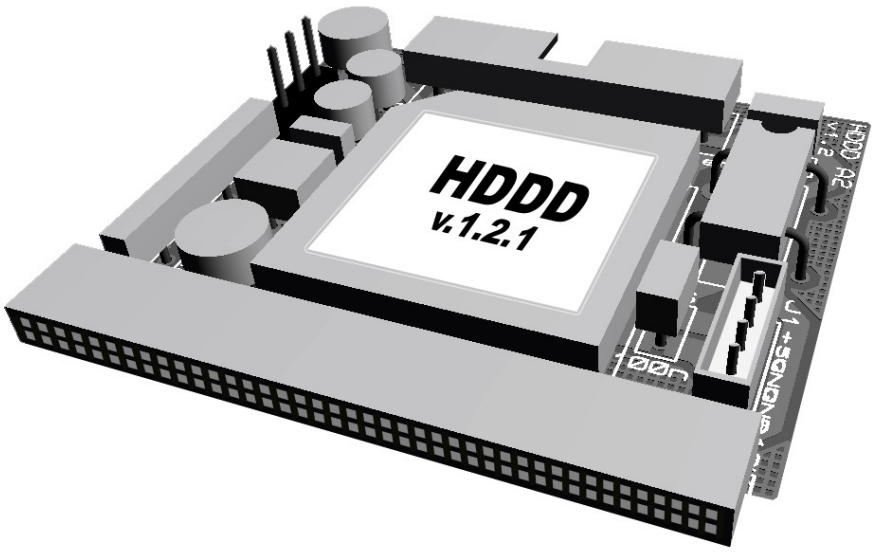
HDDD A2

v1.2

User's Manual



Contacts

Product updates and general information:
http://www.bootzero.com

Support:
support@bootzero.com

Sales:
sales@bootzero.com

Revision History

2009-09-05	(v1.0) initial creation

1. Introduction

1.1. About HDDD A2

HDDD A2 is a modern product for the Apple II family of computers. While the Apple II computers haven't lost their charm even after few decades, their 5.25” drives and diskettes are beginning to show the signs of age and wear and getting scarce. HDDD A2 tries to fill this gap and still keep the retro feeling by making a standard IBM PC 3.5” HD floppy drive and 3.5” HD diskettes a direct replacement of the venerable Disk][drive.

1.2. Features

- mimicking of Disk][drive
- user-selectable side
- 80 tracks per side
- 140 KB per side compatible with DOS 3.3, ProDOS, UCSD, CP/M
- up-to 320 KB per side (no software supplied)

1.3. System Requirements

- Apple II computer with Disk][controller card in a slot or integrated disk port
- 3.5” HD diskettes

Please note that HDDD A2 board doesn't support neither 3.5” DD drives nor 3.5” DD diskettes.

2. Installation

2.1. Caution

> Please be sure to turn off your Apple II system before making any changes to the hardware or connections. Attempt to connect or disconnect components while system is powered will likely lead to damage.

> Please check very carefully the markings on the ribbon cable connecting HDDD A2 and your Apple II computer before applying power to the system to avoid irreversible damage.

2.2. General connection scheme

HDDD A2 board has the following connectors:

