

Series
2000

**User
Manual**

DiskOnChip[®] 2000 PIK
(Programmer and Integrator Kit)

July-97
91-SR-002-04-7L REV. 2.0



M-Systems
Flash Disk Pioneers

1. Introduction

M-Systems' *DiskOnChip2000* is a new generation of high performance single-chip Flash Disk. The DiskOnChip MD2000 provides a Flash Disk in a standard 32-pin DIP package.

This unique data storage solution offers a better, faster, and more cost-effective Flash Disk for Single Board embedded systems, Internet devices and portable applications with limited space and modest disk capacity requirements.

The new DiskOnChip 2000 provides a Flash Disk (as BIOS expansion) which does not require any bus, slot or connector. Simply insert the DiskOnChip2000 into a 32-pin socket on your CPU board, with a minimal installation cost, and you have a bootable Flash Disk.

Various Operating Systems are supported by DiskOnChip 2000 : DOS, Windows, Win95. Additional support offered: pSOS+, QNX, VxWorks and others.

DiskOnChip2000 is the optimal solution for Single Board Computers - it's a small, fully functional, easy to integrate, plug-and-play Flash Disk with a very low power consumption.

The DiskOnChip 2000 can be accessed directly on the target platform. However, sometimes it is convenient to have an external programmer socket, especially for maintenance purpose. The DiskOnChip 2000 programmer is a very simple and easy to use tool, connecting to a standard desktop PC. Please note that the DiskOnChip 2000 programmer is not a must: all tasks carried by the programmer can be done while the DiskOnChip 2000 is plug onto target platform.

This manual describes the software utilities for the DiskOnChip 2000 programmer. For further details about the DiskOnChip 2000 utilities while it is plugged onto target platform, please refer to DiskOnChip 2000 utilities user manual. For the programmer installation , please refer to DiskOnChip 2000 programmer quick installation guide.

2. DiskOnChip 2000 PIK - a useful programming tool

The DiskOnChip 2000 PIK is a very useful tool for programming and duplicating DiskOnChip 2000 devices before plugging them into the target platform. This applies both to the integration and the testing stage, and in small and medium scale production stages.

During the integration and testing stage, it may be required to format the DiskOnChip using the DPFORMAT utility (since all DiskOnChip 2000 products are shipped fully tested and formatted, DPFORMAT will be rarely used), or to update its firmware without having to place it in the target platform, by using the DPUPDATE utility.

During the production stage, it is often required to duplicate the DiskOnChip which includes the source application files. In most cases, the "source" DiskOnChip will be bootable. The PIK simplifies the operation of copying the "source" DiskOnChip device onto as many as required "target" DiskOnChip devices by using the GETIMAGE utility and PUTIMAGE utilities.

3. Before you start

Make sure you have the all parts listed in the Quick Installation Guide provided with the kit. Install it according to the Quick Installation Guide. It is recommended to pay a visit to M-Systems' web site where you can find additional information and the most updated software version.

4. DPFORMAT

Before TrueFFS can access the flash media, the media must be formatted, just as a floppy disk must be formatted. Formatting initializes the media and writes into it a new and empty DOS file system. When formatting is complete, the media contains only a root directory.

The DiskOnChip is fully tested and formatted before the product is shipped, but it can be formatted more than once. Each time it is formatted, naturally all data on the media is destroyed. When reformatting, the boot-image is **retained** by default.

The DPFORMAT syntax is:

```
DPFORMAT [/SPARE:n] [/FIRST] [/S:file] [/SIZE:size]
[/USE:nnn] [LABEL:label] [/DOSVER:n] [/Y]
```

The DPFORMAT options are:

- /SPARE:n** Number of spare units. Default is 1. A value 0 selects a WORM (Write Once Read Many).
- /FIRST** Use this flag to program the DiskOnChip to be the first disk if more disks are installed in the system. This flag has no effect if the DiskOnChip is the only disk in the system. The /S parameter must be supplied when /FIRST flag is used.
- /S:file** Program the firmware *file* (.EXB) into firmware section of Flash media. This flag is usually used to with /FIRST flag or when firmware version is upgraded.
- /SIZE:size** The size of the flash media to be formatted (including the install partition). By default the entire media is formatted by DPFORMAT. This option limits the formatted size.
- /USE:nnn** Percentage of available space on the flash media to be used for file storage. *nnn* can be any number from 1 to 100. Default is 99 (99%).

The value of this option may affect the write performance of TrueFFS.
- /LABEL:label** A string to be used as the DOS label of the formatted media.
- /DOSVER:dos-major-version**
Format for a target system running the specified DOS version. The default is the current DOS version (the one on which DPFORMAT is executed). For example, /DOSVER:3 formats for DOS 3.x. Valid values are 1 to 6.

/Y Do not pause for confirmation before beginning to format.

Note: All sizes specified in DPFORMAT options are in bytes if specified as simple numbers, in KBytes if specified with the suffix **K**, or in megabytes if specified with the suffix **M**.

Example 1: DPFORMAT /S:DOC2000.EXB /FIRST

Formats the DiskOnChip as first drive using the DOC2000.EXB as firmware.

Example 2: DPFORMAT /S:DOC2000.EXB

Formats the DiskOnChip using the DOC2000.EXB as firmware. The DiskOnChip will be the last disk in case more disks are available in the system.

