SYNTHTOOLS FLOPPY DISK TOOLKIT

GeneralMusic S-Series Floppy Disk Toolkit

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SYNTHTOOLS FLOPPY DISK TOOLKIT

INTRODUCTION
Thank you for purchasing the SynthTools Floppy Disk Toolkit.
This multi part disk utility has been designed to allow you to format and write S-Series Work Disks to any of the bios supported sizes, including the previously non listed 1.76Mb capacity.
The Kit has been carefully developed to work for both conventional floppy disk users and emulators.

OVERVIEW
The Floppy Disk Toolkit (FDT), is supplied in four parts, each having its own unique use.
Two of these parts are User Programs and are loaded into the S-Series memory.
The remaining two parts are for emulator users and include floppy images and a PC disk imager.
As you will be aware the S-Series is capable of reading different disk formats containing different types of data, but they only format Work Disks to 1.6Mb as this was considered sufficient, as well as being a capacity adopted by other manufacturers. Unfortunately, the 1.6Mb standard was not adopted by the computer industry and this has introduced a range of problems. We have addressed some of these problems with this toolkit, and hope to improve on this as we develop more.

DISK EMULATORS
If you don't know what a disk emulator is, or have not seen one, this section will be new to you, but if you do, then this chapter is useful as a refresher and will explain how the FDT can help.
Disk emulators are units that replace the physical floppy disk drive with a device that has a USB connector or SDCard slot in the front. The inserted flash drive can then contain hundreds or thousands of single files known as images. These images are copies of the floppy disks, and by selecting them via the emulator control panel you are simply doing the same job as pushing a floppy disk into the drive, after this you would format, load or save files as outlined in the S-Series manual. One of the problems with image files is creating them! To create a blank disk is simple enough but still requires the software supplied with the emulator, which is then transferred to your flash drive, but unfortunately not the new 1.76Mb capacity so this is supplied with the FDT. To create an image of one of your own S-Series 1.6Mb capacity floppy disks, or a floppy disk from one of the library images available online, requires a computer with a floppy drive and not a modern USB floppy drive, an original floppy port connector drive (legacy drive), as in the S-Series. If you still have a computer with this type of drive connected you will need a freeware Windows application called Omniflop. Omniflop reads & writes different disk formats including S-Series disks, but not the new 1.76Mb capacity so this has been fixed in the FDT. If you own a modern computer with a USB floppy drive you will require a freeware Windows application called RawWrite. RawWrite reads & writes standard PC disk formats of 1.44Mb or 720Kb capacities, both of which are supported by the FDT.

REMEMBER
S-Series disks are force formatted to the 1.6Mb capacity, and written to that size when saving. Free disk space is calculated by the S-Series MIOS using the value of 1.6Mb and not the physical space on the disk, due to a bug with the floppy disk driver. Because of this size workaround we are unable to address the displayed free mem, and for this reason it can't be relied on when saving to any of the new Work Disk formats. As the S-Series floppy disk controller bios already supported all of the new Work Disk capacities, no additional software is required to load data stored on the Work Disks they will just load seamlessly.

WHATS IN THE KIT
FDT.zip contains the following files, (format.img, 176.gem.img, FWD176.hfe, IMG.CFG, PC.zip & FDToolkit.pdf). You will also require RawWrite for windows if you have not already got it; it's available from their web site or the user area link, and possibly Omniflop also available from their web site or the user area link.

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Format.img

This is a 1.44Mb S-Series Work Disk image and contains two User Programs, FORMAT and EDISKFIX (see below). Floppy disk users will require RawWrite to copy this file to a blank disk. Once copied, you can use the new capacity Work Disk in the S-Series as normal. Emulator users can simply copy this file to your flash drive and use as normal.