F1: 34way socket, to 3.5" HD floppy drive

AP1: 20way header, to Apple II

J1: 4way power header, to 3.5" HD floppy drive power supply

JP1: 3way header, jumper for side selection

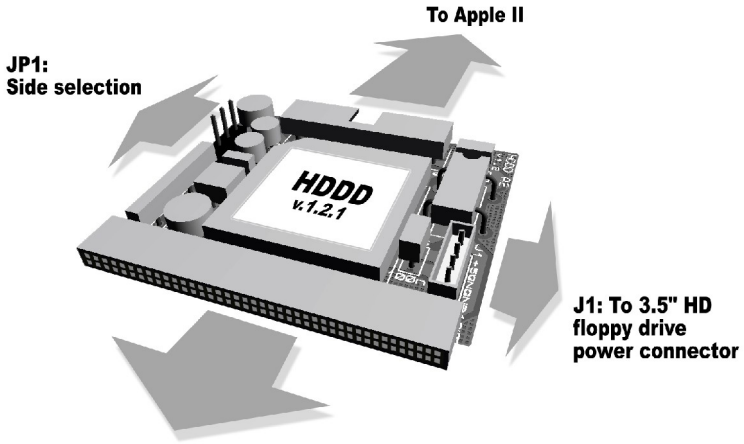


FIG.1

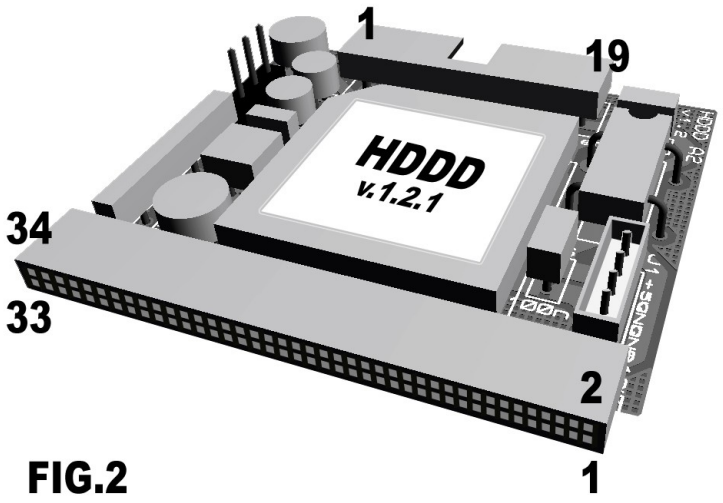


FIG.2

2.3. Connecting the cables to HDDD A2

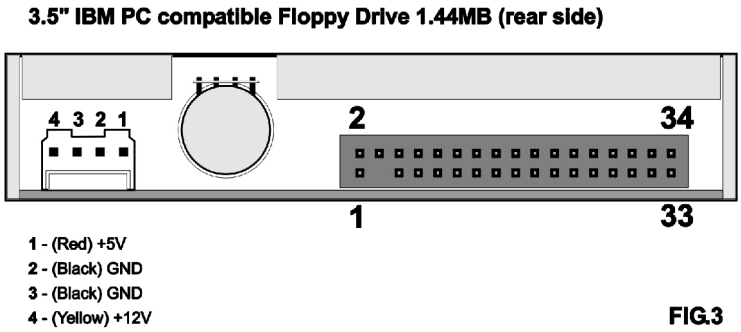
To avoid excess force applied to the HDDD A2 board while already attached to the 3.5″ HD floppy drive, we recommend that first the cables are installed.

Plug your selected ribbon cable (IDC-20 or DB19, depending on your Apple II model) in **AP1.**

Plug the short 4-lead colored power supply cable in **J1.** Alternatively, skip this step and leave **J1** empty if you plan to power the 3.5″ HD floppy drive from external ATX power supply.

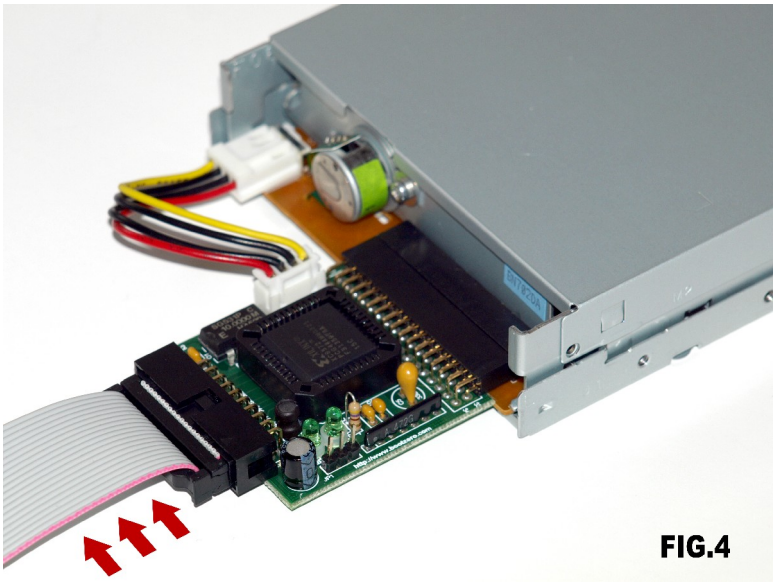
2.4. Attaching HDDD A2 to 3.5″ HD floppy drive

