sending file:CPS.NIB
Ctrl-D;Abort
End of TX
```

When it finished, you can see 'End of TX'

Simple?.. You may feel the old time era with a modem.

Status message example on FDD mode

+D2 TR#02 B Ready  ; Moving head, D# driver number, TR# track number.

***D2 TR#04**  ; Virtual writing on D2(Buffer only not loaded disk image)

>>D2 TR#08  Updating buffer to Disk Image file.

√D2: NonameD2.nib  Done update.

Status message example on HDD mode

Drive number, Read Block#.

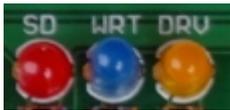
D1 R#0001

LED on SD DISK][Emulator board

RED; Access on SD memory card; must not remove SD Card while this LED on
 SD Memory card may damaged or lost data if removed while ON this LED.

Blue; DISK Writing

ORANGE; Drive Activated



How to update firmware

SD DISK][Emulator can be updated by SDBIOS.ROM file.

When I added new function or need to patch some function, I distribute newer firmware version. But, If you don't have inconveniences, you can skip some of firmware version. However updating firmware job need to care to be done properly. Read this warning before you do it.

WARNING

Your APPLE2 must **not lose** electric power while the firmware updating.

If this happens, the SD Disk][may fail to restart, or you won't be able to update firmware anymore.

In this case, please return the board to me for re-programming. (Free of charge to fix this issue but shipping costs it not included)

If you are ready to upgrade, please read first and follow it carefully

1) Power **OFF** the APPLE2 and open the cover.

2) Remove the SD Memory card only, leaving the Disk][board in the computer. (Present working SD Memory card should work fine)

3) Copy proper version of firmware file(some version may not work)on your board.

Copy SDBIOS.ROM to ROOT directory on your SD Memory card.

4) Re-insert this SD memory card to SD DISK][Emulator board.

5) Push **Dial** button (**YES**) + **Exit** button simultaneously, then power **ON** the APPLE][.

6) Then you may see as '**system check.....**'(if set 115200baud) on the terminal screen and LCD.

6) A while later, SD DISK][Emulator will start.

7) Please Power OFF and Power ON your APPLE2 again and check if the version is properly renewed.

8) Done. You can use it with new version of firmware.

If you have any difficulties or issues, please email quick09@gmail.com

Thank you.

Recovery serial connection (LCD and Bluetooth)

If LCD screen show strange letters, Please try to recover the serial connection.
(It also recover Bluetooth serial dongle too)

To perform it.

Press [Reset on dial + Exit button](#) together then release both.

SD DISK][emulator will start to recover the serial connection,

You can hear some of beep sound while recovering.

After finished it. It will change to 115200 bps.

If you can't recover it, Please try again.

If you have problem, please contact me by email. I can help you.

Recent updates

Power ON boot menu for image file

From firmware version 2.59M, it starts to support 'Power ON Boot menu'.

You can select image file on the APPLE II screen. It is very simple one.

After POWER ON your APPLE II, Simple menu will appear.



You can select a file for start. It can be a FDD file or HDD file.

It will load only D1 for booting.

For example, **13** is DOS33SP.NIB file, if you key in the number(HEX type),

SD Emulator will load the file into Drive-A for booting.

If HDD file selected, It will boot with HDD Mode.

It doesn't support scroll back yet. (I'm working on it)

Commands

Number(HEX) ; for file select . it will accept(00 to FF).

If the selection is directory, It will act as Change directory and show files.

0 ; is go to upper directory.

ESC ;Exit this menu and start as the same as no menu configuration.

If you press **EXIT** button on LCD&Dial controller, SD DISK][Emulator will also stop this menu.

* This menu will start only once when APPLE II **POWER ON**. If you want again. Press Reset on the Dial board.

* You can OFF/ON this function by **MENU command** on terminal

Some of Major Prodos commands

CATALOG or CAT; Show Directory and files.

LOAD {file name}; Load BASIC program.

BLOAD {file name}; Load Binary file

PREFIX {Directory} ; Change directory

RUN {file name}; Run BASIC program file

BRUN {file name}; Run Binary file

Prodos references

You can find it on the asimov site.

I just put a link for prodos users's manual.

ftp://ftp.apple.asimov.net/pub/apple_II/documentation/misc/Apple%20II%20Prodos%20User's%20Manual.pdf

You can search a lots of PRODOS related references, please google for more information.

