

BlueDisk

Low Cost Floppy Disk Controller
for MS-DOS Type Floppy Disk Drives

For Apple IIe and Apple IIGS Computers

User's Manual

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Help and support:

We will do our best to help you and we want you to be a satisfied customer. We want to hear from you. Please report any problems to us. We appreciate your comments and questions.

We will continue supporting the *BlueDisk* card as long as the Apple II is alive and we can find a way to reach the Apple II community. Free support to any *BlueDisk* card owner in the A2 bulletin board on GENie (category 46, topic 12 at this time). Late news about the *BlueDisk* card or other topics should always be available on GENie in the A2 library (search for the string *BlueDisk* and TURBO).

Apple II forever!

Software upgrades:

	(overseas)	(Europe)	
ROM + Diskette	US \$20	DM 25.-	
ROM + Diskette	US \$16	DM 15.-	(if old ROM returned with order)
Diskette only	US \$12	DM 10.-	

Pricing includes air mail shipping for overseas orders or surface shipping for European orders. Upgrade orders must be cash prepaid. Pricing varies due to Dollar exchange rate. Upgrade notification will be published in press releases in various Apple II magazines and via electronic mail (GENie and Internet).

BlueDisk User's Manual

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Getting Started with BlueDisk

What you should have received:

The *BlueDisk* Manual you're just reading.

The green *BlueDisk* Interface card with golden fingers.

The *BlueDisk* utilities disk which is a standard Apple 800K disk (not usable with MFM drives).

What you should do first before doing anything else:

Make a copy of the *BlueDisk* utilities disk and keep the original disk in a safe place!

Use the Finder or another GS/OS utility to copy ProDOS 8 (=P8, the 8-bit disk operating system found in the /SYSTEM folder on every bootable GS/OS System Disk) and the INSTALLER (can be found on the /INSTALL disk of GS/OS System 6) on your copy of the *BlueDisk* utilities disk.

Rename the file P8 on your utilities disk to PRODOS (to make the disk bootable)

If you want to be perfect, you can do a printout of the README files that perhaps could be found on the disk (containing late news and additional program descriptions which could not be included with this document).

Please be sure to read the whole manual carefully. Many hints can be found all over in this document, and there is no way to include all information on a single sheet of paper.

BlueDisk requires a floppy cable which is not included in the package. You can buy it at you local PC-clone dealer or you can build it yourself. Please have a look at the drawing on the last page of this manual.

About *BlueDisk*

Congratulations! You have purchased the latest and most versatile floppy disk controller for the Apple II family!

BlueDisk is a high-tech and sophisticated yet inexpensive solution to bring standard MS-DOS floppy disk drives into the Apple II world. Several attempts to create such a controller failed in the past because too many problems needed to be solved. We are proud that we can offer this controller to the Apple II community!

Features:

Allows the use of one or two MS-DOS style floppy drives of any size and combination.

Fully ProDOS and GS/OS compatible. Use all your Apple II applications with *BlueDisk*.

Storage capability of up to 2.88meg per disk under ProDOS, GS/OS (including HFS), and MS-DOS.

Compatible with Apple IIGS and Apple IIe enhanced.

Compatible with all known hardware used today with Apple II computers.

BlueDisk is a non-DMA device, so it cannot have DMA problems with certain memory cards.

Compatible with the full range of Apple memory, up to 8 MB on the Apple IIGS.

GS/OS driver with GS/OS caching support included.

PC Transporter compatible: big storage for your MS-DOS applications on the Apple II. MS-DOS is bootable from *BlueDisk*. You will never need your PCT drives again.

Supports four different data rates and seven different diskette sizes.

Reads, writes and formats standard 1.44MB Macintosh diskettes using the GS/OS HFS File System Translator.

Supports all MS-DOS diskette formats: 360K, 720K, 1.2MB, 1.44MB, 2.88MB.

Fully prepared for floppy tape streamer operation.

Many more utilities planned for the future.

Low power design assures reliable operation.

What *BlueDisk* cannot do:

BlueDisk is capable of reading almost any disk in the world that was created using standard MFM recording, but *BlueDisk* cannot read and write standard Apple 800K diskettes (including Macintosh 800K). These disks are formatted using GCR (Group Code Recording), which is completely different from MFM recording. Also, *BlueDisk* may not be compatible with programs which (partially or completely) do not adhere to the standards published by Apple Computer.

BlueDisk Design:

Hardware, firmware, installation software and GS/OS device driver

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BlueDisk DIP Switch Setting

Read this manual carefully before attempting to install your *BlueDisk* card (you can read this several times in the manual). Please be very careful when working with your computer and the *BlueDisk* card. Do not touch the gold fingers and do not bend the gold pins of the floppy disk connectors.

There are different kind of DIP switches, depending on the manufacturer. Some DIP switches are marked **on/off**, others **open/closed**. Here is the "official" translation table:

open has the same meaning as **off**
closed has the same meaning as **on**

DIP switches 1, 2 and 3 determine the slot number for the *BlueDisk* card (representing the inverse bits 0, 1, 2 of the slot number) The *BlueDisk* card must be located in the slot that you choose by the DIP switch setting. Your system will crash during boot time if the setting is not correct! If you ever want to use a different slot, never forget to adjust the DIP switch setting accordingly.

Slot	DIP switch			
	1	2	3	
n/a	on	on	on	(card disabled)
1	off	on	on	
2	on	off	on	
3				slot 3 not allowed!
4	on	on	off	
5	off	on	off	
6	on	off	off	
7	off	off	off	

DIP switch 4 : No configuration required if present. Some cards only have three DIP switches.

On the Apple IIGS, be sure to set the *BlueDisk* slot to "Your Card" in the Control Panel.

BlueDisk Jumper Settings

The *BlueDisk* card needs jumper setup to work correctly with your drives. Be careful with setting the jumpers (see figure on the last page of this manual).

Please don't blame us for putting all those jumpers on the board. The jumpers are required because many different types of disk drives must be supported. The MS-DOS style floppy drives are "dumb" hardware. Therefore the *BlueDisk* hardware and software cannot quickly detect which kind of drive is connected, so you must tell it by setting the jumpers correctly. This is the price of cheap (and dumb) hardware. If we didn't support as many drives as possible, you probably would blame us for NOT supporting YOUR specific drive.