Attach the HDDD A2 board's **F1** socket to the 34way header at the rear side of the 3.5″ HD floppy drive, matching pin numbers. Consult *fig.3* for general diagram of a 3.5″ HD drive. Usually pin #3 is keyed. For the majority of the drives the HDDD A2 board will face components up.



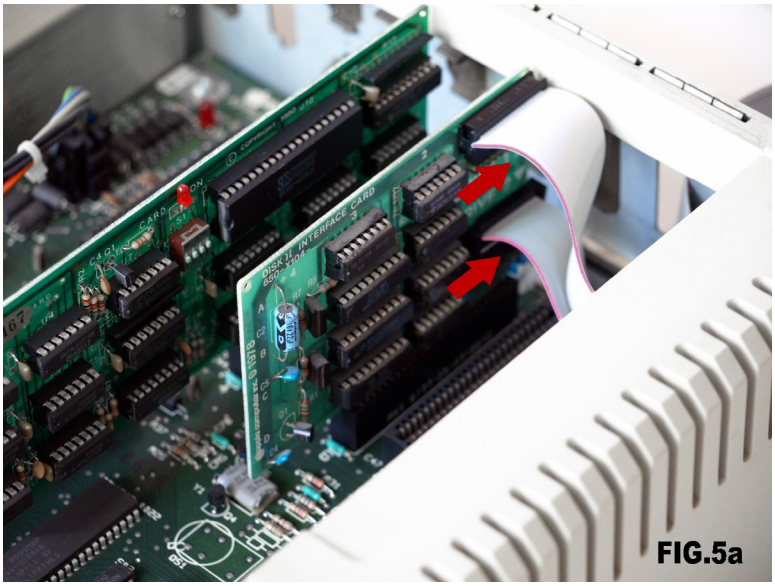
Plug the other end of the short 4-lead colored power supply cable in 3.5” HD floppy drive's 4-pin power supply header. Alternatively, connect external ATX power supply's floppy drive lead to the 3.5” HD floppy drive's 4-pin power supply header if your Apple II cannot deliver enough power for the floppy drive.

After these steps your assembly should look like *fig.4*. Pay close attention to the red marking on the ribbon cable.



2.5. Connecting to Apple IIe

If your Apple IIe is using the standard disk controller card with two 2x10 headers, plug the other end of the ribbon cable to the selected drive number as shown in *fig.5a*. Pay close attention to the red marking on the ribbon cable.



If your Apple IIe has DB19 connector at it's rear panel, plug the other end of the ribbon cable to it as shown in *fig.5b*. Please note that HDDD A2 doesn't allow connecting a daisy-chained drive after itself, as it lacks a pass-through port.