Tips and others

- SD DISK][Emulator tested on APPLE][, APPLE][Plus, APPLE][e and APPLE][GS other APPLE2 system are not tested and not guaranty working.
- SD DISK][Emulator support Read/Write and format on the FDD image but, if format DISK image, it may not (not always) usable on APPLE2 emulator software. If you want to sur e to run on APPLE2 software emulator, you should use copied NIB file from Software e mulator. This issue is due to the differences between actual DISK format with virtual form at. SD DISK][Emulator will create true DISK Images.
- DSK extension image file is not write support. In fact, SD DISK][Emulator internally conv erts DSK to NIB data format and doesn't update back to DSK image file. So, if you want to have updated image file, you need to use NIB image file. To convert you can use the cider press Anyway, there is a command as CONVDISK. Anyway, if you save buffer to im age file, it will save NIB format.
- Read Only(**LOCK**ed) image file can be write even works DISK **format**, but it doesn't updat e to actual image file. It it working on the buffer only. So, you can use some special pur pose such as saving at that time present game or for crack or testing. But, Be careful, it doesn't work on HDD image. Hard disk image should **not** locked always must writable.
- When you use **lock** command on loaded image file, from that time, SD DISK][Emulator s top to update and ignore any changes. It only works only buffer side. When you set **unlo ck**, from that time SD DISK][Emulator can write the image file so you can have updated image file. You can lock your disk file at any time.
- To transfer from Actual **DISKETTE** to **SD memory** card, Simply use the **COPY II PLUS** to copy actual DISK to SD DISK][Emulator then You can have copied image file. Vice versa you can copy image file to actual disk. No more need to use serial transferring with tim e consume.
- Please don't try use control dial while the emulator **BUSY LED ON**, You may have data e rror. DISK emulation is timing sensitive.
- SD DISK][Emulator support hot swap SD memory card. So you can change SD Memory card. After replace to another SD memory card, just press reset button once or run reset command. This hot-swap should do when SD DISK][Emulator is not busy.
- SD DISK][Emulator has **512KB** R/W cache, Due to cache function, it needs some of seco nds to complete the **write** operation, So, don't off immediately APPLE2 when it just finish ed write operation. In general, it required some seconds not more than 10 seconds to be completed image file. just wait until the **BUSY LED OFF** then 3 seconds later you can po wer OFF. If not, you may lose your written data. Especially critical on **HDD** image.
- SD DISK][Emulator support virtual FDD **blank writing**, even if you don't load any DISK i mage on drive even though It acts as you inserted one of bulk disk. If you write some l ocation you can have new named file. disk name will named as NODSK1?.NIB(if Drive1) o r NODSK2?.NIB(if Drive2). if you know the APPLE2 DISK structure, you can use this trac k saved data file.
- SD DISK][Emulator recommended to insert into the slot #6. other slot also work but, m

any of softwares looking for disk on the **Slot#6**.

- SD DISK][Emulator using **8.3 short file name**. long file name will shows ~ postfix.
- Please make **label name** on SD Memory card. SD DISK][Using to detect root directory and power on booting will work properly.
- New **Firmware** will be announced at <http://Quick09.tistory.com> please check SD DISK][emulator category.
- SD DISK][Emulator not supported all type of copy protected images.
- Recommended and tested COPY programs are
 - Copy II Plus 5.1; RW Format OK
 - Copy II Plus 6.0; RW Format OK
 - Copy II Plus 7.4; RW Format OK
- SD Memory lock switch is ignored so, SD memory card is always writable.
- While running HDD emulation, Your DRV1 and DRV2 image files should be in same directory.
- Bluetooth option board work with a Super capacitor, it charged when APPLE II on and provides short period of electric power to keep on Bluetooth connect. So, even if power off your APPLE2, the Bluetooth connection will keep for several seconds.
- if you are experiencing some **error** on **Bluetooth** connection, please **power off** APPLE2 wait **more than 1 min** to be completed discharge on super capacitor then It will help to cold restart the Bluetooth module.

Error messages

SD DISK][Emulator may show some error or warning while you are using.

SD Memory card related error

SD media detection error; [ERR#233](#)

Some memory card may not work with SD DISK][Emulator. not all memory cards tested.

Try to use another memory card or try to format the memory card on your PC.

Error while on RAMTEST

Buffer ram error ; [ERR counted #](#)

While you testing RAMTEST. If error counted as above, internal memory may get fault.

You have to try it again. This RAMTEST command must run when SD Emulator and APPLE2 are not busy. All indicators LED must be off status.

Other error of PRODOS HDD mode

Command [SPIN](#) error

PRODOS protocol error. You need to change another HDD image file.