Jumper 1: Drive Type Drive One

Install this jumper if your first drive is a 3.5" drive.
Remove this jumper if your first drive is a 5.25" drive.

Jumper 2: Drive Type Drive Two

Install this jumper if your second drive is a 3.5" drive.
Remove this jumper if your second drive is a 5.25" drive.
This jumper is "don't care" if only a single drive is connected (if jumper 3 is removed).

Jumper 3: Drive 2 Presence

Remove this jumper if only one drive is connected to your *BlueDisk* controller.

Install this jumper if two drives are connected to your *BlueDisk* controller.

Your *BlueDisk* controller will not work correctly and you will have serious problems if the jumper setting is not according to the number of drives. If only one drive is used, it must be connected as drive 1 as shown in the cable layout (see last page of this manual).

Jumper 4: "No floppy disk drive present, Floppy Tape Streamer only".

This jumper is intended for those users who want to use a Floppy Tape Streamer with *BlueDisk*, but don't want to use any MS-DOS type disk drive. If this jumper is set, you make the *BlueDisk* software and firmware believe that no floppy drive is currently attached. This jumper must not be set if floppy drives and a tape streamer are attached.

ED Invert: Selects active high or active low level for the Extra Density Select signal (only used with Extra Density drives, don't care with HD and DD drives).

Set this jumper to position "low" (0) if ED signal should be active high.

Set this jumper to position "high" (1) if ED signal should be active low.

Please refer to your ED drive user's manual or ask your dealer.

ED Select: Selects the connector pin where the Extra Density select signal should go to (only used with Extra Density drives, this jumper setting has been "disabled" for reason of security).

Install jumper to position "6" if your drive needs the ED signal at pin 6 on the floppy bus.

Install jumper to position "33" if your drive needs the ED signal at pin 33 on the floppy bus.

Please refer to your 3.5" ED drive user's manual or ask your dealer. Normally, it is strongly recommended that this jumper is set to position "6". If it is set to "33" and you have two drives connected, your second (non-ED) drive will pull down the line to ground and will cause a malfunction. In addition, a circuit on the *BlueDisk* board will get damaged.

If you absolutely need to select pin 33 for the ED signal you must cut off the line number 33 of the flat ribbon cable that goes to your non-ED drive. Removing this line will not cause any further problems because all other signals needed are on lines with even numbers.

Usually the ED drives need to be configured carefully by a considerable number of jumpers before they can be used in a computer system. Be sure you receive a data sheet whenever purchasing a floppy disk drive.

Installing Your *BlueDisk* Card

Set the DIP switches and jumpers correctly as described before.

Connect the floppy disk cable to the *BlueDisk* card and to your floppy drives. Do not bend the connector pins!! Be very careful especially when removing the cable from a connector!

Turn off the Apple's power switch. Never insert or remove a card while your computer is turned on. You should, however, leave it plugged in to allow the power supply to absorb any static electricity from your body. Also, be sure that any other power supply involved (e.g. the floppy drive's) is turned off!

Remove the cover from your Apple.

Touch the power supply case in the Apple to discharge any static electricity from your body. Make sure you do this because static can cause a great deal of damage to the computer chips on interface cards and in your computer.

Select the slot into which you are going to install the *BlueDisk* card. Align the card edge with the slot and use the heel of one hand to slowly push the card down into the slot.

Setting up the Floppy Drives

(also see figure on the last page of this manual)

Important Note: Configuring a floppy drive requires a manual. We cannot be responsible for the lack of a manual for your floppy disk drives. If you have purchased a floppy drive without manual and you don't know how to set it up correctly, please don't expect that we can help you! We won't. There may be thousands of manufacturers and you really can be sure that we don't know anything about your specific drive. (period).

Don't accept a floppy disk drive shipped without manual!!

You can use two MS-DOS style floppy drives with your *BlueDisk* card. Supported drives are (in any combination):

- 5.25" Double Density (360KB)
- 5.25" High Density (360KB up to 1.2 MB)
- 3.5" Double Density (720KB)
- 3.5" High Density (720KB, 1.44 MB, automatically supports 1.6 MB)
- 3.5" Extra High Density (720KB up to 2.88 MB)

Both drives must be set up to be active on drive select 1 at pin 12 (of their own connector) and a twisted flat ribbon cable must be used. This cable should be a standard cable as it is used in most MS-DOS style computers. Alternatively you can build it yourself using the cable layout drawing.

The first plug (non-twisted part of the cable) is assigned to drive 1 (must be connected), the second plug (twisted part of the cable) should go to drive 2 (optional). If you are not sure about how your cable should look like, please ask your dealer. If your dealer cannot help, don't give him your money.

Another Important Note:

At least one drive must be connected and must be powered up or your Apple won't boot with a *BlueDisk* card installed. The *BlueDisk* hardware cannot detect drives which are not powered up (exception: if jumper 4 is set appropriately, you can disable any floppy drive functions). The floppy drives must be powered up (and down) at the same time when your Apple is turned on. Be sure all disks are ejected from the drives when powering up your system.

If something goes wrong: *BlueDisk* works with standard MS-DOS type drives! Think of *BlueDisk* as a "standard MS-DOS floppy disk controller".

As a rule of thumb, you can assume the following: If you have configured your floppy disk drive in a way that it works with a standard MS-DOS computer (used all over the world), you can use it with *BlueDisk* with no modifications (however the drive 1/ drive 2 designation on the cable could be the opposite, please check out using the DRIVE.TESTER). This statement is valid as long as the drive works with standard MS-DOS computers, it is not valid with IBM PS/x computers, old XT type computers and other non-standard computers which may use a more proprietary interface. Also, you cannot make these assumptions when configuring an Extra Density drive because of the lack of standards (please read the sections regarding ED drives carefully).