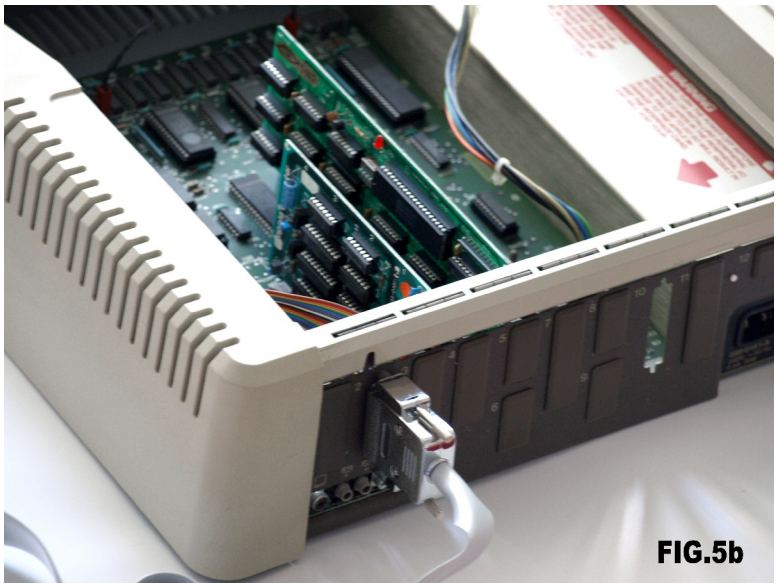


FIG.5b

2.6. Connecting to Apple IIc / IIc+

Find the DB19 disk port on the rear panel (*fig.6a*) and connect the other end of the ribbon cable to it as shown in *fig.6b*.

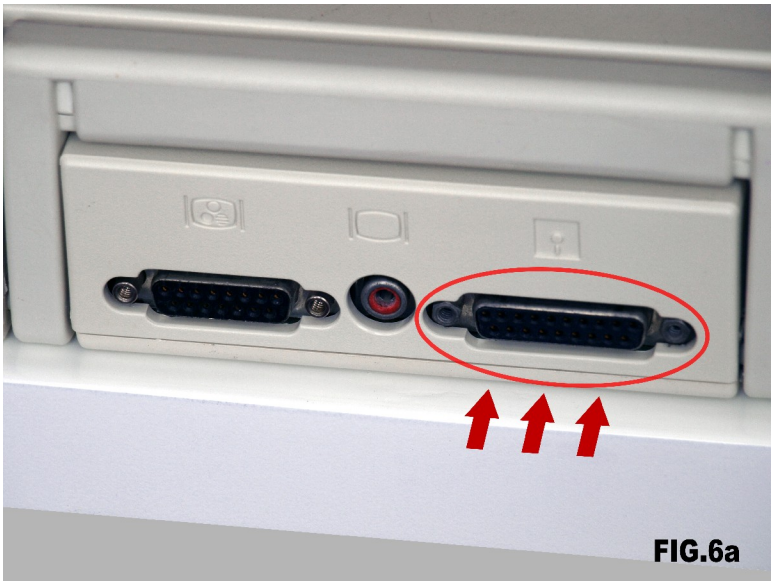


FIG.6a

FIG.6b

2.7. Connecting to Apple IIgs

Find the DB19 disk port on the rear panel (*fig.7a*) and connect the other end of the ribbon cable to it as shown in *fig.7b*.