If continue the error, please try cleaning of the golden edge connector. Use a cotton bud and apply some of alcohol and clean it. Then insert in the APPLE2 slot.

[Any Other malfunctions](#)

No error message showing but still doing strange behavior? If you experiencing this error, It may have some error on the board anyway you can press to reset button to restart SD DISK] [Emulator and test RAM.

If you still have some error or difficulties, please send email quick09@gmail.com I will help you.

Software control mode

Software control modes are not perfect and on going functions.
SD DISK][Emulator support change disk by software there are two modes exist.
And DOS3.3 and PRODOS mode have each different way.
I will make better way for it. Anyway please just refer it.

Advanced `direct` command mode and complex `text` command mode.
Direct mode is simple to use but have simple function.

Text command mode is not completed. I will announce when I ready to show.
I just tested LOAD, UNLOAD, CD commands.

Under sample code is simple Direct mode. And can order to put a image file to Drive2 with the file number(SD DISK][emulator reference file number)

Entering Direct mode. (SD DISK][Emulator board should be in slot #7)

--Entering code

```
0302- AD F0 C0 LDA $C0F0; slot #7
0305- AD F3 C0 LDA $C0F3
0308- AD F4 C0 LDA $C0F4
030B- AD F7 C0 LDA $C0F7
030E- 48 PHA
030F- 68 PLA
0310- 48 PHA
0311- 68 PLA
0312- AD F1 C0 LDA $C0F1
0315- AD F2 C0 LDA $C0F2
0318- AD F5 C0 LDA $C0F5
031B- AD F7 C0 LDA $C0F7
031E- 60 RTS
```

Change disk function by Basic

It will load the image disk#(9~32) on drive2 9 to #32 and performing catalog.

--Basic sample

```
5 FOR I = 9 TO 32
6 PRINT "FILE NUMBER#"; I
7 A = PEEK (49402)
10 CALL 770; request direct mode
20 A = PEEK (49400)
50 A = PEEK (49404)
55 A = PEEK (49405); Get Emulator status
```

```

60 IF A < > 81 THEN 55 ; Ready?
90 A = PEEK (49405); Get Emulator status
95 IF A < > 81 THEN 90 ; Ready?
100 POKE 49405,68 ; DISK Change
110 A = PEEK (49404); ACK
120 POKE 49405,1 ; put disk#
130 A = PEEK (49404) ; ACK
140 POKE 49405,2 ; disk#
150 A = PEEK (49404) ; ACK
160 POKE 49405,13 ; END code
170 A = PEEK (49404) ; ACK
180 A = PEEK (49400) ;
200 A = PEEK (49405) ; Get Emulator status
210 IF A = 81 THEN 400; Ready?
220 GOTO 200; wait.
400 POKE 49405,78 ; End Direct command
410 A = PEEK (49404); ACK
420 POKE 49405,8 ; dummy
430 A = PEEK (49404) ; ACK
440 POKE 49405,1 ; dummy
450 A = PEEK (49404) ; ACK
460 POKE 49405,13 ; end of command
470 A = PEEK (49404) ; ACK
480 A = PEEK (49400) ; Get Emulator status
490 IF A > 127 THEN 500 ; ready?
500 A = PEEK (49405) ; ACK
520 A = PEEK (49392) ; clear flag
530 A = PEEK (49394) ; clear flag
540 A = PEEK (49396) ; clear flag
550 A = PEEK (49398) ; clear flag
600 PRINT CHR$ (4);"CATALOG,D2"
605 A = PEEK (49402) ; clear flag
620 NEXT I

```

It may be a useful or interesting way to control the SD DISK][Emulator by APPLE2.

Reading control dial

APPLE2 can read the status of SELECT button and dial signal.

Those combinations could be used to select menu on your program or other way on your own idea.

IO port address

C0n8

C0F8; Slot#7

C0E8; Slot#6

C0D8; Slot#5

....

Data bits

READY	SEL button	Dial_A	Dial_B	NONE
D7	D6	D5	D4	D3/D2/D1/D0

D7; SD DISK[] Emulator Ready flag(0;Busy 1;Ready)

D6; SELECT button status

D5,D4; if you turn the Dial, D5,D4 show gray code. You need decoding to know the spinning.