Power supply for the floppy disk drives

Unlike Apple's original drives, the floppy disk drives attached to *BlueDisk* must be supplied by an external power supply. *BlueDisk* was intentionally designed to not supplying power for the disk drives. Due to excessive current flow, the data integrity and proper functioning of *BlueDisk* would suffer if power would be drawn via the slot connector. This is a matter of precaution, nevertheless you can use your Apple's power supply (using the lines coming out of the case directly) to supply the drives. It won't affect the functions of *BlueDisk*. **If you are using an external power supply, be sure to use the same wall outlet as your Apple computer does (to avoid ground loop problems). Once again: An external power supply must be turned on an off at the same when your Apple is turned on and off.**

Floppy Disk Connector Pin Assignments

("Out" means this pin is an output from the card to the drives, "In" means this pin is an input to the card from the drives)

Pin#	Name	Kind	Description
2	DENSEL	Out	Density Select
4	n/a		
6	EDSEL	Out	Extra High Density Select (first connection)
8	INDEX	In	Index Hole Signal
10	ME2	Out	Motor Enable Drive 2
12	DS1	Out	Drive Select Drive 1
14	DS2	Out	Drive Select Drive 2
16	ME1	Out	Motor Enable Drive 1
18	DIR	Out	Direction Select for Stepper Motor
20	STEP	Out	Step Signal for Stepper Motor
22	WRDATA	Out	Write Data, Serial Data to Drive
24	WE	Out	Write Enable for Write Operation
26	TRACK00	In	Track 0
28	WP	In	Write Protected
30	RDATA	In	Read Data, Serial Data from Drive
32	HDSEL	Out	Head Select, Side Select
34	DSKCHG	In	Disk Changed Flag
33	EDSEL	Out	Extra High Density Select (second connection)
9, 17, 27, 29:	open		
1, 3, 5, 7, 11, 13, 15, 19, 21, 23, 25, 31:	Ground		

Considerations on Special Signals

In certain cases (usually if a drive connected to *BlueDisk* does not work properly), the following pin assignments should be checked carefully. Again, we should mention that the *BlueDisk* card is designed to work with almost any standard MS-DOS floppy drives, so any drive which will work with an MS-DOS compatible computer can be used with no modifications. The details following now should serve as a reference.

Pin 2: DENSEL

Must be supported by the drive unless your drive does its own auto-detect for Double Density and High Density media.

DENSEL is high level (1) for High Density mode and low level (0) for Double Density mode. No difference for 5.25" and 3.5" drives. If you are using a floppy drive from an IBM PS/2 or similar system, the DENSEL signal may not be correct for this drive. In addition the drive may not be compatible at all (PS/2 is not a standard PC compatible computer).

Pin 6 or Pin 33: EDSEL

Must be supported by the drive unless your drive does its own auto detect for Extra High Density media. Only used with 3.5" Extra Density drives. Please read your drive's manual carefully if you want to use an ED drive and make provisions that this signal is supported correctly.

If the jumper ED INVERT is set to "0" (low level), EDSEL is high level (1) for Extra High Density mode and low level (0) for any other mode.

If the jumper ED INVERT is set to "1", EDSEL is low level (0) for Extra High Density mode and high level (1) for any other mode.

Pin 16: ME1 or ME (Motor Enable, at the drive's connector only)

Be sure both drives do have the "Motor Enable" signal assigned to this pin (all known drives do). Usually only one motor enable signal is used on the drive's connector which is simply called "Motor Enable". At the *BlueDisk* connector, two motor enables are used to support both drives independently.

Pin 12: DS1 (at the drive's connector only)

Be sure both drives have "Drive Select 1" assigned to this pin (all known drives do). Usually two or three drive select signals are available on the drive's connector which are marked DS0..DS1, DS1..DS2, DS0...DS2 or DS1...DS3. Any known drive can be jumpered (or switched) in order to support DS1 on pin 12, which is required for the drive to working correctly with the *BlueDisk* card.

Pin 34: DSKCHG

Some drives do have the READY signal at this pin. This is not what we need! Please be sure your drive supports DSKCHG at this pin. All known drives can be jumpered to accommodate this situation or automatically do have DSKCHG assigned to this pin.

Taming the GS/OS Driver

For best performance and versatility it is recommended to install *BlueDisk*'s GS/OS driver on your System volume (the floppy disk or the hard disk partition you boot from). If you don't install the driver, your floppy drives connected to *BlueDisk* will appear on the Finder desktop like Apple 5.25" drives. Even disk handling is equal to Apple's original 5.25" drives if no GS/OS driver is installed. With the GS/OS driver installed, *BlueDisk*'s drive icons will be looking equal to Apple's 3.5" drives.

To install the GS/OS driver, just use any file copy utility and copy the driver from the utilities disk to your

```
/my.disk/SYSTEM/DRIVERS/
```

folder. "my.disk" is the place holder for the name of your boot volume. This can be an Apple system disk, your hard disk, a RAM disk or even a bootable MFM ProDOS disk you created using a *BlueDisk* drive. The driver's functions are available after the next reboot of your system. You also can use the INSTALLER to install the driver a bit more conveniently. For this purpose, a copy of the INSTALLER should be launched from the *BlueDisk* utilities disk.

Once you have installed the GS/OS driver, two key functions can be used to control *BlueDisk*'s behaviour under GS/OS operation. Note that the driver is active only as long as GS/OS is active. If you launch a ProDOS 8 application, the driver "sleeps" until you return to GS/OS operation. This is true for any block device driver under GS/OS, this is not a fault or a special feature of *BlueDisk*'s driver.

CTRL Key: poll the drive(s) once

Pressing the Control Key for about a second will force polling the drives connected to your *BlueDisk* Card. Normally the driver responds to status calls with the last status information that was "really" received from the drive. Pressing this key tells the driver that the current application should receive an updated information about the current status of the disk drive(s). This is usually required if you insert or remove a diskette.

SHIFT & CTRL Key: toggle auto-polling

Holding down both the Shift and the Control key toggles "permanent polling" on and off. In certain situations or in conjunction with certain programs permanent polling is the preferred way to use the drives connected to *BlueDisk*. In many other situations you might feel much more comfortable if the noisy polling is not present all the time. As you can see, we have tried to satisfy any requirements of handling floppy disks on the Apple II.

You will need a little practise to find the right time pressing the keys. Since a status call is issued only every second, a short keypress won't be enough to meet the time frame required. First, try to use the Control Key only (which needs the same timing) to get the right feeling and to press the keys "in time".