4.1 Configuring the DiskOnChip as a Bootable Disk

When the DiskOnChip 2000 is placed in the programmer socket, which is I/O mapped, it can't be accessed as a disk drive the way it would be if it was placed in a socket which is memory mapped on the target platform. Therefore, it is impossible to run DOS commands to make the DiskOnChip 2000 bootable ("SYS") by using the PIK. However, once a bootable DiskOnChip was generated according to the following instructions, it is possible to duplicate it as many times as required using the PIK, as described in "Duplicating DiskOnChip" (next section)

In order to make the DiskOnChip 2000 bootable, the following steps must be followed:

1. Plug the DiskOnChip into the target platform.
2. Boot from floppy or hard disk.
3. The DiskOnChip should be recognized as a disk drive. (assuming the PC was booted from hard disk which was assigned drive letter C:, the DiskOnChip will be assigned drive letter D:.
4. Run the SYS command (for example, following last assumption, type: SYS D:).

Please refer to DiskOnChip 2000 product manual for further information.

5. DPUPDATE - Updating DiskOnChip 2000 Firmware

In case a firmware update will be required, M-Systems will deliver a new .EXB file which should be written into the firmware portion of the Flash media within the DiskOnChip, using the DPUPDATE utility. (it is always recommended to pay a visit to M-Systems' web site. It may include newer software version, application notes and other useful material)

DPUPDATE requires that the DiskOnChip will be already programmed with previous firmware file programmed into, which is the default. Since the DiskOnChip is shipped fully tested and programmed.

The DPUPDATE syntax is:

```
DPUPDATE /S:BootImage /FIRST
```

/S:BootImage The boot image file of the new firmware to be written to the DiskOnChip. Usually the file type is .EXB

/FIRST Use this flag to program the DiskOnChip to be the first disk if more disks are installed in the system. This flag has no effect if the DiskOnChip is the only disk in the system. The /S parameter must be supplied when /FIRST flag is used.

Example 1: DPUPDATE /S:DOC2000.EXB

Program the firmware which is supplied in DOC2000.EXB file into the DiskOnChip located in the programmer socket. The DiskOnChip will be the last disk in case more disks are available in the system.

Example 2: DPUPDATE /S:DOC2000.EXB /FIRST

Program the firmware which is supplied in DOC2000.EXB file into the DiskOnChip which is located at the programmer socket. The DiskOnChip will be the first drive (C:) in case a hard disk is available in the system.

6. Duplicating DiskOnChip 2000

Copying DiskOnChip device is the procedure of copying a “source” DiskOnChip contents into an “image file”, then copying the “image file” contents into as many target DiskOnChip devices as required. All target DiskOnChip devices will have exactly the same contents as the source DiskOnChip, which means they will have exactly the same functionality when plugged into target platform. The only limitation for this process is that all target DiskOnChip devices must have the same capacity of the “source” DiskOnChip. For example: if the “source” DiskOnChip has a 12MB capacity then the “target” DiskOnChip should have 12MB capacity as well.

The duplicating process include 3 stages:

1. Prepare “source” DiskOnChip.
2. Copy “source” DiskOnChip into an image file.
3. Copy the image file into as many as required “target” DiskOnChip devices.

6.1 Stage 1: Creating the “source” DiskOnChip

The source DiskOnChip includes all target application files. Usually, it will be bootable (see chapter 4.1). The following commands are usually used in order to prepare the “source” DiskOnChip:

1. Format DiskOnChip with M-Systems software (DFORMAT in target platform, DPFORMAT in PIK) using version 1.04 or above.
2. Copy all target application files onto the DiskOnChip.
3. If required, make the DiskOnChip bootable (this is not a must - but mostly it is required. refer to chapter 4.1) - this operation must be done in the target platform (not in PIK)

After the source device was properly prepared, follow the guidelines described below in order to duplicate it as many times as required.

6.2 Stage 2: Copy the “source” DiskOnChip into image file

At this stage, the source DiskOnChip includes all target application files, and it is ready to be duplicated as many times as required. Each duplicated copy will function on the target platform, as the “source” DiskOnChip.

Use GETPIMG utility to copy the “source” DiskOnChip contents into an image file on disk, to be used later as source file for duplications.

1. Run GETPIMG image_file_name.
(for example: GETPIMG MYDOC.SRC)

6.3 Stage 3: Copy the image file onto “target” DiskOnChip devices

At this stage, the contents of the “source” DiskOnChip is stored in the disk in what we call “image file”. Copying this image file into target DiskOnChip, will result with identical DiskOnChip target device to the one that used as “source”. Use the PUTPIMG utility to perform this task:

1. Insert a target DiskOnChip with the same capacity as the source DiskOnChip into the PIK socket.
2. Run: PUTPIMG image_file_name.
(for example: PUTPIMG MYDOC.SRC)
3. The target DiskOnChip will have the exact contents and functionality as the source DiskOnChip when this operation is done. Repeat last stage for all target DiskOnChip need to be copied.
4. Repeat step 3 with as many target DiskOnChip devices as required.

All DiskOnChip devices programmed according to the above procedure are ready to be plugged into the target platforms, and will function exactly the same as the source DiskOnChip.