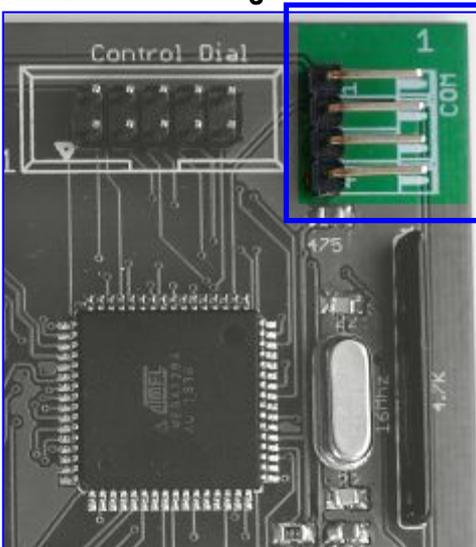
Hardware information



SD DISKII Emulator

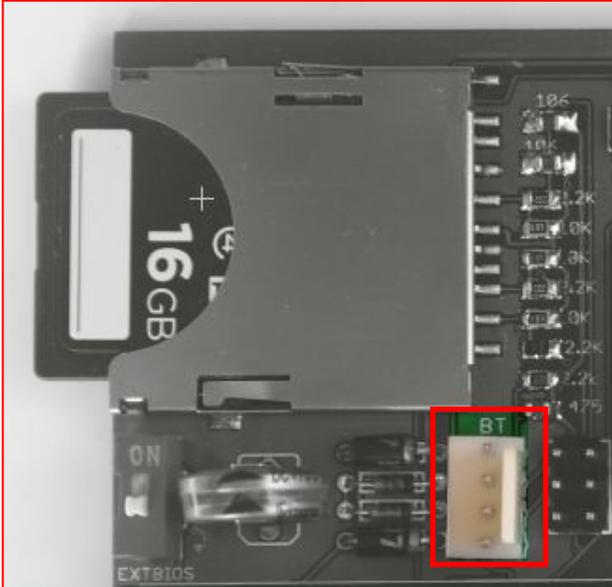
MPU	Atmega128-16Mhz and Atmega8A for LCD
SRAM cache	684000-70ns 4Mbits(512KBytes)
SD Memory	SD/SDHC support, Max 32GB, FAT16/32 only

USB Serial dongle connector



4.3V; 100mA
GND
TX
RX
5V UART Signal

Connector for Bluetooth dongle



4.3V; 100mA

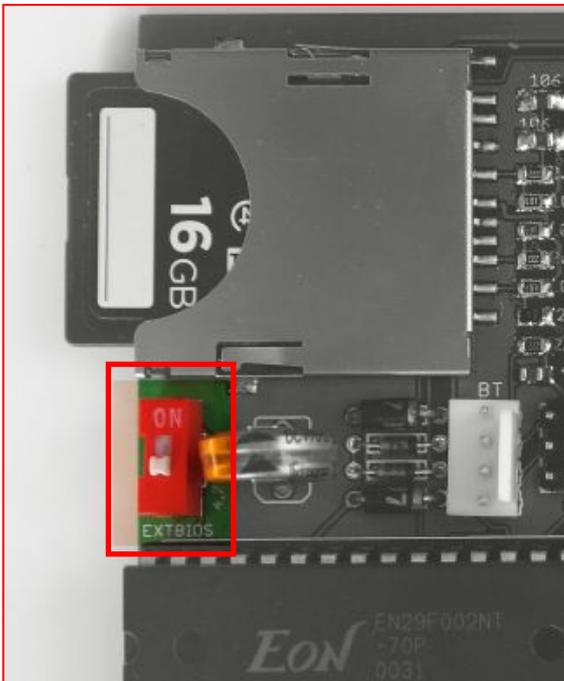
GND

TX

RX

5V UART Signal

SW for EXTrA BIOS selection



Normal

OFF (DOWN)

If you ON this switch, some area of ROM will re-map to \$C800~\$CFFF

If you have other card installed which may occupied this memory area, you should not ON this switch. Otherwise another card may not work properly.

ROM Address Map

Address	Data type
\$0~\$07FF	Prodos boot codes (Each 256bytes are repeats)
\$0800~\$0FFF	EXTBIOS (Will sit on APPLE address \$C800~\$CFFF)
\$1000~\$18FF	DOS33 mode boot codes (Each 256bytes are repeats)
\$1900~	Reserved

WARRANTY

The warranty periods are 3 months. (shipping costs is not covered).
Out of warranty, it will be charged the actual repair costs.

- Any of above documents or comments may different with actual SD DISK][emulato
r version and any hardware changes may happened for better performance or functi
ons.
- Anything of hardware change such as soldering, disassemble, Reverse engineering, i
t would expire any warranty.

If you need any help or information please email me Quick09@gmail.com

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