Some examples where auto-polling is recommended to be on:

- Shell applications like PROSEL-16 shell, ORCA shell, GNO/ME, MS-DOS Tools
- Archiver Backup
- Replicator

Formatting options available with GS/OS driver installed

When using the menu item Disk/Initialize in the Finder, you will be presented with a standard GS/OS formatting dialogue. Depending on the drive you are currently working on, you can choose from three or six formatting options. All diskette sizes can be used with ProDOS or HFS directory structures. In addition, the formatting options marked "standard MS-DOS disk size" can be used to create (non-bootable) MS-DOS diskettes (using Peter Watson's MS-DOS tools). The standard GS/OS formatting dialogue is also available (as a text version) when using a text-based program such as PROSEL-16, ORCA or MS-DOS Tools. Remember to insert a disk in your MFM drive and to press the Control Key or you probably won't be able to access the Initialize menu item.

3.5 inch drives:

1.44 MB High Density (HD) interleave 2:1 80 tracks, 18 Sectors/track, 2880 blocks per disk	(standard MS-DOS disk size)
1.60 MB High Density (HD) interleave 2:1 80 tracks, 20 Sectors/track, 3200 blocks per disk.	
2.88 MB Extra High Density (ED) interleave 2:1 80 tracks, 36 sectors/track, 5760 blocks per disk.	(standard MS-DOS disk size)
2.88 MB Extra High Density (ED) interleave 3:1 80 tracks, 36 sectors/track, 5760 blocks per disk.	(standard MS-DOS disk size)
720 KB Double Density (DD) interleave 2:1 80 tracks, 9 sectors/track, 1440 blocks per disk.	(standard MS-DOS disk size)
800 KB Double Density (DD) interleave 2:1 80 tracks, 10 sectors/track, 1600 blocks per disk.	

5.25 inch drives:

360 KB Double Density (DD) interleave 2:1 40 tracks, 9 sectors/track, 720 blocks per disk.	(standard MS-DOS disk size)
720 KB Double Density (DD) interleave 2:1 80 tracks, 9 sectors/track, 1440 blocks per disk.	(standard MS-DOS disk size)
1.20 MB High Density (HD) interleave 2:1 80 tracks, 15 sectors/track, 2400 blocks per disk.	(standard MS-DOS disk size)

As a reminder (that you are currently working on a 5.25" drive and disk), the interleave shown in the GS/OS formatting dialog is 52:1 rather than 2:1. The diskette will be formatted correctly with interleave 2:1.

The 5.25"/720KB disk has the same layout as a 3.5"/720KB disk. However, due to MS-DOS system limitations such a disk will not be recognized as a valid MS-DOS diskette on MS-DOS computers. It works fine when used on the Apple side, regardless of which file system is to be used.

Using *BlueDisk* with PC Transporter

Note: You don't need to connect your BlueDisk drives directly to the PC Transporter card. Just leave your BlueDisk configuration as it is, and configure the PCT card via its control panel. To get access to *BlueDisk*'s drives for use with the PC Transporter card, two things need to be done:

- 1) Assign proper ProDOS devices to MS-DOS devices using the PC Transporter configuration program.
- 2) Install drive properties on the MS-DOS side by setting up CONFIG.SYS correctly.

1) Assigning *BlueDisk*'s drives to PCT

You must assign one (or two) drive letter(s) (A:, B:, C:, D:) to the slot and drive number(s) of your *BlueDisk* card. For instance, a single drive connected to *BlueDisk* in slot 6, should appear as slot 6, drive 1 assigned to the MS-DOS drive letter that you choose. A second drive connected to *BlueDisk* is always defined as drive 2 in *BlueDisk*'s slot.

2) Setting up CONFIG.SYS

You must tell MS-DOS which kind of drive you are using. You need a separate definition for every disk format you intend to use. A single drive definition usually is not sufficient. The following CONFIG.SYS commands assume that your MS-DOS system files are located in a folder named \DOS.

Using a 3.5" drive, the first entry in your CONFIG.SYS should look like this:

```
DRIVPARM=/D:1 /F:2           (this command is only available in MS-DOS v5.0 or later)
```

This entry allows you to use a 720K disk (/F:2) as the second drive (B:) for your PCT (/D:1, whereas 0=drive A:, 1=drive B:, 2=drive C: and so on).

If you want to use higher density formats, you need to add further entries in your CONFIG.SYS file. To be able to use 1.44meg diskettes, an entry should look like this:

```
DEVICE=C:\DOS\DRIVER.SYS /D:1 /F:7
```

Again, /F:7 defines the additional disk format being used, and /D:1 assigns this format to your second MS-DOS drive (B:)

So if you access a 720K/DD disk in *BlueDisk*'s drive from the MS-DOS side, you must specify B: as the logical drive. You must specify x: for the same *BlueDisk*'s drive if a 1.44meg/HD disk is to be used. The letter x: stands for the first device letter not being used by your MS-DOS system. Example: your MS-DOS system has two floppy drives A: and B: and a single hard disk volume C:.. Then your first DEVICE=C:\DOS\DRIVER.SYS .. entry is assigned to drive letter D: (first device letter not being used), next entry is assigned to E: and so on.

The first entry for a 1.2meg/5.25 inch disk drive should look like this:

```
DRIVPARM=/D:x /F:1
```

The first entry for a 2.88meg/3.5 inch disk drive should look like this:

```
DRIVPARM=/D:x /F:9
```

whereas D:x defines the drive number (x=0...3 for drive letter A:...D:) you assigned to *BlueDisk*'s corresponding drive using the PCT setup program.

If you have problems reading and writing diskettes with higher density than the 360KB (5.25") and 720KB (3.5") formats, try to reload the PC Transporter operating system until it works. This gets around what appears to be a bug in the initialisation process of PCT. Many people don't have problems at all, several people have to restart their PCT software more than twice to get the correct functions.

Formatting a Disk Using the Firmware

Please read this section if you intend to use any of the following applications for formatting a disk:

Any ProDOS 8 program which is capable of formatting a disk.

PC Transporter software (which has a "hidden" ProDOS part when running MS-DOS).

Certain disk utilities that call the firmware directly rather than using GS/OS calls or ProDOS 8 calls (for instance certain CDAs).