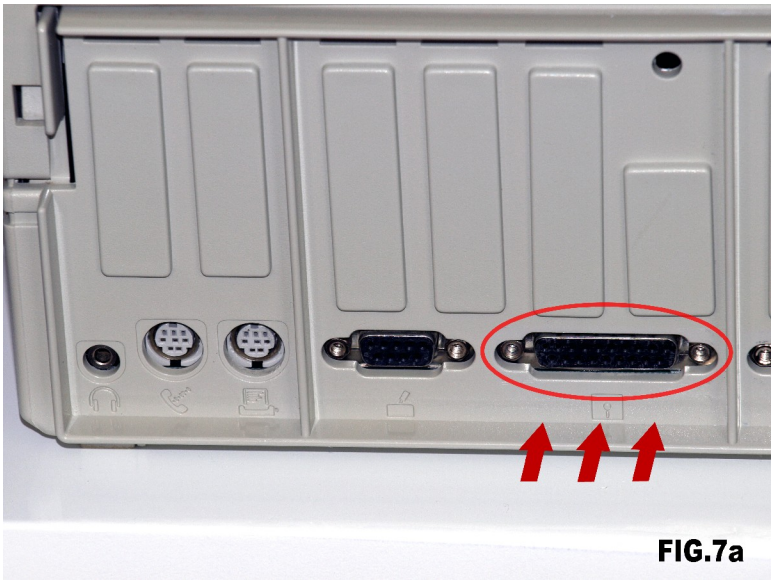


FIG.7a

FIG.7b

3. Usage

3.1. Side selection

Disk][supports only single side and there is no electrical signal or notion for side selection, so this has to be selected manually. HDDD A2 provides 3way header JP1 with jumper for side selection. Two LEDs on the board indicate currently selected side. Please do not change side while write operation is in progress, as this may result in data loss. For increased flexibility you may install external switch and indication at a convenient place.

3.2. Software

There is nothing special to do to use HDDD A2 in place of Disk][. After successful installation you can start using 3.5" HD diskettes the same way as the old 5.25" DD ones — format and copy using your favourite software and enjoy. Please keep in mind that 3.5" diskettes cannot be flipped upside-down — use the side selection jumper to achieve this.

4. For Advanced Users

4.1. Conversion

The original Disk][is a double density (DD), 300 RPM device. Double density corresponds to 250 kbit/sec transfer rate. Apple II computers use a form of Group Code Recording (GCR) encoding invented by Steve Wozniak and their diskettes are incompatible with other platforms.

3.5” high density (HD) drives work also at 300 RPM, but at increased transfer rate — 500 kbit/sec. Of course the increased capacity per track cannot be used and at the same time still be compatible with Apple II disk controllers and software, so HDDD A2 employs additional FM encoding on top of the Apple's GCR to satisfy magnetic media requirements.

HDDD A2 also does the necessary signal conversions between Apple II and IBM PC compatibles' floppy drives.

Each “half” track of Disk][is mapped to a separate track on the 3.5” HD diskette. Thus any standard Apple II operating system such as DOS 3.3, ProDOS, CP/M and UCSD will actually use only every other track on the 3.5” HD diskette.

4.2. Extras

While half of each track is sacrificed in the name of compatibility, there is still benefit — increased number of tracks. There are 80 of them on each side, leading to theoretical capacity of 320 KB per side assuming standard 16-sector format.

4.3. Enhancements

For users who need to switch sides often we recommend connecting an external single pole double throw (SPDT)

switch to **JP1** header and mounting it at a convenient place.

4.4. Deviations from Disk][

Because the drive, the media and the signal encoding are different, there are minor observed differences.

4.4.1. There are no “quarter” tracks with HDDD A2. They are mapped to the nearby “half” track depending on head movement direction. Software trying to utilise them will likely fail.

4.4.2. 3.5” HD drive's speed is fixed internally at 300 RPM, while Disk][is usually calibrated at a slightly lower speed for optimum performance. The following effects may be noticed only on **14.25 MHz PAL** Apple II machines, as the track capacity shortens slightly due to higher RPM.

4.4.2.1. Locksmith 6.0 16-sector Format

Effect: Tracks are reported to fail, but in reality they have been formatted fine.

Reason: Locksmith 6.0 16-sector Format reports error during post-format check and a certain gap size falls below set threshold.

Workarounds:

- Ignore the errors
- Use a different formatting program
- Detune the 3.5” HD floppy drive oscillator (for very advanced users)

4.4.3. Due to different timings (track seek, RPM, etc) some software may exhibit unusual behaviour.

4.4.3.1. DOS 3.3 may slow down under some read/write patterns. “Fast” DOS versions as well as ProDOS

are not affected.

4.4.4. Last but not least – even if these differences (especially the lack of “quarter” tracks) may affect some complex copy-protected titles, for the majority it should be possible to be transferred to 3.5” HD diskettes by HDDD A2 for backup or everyday usage.