If no GS/OS driver for *BlueDisk* is installed: any GS/OS application that is capable of formatting a disk.

(The "Firmware" is the "firm" part of the software that belongs to the *BlueDisk* card. This software resides in the ROM (EPROM) on the card itself and cannot be modified or reloaded. The firmware is fully responsible for correct operation with the ProDOS 8 disk operating system. It also does important things during the first stage of the boot process. The firmware also does the full job if no GS/OS driver for *BlueDisk* has been installed.)

If you have an Apple IIe, if you are using ProDOS 8 utilities on the IIGS, or if you are using a PC Transporter card, you cannot take advantage of the GS/OS driver features. We have made provisions that the standard 3.5" and 5.25" format options are available in any case, even if a PC Transporter card is being used and is currently active. The standard formats supported by the firmware are 720K, 1.44meg and 2.88meg on 3.5" drives and 1.2meg on 5.25" drives. Note: the supported capacities are not restricted to a certain operating system. The format laid down on the disk depends on what your program is doing on the high-level. Diskettes usually can be formatted with ProDOS, HFS or MS-DOS data structures.

Almost any formatting utility can be used to format a disk. Usually you would use the Finder or the Advanced Disk Utilities for convenient formatting, but if you are using ProDOS 8, you are forced to use a ProDOS 8 utility. (COPY II PLUS, ProDOS 8 System Utilities, AppleWorks 4.0, other third-party products and many shareware/freeware utilities). When using a PC Transporter you don't need any special formatting utility under ProDOS 8. Just use your favorite MS-DOS format utility and keep in mind how to control the format options as described in the following section.

Here is how to format a disk if the firmware formatting routine is to be used.

To get the specific format option, you need to press one or two of the well known Apple Keys. You must hold down the Apple Key(s) for about two or three seconds, starting at the last entry of your program's formatting dialog (when pressing RETURN, hold down the desired Apple Keys at the same time). After formatting has begun, no further action is needed.

No special function key pressed (default format option):

1.44 MB High Density (HD)

80 tracks, 18 Sectors/track, 2880 blocks per disk, interleave 2:1.

This option can be used with 3.5" High Density or 3.5" Extra High Density Drives. Formatting will fail when used with Double Density drives. High Density floppies required! Also works with certain drives when using Double Density floppies, but cannot be guaranteed. Using Double Density floppies with this format option is probably very unreliable! You are on your own!

This formatting option will fail if you try to format a disk in a 5.25" drive.

Open-Apple Key (Command):

2.88 MB Extra High Density (ED)

80 tracks, 36 sectors/track, 5760 blocks per disk, interleave 3:1.

This option can only be used with 3.5" Extra High Density Drives and Extra High Density floppies. Formatting will fail when being used with other drives or floppies. Of course this formatting option will fail if you try to format a disk in a 5.25" drive.

Option Key (also known as Solid Apple or Closed Apple Key):

720 KB Double Density (DD)

80 tracks, 9 sectors/track, 1440 blocks per disk, interleave 2:1.

This option can be used with any 3.5" Double Density, High Density or Extra High Density drive. You must use DD diskettes or the formatting will fail. Certain drives nevertheless will format HD diskettes in DD format correctly. This formatting option will fail if you try to format a disk in a 5.25" drive.

Open-Apple and Option Key together:

1.20 MB High Density (HD)

80 tracks, 15 sectors/track, 2400 blocks per disk, interleave 2:1.

This option can only be used with 5.25" High Density Drives and High Density floppies. You must use HD diskettes or the formatting will fail!

Because there is no way to support all formats that would be available with the GS/OS driver installed, the firmware only allows formatting the "standard" sizes which are required to work correctly with the MS-DOS operating system. Once again, all sizes supported here can be used under ProDOS 8, GS/OS or MS-DOS. Although you cannot format any disk size, *BlueDisk's* firmware is smart enough to read and write all the formats created with the GS/OS driver.

Please keep in mind that the MS-DOS style floppy drives are dumb, so *BlueDisk* cannot detect easily which kind of disk is inserted. Also, it cannot detect which kind of drive (DD, HD or ED) is connected. These are the reasons why you must tell the firmware which kind of format currently is desired.

Tips and Tricks, Miscellaneous

Why do the disk drives need to be polled?

Under GS/OS (and even under the Macintosh operation system) the disk drives will be tested (polled) from time to time whether something has changed. When inserting and removing a diskette, the Finder automatically displays any changes that happen with the disk drives. Even the write protect symbol reflects the current state of the write protect hole on the disk. By contrast, the MS-DOS operating system only takes notice of any changes when the user forces accesses to a disk drive. While Apple's original drives have a certain built-in intelligence to detect disk switching, MS-DOS type drives only have very limited capabilities. Now here is the point: While Apple's drives can send a "silent" message to the operating system (that something has happened), MS-DOS drives need to be turned on for a short time, and the stepper motor must be moved at least one step. Only after these actions, the status line (DISKCHG) reflects the current state of the floppy drive. As the stepper motor must be moved, you can hear some noise if a drive connected to *BlueDisk* is being polled. There is no way to do it better. If you know the way the PC Transporter card handles its drives under GS/OS, you know what I mean and you hopefully will be much happier with the way *BlueDisk* does.

Disk change handling

When working with the Finder, you can use eject commands to physically eject a disk from an Apple 3.5" drive. Both commands OA-Y and OA-E can also be used with *BlueDisk* drives. As the "dumb" MS-DOS drives cannot eject a disk, you have to do it yourself by pressing the eject button. Here is the important thing you should be aware of:

Never remove a disk from a drive connected to *BlueDisk* if the drive's motor is still spinning (the LED is on). If you do so, you may leave the *BlueDisk* controller chip in a rather undefined condition and the following actions concerning the *BlueDisk* card cannot work correctly. In addition, the data on you floppy disk can be corrupted.

However, you are allowed to change diskettes while the auto-polling is turned on. In this case, your MFM drives behave exactly the same as the Apple 3.5" drives.

When using MS-DOS and GS/OS frequently...

it is recommended to format MS-DOS diskettes on the Apple IIGS (you can use the BLUE.FORMATTER or Peter Watson's utilities). In this way, the diskettes will become formatted with interleave 2:1, which is the optimum for the Apple IIGS. You won't notice a remarkable difference in speed on your MS-DOS computer, but on the Apple you will find it much speedier than using the 1:1 interleave. Same things apply if you want to read Macintosh diskettes frequently. The Mac always uses interleave 1:1 when formatting a High Density disk, which is just a bit too much for the Apple IIGS.

Formatting a disk using Peter Watson's MS-DOS Utilities (v2.1 or earlier)

When formatting a disk for use with MS-DOS first format the disk from the Finder (ProSel-16, etc.) at the desired density, using the ProDOS file system. Next use the MFORMAT command (with the /Q option) from MS-DOS Tools (this gets around what appears to be a bug in MFormat).

Formatting a disk using Peter Watson's MS-DOS Utilities v2.2 (MFORMAT)

When formatting a disk you must use the parameter /P in order to get a GS/OS formatting dialogue, as you would expect it using the Finder. Otherwise, the disk will be formatted with the default format option 1.44MB (if the disk was not formatted at all) or with the same format option that was already found on the disk. The GS/OS driver must be present (active) or you won't be able to format a disk as you would like. At this time, the /S (size) option doesn't work reliably with *BlueDisk* (try and see whether it works). Formatting a disk using the /P switch, you can choose the file system in the GS/OS formatting dialogue. At this point, you may choose any file system you want. MFORMAT simply writes over the directory structure that was written by GS/OS and creates the MS-DOS format not available by the GS/OS formatting dialog (we know it's a bit confusing, but there is no way to get around but the /S option).

Formatting a disk with PC Transporter

When formatting a disk for use with MS-DOS it is most convenient and fast to have the disk preformatted under ProDOS or GS/OS. In this case you can use the quick format option under MS-DOS:

```
FORMAT A: /Q
```

Please replace the letter A: in your command if your *BlueDisk* drive is assigned to another letter. This command tells MS-DOS it should use the existing low-level format. MS-DOS will accept the command, bypasses low-level formatting and only puts its own directory structure on the already formatted disk.

Formatting a Double Density disk to High Density format (don't do it)

Do not take DD disks and punch out the HD media ID hole to try and save money on disks. Disks are cheap compared to data. Using DD disks in HD drives at HD will possibly cause a loss of data, and it will occur when you have no other backups available (Murphy's Law). Quoted from Harold Hislop.

Drive polling

Many programs that are dealing with diskettes may not be as smart as the Finder and possibly will require that auto polling is turned on all the time. Please refer to the section "Taming The GS/OS Driver". Here is a list of programs where we recommend that auto-polling is on:

- Archiver (GS/OS System 6)
- Shells such as ORCA, PROSEL, GNO/ME, Peter Watson's MS-DOS Tools
- Replicator (EGO Systems)

If you feel *BlueDisk* is not working correctly, first try the program in question with *BlueDisk*'s auto-polling enabled and see if your problem has gone.

Using Archiver Backup with *BlueDisk*

Archiver always forces a reformatting on backup disks. However, Archiver doesn't give you a chance to setup the format options as you would like to have. Due to this shortcoming in Archiver we strongly recommend to use a preformatted set of backup disks or the disk formatting won't be as expected. When Archiver forces formatting, your current disk simply will be formatted with the same size once again. This is the only way to let Archiver use the desired disk size.

Of course you can use Extra High Density disks (as well as any other disk size) to make your backups as comfortable as possible. Do not mix different disk sizes in a backup set.

Why is writing to a HFS (Macintosh) disk sooo slow?

Even when having a disk formatted to interleave 2:1 (optimum), you cannot write to a HFS volume at a reasonable speed (however reading is much faster). There are several reasons that cause this problem, this is not a fault of *BlueDisk*'s hardware or the GS/OS driver. The problem is "hidden" in the HFS file system translator (if you don't understand the technical details following now, just skip them)

- 1) The HFS FST constantly issues redundant status calls to the GS/OS driver while updating the data structures on the current volume.
- 2) The HFS FST is a piece of software written in a high-level language (this is the old story of assembly language speed, any high level language slows down compared to assembly language)
- 3) While doing the mass data transfer, the HFS FST exclusively issues SINGLE BLOCK write requests to GS/OS, passing them over to *BlueDisk*.
- 4) While doing the mass data transfer, HFS FST writes blocks in REVERSE order, i.e. blocks 200...300 are transferred in the order 300, 299, 298, 297,, 200. There is even no chance for a driver to speedup things.

If you have a little insight in what's going on when the HFS FST is working, you may figure out that almost everything has been done by the programmer to let this FST work as slowly as possible. I only can assume that this has been done intentionally.

Different boot slot at your fingertip

If your system is set up to boot from *BlueDisk*, you can hold down an Apple Key to modify the boot process. The message

BlueDisk: boot from other slot?

will appear on the bottom of the text screen. Now, you can press a number key 1...7 to choose a different boot slot.

Using BLUE.FORMATTER

Why BLUE.FORMATTER?

Very simple. If you have an Apple IIe or if you are only using ProDOS 8 (for whatever reason), you cannot take advantage of the GS/OS driver and its formatting routines to create every disk format that is available. There is no means (other than the Apple keys) to tell *BlueDisk*'s firmware that it should format a disk with a certain format option. Entering these format options is limited to four different formats, but *BlueDisk* is capable of formatting seven completely different diskette layouts.

Also, some people might feel more comfortable because now they don't need to type lengthy command lines for formatting a disk as it is required when using a shell application.

The Menu Items

Arrows up and down: select menu item (highlight).

<RETURN>: activates the selected menu item. It either executes formatting or toggles through the options available.

Drive Change: Toggle drive selection.

You cannot select drive 2 if only one drive is attached to *BlueDisk*.

Interleave: Cycle through interleave values.

The interleave range available here is 1:1 ... 4:1. If you want to create diskettes for use with ProDOS 8 only, it is recommended to use 3:1 or 4:1 for best performance when writing to a disk. ProDOS is too slow to handle interleave 2:1 or 1:1 fast enough (at 1 MHz operation). However reading can be done well with interleave 2:1.

Volume Name: Enter ProDOS volume name.

The input line only accepts valid ProDOS volume names. Blanks and other illegal characters are not rejected. If a wrong volume name was given, the program re-prints the previously used (or default) name. MS-DOS diskettes won't be named in the formatting process, this is a legal thing in the MS-DOS world.

File System: Toggle ProDOS / MS-DOS format.

Blue.Formatter writes the appropriate directory structure on the formatted disk. If the current file system is MS-DOS, you will get an error message if you try to format a disk with a non-standard size (MS-DOS standard sizes are 360K/5.25", 720K/3.5", 1.2meg/5.25", 1.44meg/3.5", 2.88meg/3.5"). At this time *Blue.Formatter* doesn't consider a 2.88meg format as a standard disk size although this is the case under MS-DOS. Watch for an update.

Verify on/off: Toggle Verify-After-Formatting on and off.

If you turn verify off, you really MUST know what you are doing!! You are responsible for what you are doing!! No further comments (and no complaints, please).

The remaining menu lines simply allow for selecting the specific disk format option and starting the formatting process.

Quit (and <ESC> for fast Quit): leave the program, execute a ProDOS QUIT command.

How to use the "*Blue Drive Tester*"

CHECK.DRIVES, the Blue Drive Tester, is a small ProDOS 8 application which can be found in the folder DRIVE.TESTER on the utilities disk..

Note: This is a little helper if you are running into problems, normally you don't need to use this program. It could be quite useful if you don't know how correct jumpering of your drives should look like or if you are using a floppy cable of unknown condition. Also, some really old-fashioned drives may have a non-standard pin assignment (such as the PC Transporter drives) and you probably want to find out how to connect Drive Select and Motor Enable lines correctly. Please do not use this program under GS/OS, i.e. do not launch it from within a GS/OS program.

Abbreviations used:

Motor Enable Drive 1 = ME1

Motor Enable Drive 2 = ME2

Drive Select 1 = DS1

Drive Select 2 = DS2

Before running this program:

Connect your drive(s) to your *BlueDisk* controller.

Insert your *BlueDisk* card in your Apple (choose any slot except slot 3, as described in the section "*BlueDisk* DIP Switch Setting" in this manual).

The drives must be powered up at the same time when your Apple is turned on (we told you before).

If your Apple doesn't allow to boot into ProDOS 8, disable *BlueDisk* by setting the slot to the opposite of "Your Card" in the Control Panel (only available on the Apple IIGS). The program is capable of selecting *BlueDisk* even if it is disabled in this way. If you have an Apple IIe, you can use the NoDr jumper to tell *BlueDisk* that no drive is currently attached (even if it is). If the jumper is set, the *BlueDisk* firmware assumes that it does not have to control any drive (which could be defect at this time).

For your convenience, copy the ProDOS 8 file (P8, the 8-bit disk operating system found in the /SYSTEM folder on every GS/OS System Disk) on the same disk from where you run the Blue Drive Tester and rename it to PRODOS.

Now, launch the CHECK.DRIVES program from your *BlueDisk* utilities disk (you took a copy of the disk and your original disk is in a safe place, didn't you?). Use the built-in ProDOS 8 program launcher or any other ProDOS 8 utility. You probably won't be able to boot GS/OS if you have a problem with *BlueDisk* or your disk drives, and we even don't encourage you using GS/OS for this purpose.

Checking the flags

The first part of testing is to visually check some flags and jumper settings which are displayed on the screen after start-up.

IRQ: should be 0 (zero).

RST: should be 0 (zero).

DR2: Should be "Yes" or "No". Represents the jumper #3 position which tells *BlueDisk* whether a second drive is connected.

NoDr: "no drive connected", "Yes" or "No". This flag (Yes) tells *BlueDisk* that no disk drive is connected. For use with streamer-only operation.

Typ1: Represents the jumper #1 position (drive type), depending on your specific drive configuration.

Typ2: ditto, jumper #2.

ME2: Motor Enable monitor bit. Reflects the current state of the Motor Enable line on the floppy bus (this bit gets updated on every keypress). Should be off after two seconds.

ME1: ditto.

If you feel your jumper settings and flags displayed are as expected, you can try to control your drive(s) on the low-level:

Controlling the drive

Insert a blank disk in drive 1 (don't use your *BlueDisk* installation disk or any other disk containing valuable information).

Activate ME1 and DS1.

Now the drive's spindle motor should be on, as well as the front bezel LED.

Next try to recalibrate your drive using the menu item RECALIBRATE. The R/W head should move to its track zero position. If the R/W head is already in its recalibrated position, nothing happens (this is OK).

Now you can move the R/W head to the maximum track position (using menu item "SEEK CYL 79") or you can move it from track to track using the "+" and "-" commands ("track" and "cylinder" are interchangeable terms here).

If you have been able to follow these steps successfully, chances are very good that your drive works fine. This test also can help you to find out the correct drive 1 pin/cable assignments.

All commands also can be executed with a second drive connected to *BlueDisk* (enable ME2 and DS2). It is very important that both Motor Enable and Drive Select must be active for the drive to be tested. However you can use the menu items (ME1, ME2, DS1, DS2) to activate a single interface bus line at a time and to verify that the correct line is selected on the drive's connector. This can be quite helpful if a non-standard drive or cable is to be used. An active signal goes to "low" level, whereas inactive signals do have a "high" level (+5V). MEx signals can go active without any other signals being active, DSx signals also require the corresponding MEx signal to be active at the same time.

If a disk is inserted, the spindle motor can be activated independently from the drive select signal, but the drive's LED only is on if DSx and MEx are active at the same time. Note that the drive's spindle motor is always off as long as no disk is in the drive.

Read a disk

If you happen to have an MFM formatted disk on hand, you can choose menu item "TRY TO READ FROM DISK" and see whether *BlueDisk* can read data from your drive (first of all, write protect your disk) If successful, the drive tester displays three test results on the bottom of the display. Example:

```
DRATE=500K/HD  SECTORS=18  CYLFOUND=53
```

DRATE (data rate) can be 250K/DD, 300K/DD, 500K/HD or 1meg/ED

SECTORS can be 9,10,18,20 or 36 (there is still a bug in the program which often causes wrong numbers of sectors displayed)

CYLFOUND should be the current cylinder (=track) where the R/W head was positioned on.

If *BlueDisk* cannot read your disk, the results should look like this:

```
DRATE= -err-    SECTORS=xx  CYLFOUND=xx
```

xx are invalid numbers if no valid data rate was found.

On 5.25"/360K DD diskettes, you only can read tracks with even numbers, because these disks only have 40 tracks formatted. On tracks with odd numbers you will get an error when trying to read. Example: reading physical cylinder (track) #56 will display CYLFOUND=28 on a 40-track diskette. Cylinder #57 will give you an error.

Troubleshooting

We have tested each card thoroughly before it went to our customers, so your card should work flawlessly. And we have tried to cover every aspect of the installation process here in this manual. Our records show that most problems are related to floppy drives which have been configured incorrectly. A few problems occurred because some users didn't follow our hints in the manual.

We don't claim to be the perfect company, so in rare cases problems may occur which cannot be solved by the customer. Please check out if you have done your installation according to the guidelines found here in this manual. If we receive hardware to be repaired and we find it is OK, we'll have to charge you for checking out that it is OK.

So before you come up and complain that your new hardware doesn't work, please check out once again:

Did you read this manual completely? Did you overlook anything at the first glance?

Does your "third party hardware" (disk drive) work correctly? Check the drives in an MS-DOS computer if possible. Please read the "Considerations on Special Signals" section carefully and make sure your drive supports these signals correctly. If you don't have a manual for your floppy drives, do you know the meaning of the drive's jumpers?

Are you sure your drives can do what you are expecting? As an example, many "old" 3.5 inch drives cannot read/write/format HD diskettes ("...I took it out from an old XYZ computer..."). ED diskettes require a special ED floppy drive ("...I'm sure my HD diskettes can be formatted with ED density on my HD floppy drive, so why should I buy expensive ED media..."). AE PC Transporter drives are not standard MS-DOS floppy drives, etc.

Describe as detailed as possible !

If your problems cannot be solved in this way and you don't know how to continue, please send us e-mail via GENie or write via snail mail. Please do not send anything back to us without an RMA number. SHH Systeme will refuse to accept any shipment without RMA number.

Please describe your complete configuration (this is a very important thing, otherwise we cannot fix problems):

Your *BlueDisk's* serial number (located at the bottom of the floppy disk connector), firmware revision and revision numbers from the utilities disk.

Your computer: Apple IIe, Apple IIGS, which ROM # and the serial number printed on the motherboard (located at the upper right corner, beside slot 7).

Any card which is installed in your Apple IIe or IIGS, slot number of each card, revision number and software revision number.

The drive manufacturer and model number you are using.

Apple IIGS Control Panel slot setup (internal/your card) for each slot.

Give us exact information about what kind of memory expansion card you are using (revision number and serial number required).

Describe the symptoms where the error occurs. What software did you use? Describe the steps in detail to duplicate the problem.

If you have a user account on GENie, please send us e-mail or tell us about your problems using the GENie A2 bulletin board. We have a topic called "*BlueDisk* Card - SHH Systeme" where we can discuss problems and the like. Currently you can visit us in category 46, topic 12. If you cannot find our topic, please send mail to the GENie address A2.HELP and the sysops will help.

If you would rather like to search for an update, you can probably find it in the GENie A2 library. The following keywords could be useful when searching for *BlueDisk* related software: *Blue*, *BlueDisk*, Turbo, and Author=J.LANGE7.

Error Messages at Boot Time

To boot from the *BlueDisk* card, the firmware must be able to access the first floppy drive connected to the card. You only can boot from the first drive connected to your *BlueDisk* card. A valid operating system must be present on the boot disk (i.e. a complete GS/OS operating system or a ProDOS 8 system).

If an error occurs during the very first part of the boot process, the *BlueDisk* firmware or the operating system informs you about the error by displaying one of the following error messages.

BlueDisk boot error: no disk in drive

Obviously no disk is present in the boot drive. Did you really want to boot from a disk?

BlueDisk boot error: bad disk

The *BlueDisk* card cannot get access to a floppy disk. There are many reasons that can cause this error:

- the floppy disk is not formatted using MFM recording (standard Apple II recording is GCR). Also, the floppy may not be formatted at all.
- the disk has no valid boot sector (such as any Macintosh HFS disk or any MS-DOS disk, you cannot boot those disks) or the boot sector is damaged.
- only one floppy drive is connected and was chosen as the second drive connected to *BlueDisk*.
- two floppy drives are connected and both are configured as the first drive or as the second drive (for example when using a non-twisted cable).
- the boot floppy drive has a defect.

BlueDisk: cannot boot from MS-DOS disk

The *BlueDisk* firmware has found certain bytes on the boot disk that indicate it is an MS-DOS formatted disk. The MS-DOS boot area does not contain a valid ProDOS boot code, so the boot process cannot be continued. This error message will not appear if you want to boot MS-DOS with the PC Transporter via *BlueDisk*.

BlueDisk: no drive attached

Currently your *BlueDisk* card is configured in a way to tell the firmware that no floppy disk drive is attached (see "Jumper Settings"). You cannot boot from a floppy tape streamer.

Unable to load ProDOS

This message appears if the ProDOS boot routine (located on the boot sector of any ProDOS volume and loaded into the computer's memory at boot time) has found one of the following errors:

- the boot routine cannot find a directory structure on the boot volume (the directory may be damaged)
- the boot routine cannot find a file with the name PRODOS in the root directory of the current boot disk. The file PRODOS usually is the ProDOS 8 disk operating system or the file that launches GS/OS when being on a GS/OS system disk.
- while loading ProDOS, a read error occurs because of a bad sector belonging to the file PRODOS.

Relocation/ Configuration Error

This message appears after the ProDOS boot routine has finished execution (loading PRODOS) and corrupted data was found in memory while installing the ProDOS 8 disk operating system.

Warranty Registration

Please fill out this warranty registration. You must return the completed form or we cannot give you warranty support or regular service.

Purchaser

Name :
Address :
City :
State, Zip :

Vendor

Company/Name :
Address :
City :
State, Zip :

Product

Name :
Date of purchase :
Serial number :

Misc. Infos

Computer type :

Other cards installed, :
slot number of each :
card :

comments, wishes,
suggestions,
improvements,
bugs found

Please send this registration form to:

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