FWD176.hfe

This is a 1.76Mb S-Series blank pre-formatted Work Disk image for HXC Emulator users and has been supplied because HXC have not yet included the new format in their Emulator software, but they have updated the firmware to use them. HXC emulators will read 1.76Mb (.img) files but require (.hfe) to write them correctly. We have had issues formatting (.hfe) files with firmware v5.1.1.1a so FWD176.hfe has been supplied pre-formatted ready to use. Emulator users can simply copy this file to a flash drive and rename it to suit your requirements. This file is not required by floppy disk users.

176.gem.img

This is a 1.76Mb S-Series blank pre-formatted Work Disk image and has been supplied for Flashfloppy Emulator users. Flashfloppy supports this new image size through the use of IMG.CFG detailed below. Flashfloppy will read, write and format 1.76Mb (.gem.img) files but not (.img) files as these will require renaming to (.gem.img) to prevent Disk Error. Emulator users can copy this file to a flash drive and rename it to suit your requirements. This file is not required by floppy disk users.

IMG.CFG

This is a configuration file required by Flashfloppy Emulator users to support the new 1.76Mb Work Disk image 176.gem.img detailed above. Emulator users must copy this configuration file to the root of any flash drives that contain the new 1.76Mb Work Disks to prevent Disk Error. This file is not required by floppy disk users.

FF.CFG

This is a configuration file required by Flashfloppy Emulator users to support the standard Gem 1.6Mb Work Disks. This file is only required if you have not already enabled Gem support on your Gotek drive. Copy the file to the root of a flash drive, place it in the Gotek drive and then switch on the S-Series unit. Flashfloppy will auto update the internal settings and is only required once. This file is not required by floppy disk users.

PC.Zip

This file contains the new PC application required to read\write 1.76Mb Work Disk image files to floppy disk and from floppy disk to image. This application requires a traditional floppy port connector drive, (Legacy drive), in the same way that Omniflop does. Unfortunately, this new Work Disk format like the original 1.6Mb Work Disks can't be read\written using a USB floppy drive.

If you want to use 1.6Mb Work Disks you require Omniflop, hopefully the new 1.76Mb format will be included in later versions of Omniflop as well.

FDToolkit.pdf

A copy of the file you are currently reading, the Floppy Disk Toolkit manual.

WORK DISKS

As explained S-Series Work Disks were fixed at 1.6Mb but now you have a choice.

The new 1.44Mb format is only 10% less than the original 1.6Mb but allows you the freedom to copy Work Disks from an S-Series with a floppy disk to an S-Series with an emulator with a modern laptop or computer using any USB floppy, a small price to pay for such a convenience. You can even open the image with any PC image viewer like WinImage and see the files inside, as far as we are aware you can't at present move the image contents about, but hopefully this will change in the future.

The new 720Kb format has been included just in case you want a smaller image size or own some old double sided floppy disks, but again this format is another standard PC capacity as with 1.44Mb.

The new 1.76Mb format is 10% larger than the original 1.6Mb so if you already have the kit to move

these images about then why not utilise the additional space, but if not and you are using an emulator or floppy disk then why not utilise the additional space as they are both compatible.

Remember: A Work Disk is a Work Disk the S-Series loads them without the FDT.

GETTING STARTED

If you have not already done so, please unzip the Floppy Disk Toolkit FDT.zip to gain access to the files. Download RawWrite for Windows if you have not already done so, and unzip the contents, the program does not need installing as it runs from the unzip location; this is also the location it puts any image files you may create later. Floppy disk users need to put a blank disk into the floppy disk drive and make sure it is connected to the USB port if it's a USB drive, then run rawwritewin.exe, make sure the write tab is selected, locate the FDT file format.img and click Write.   Emulator users just need to copy format.img to the flash drive you use in your S-Series as you would with any file.

WORKING WITH THE FLOPPY DISK TOOLKIT

Using the FDT is different for floppy disk users than it is for emulator users. If you only have one or the other then follow the instructions you require, but if you own both reading both is advisable.

FLOPPY DISK USER

FORMATTING A WORK DISK

Formatting a Work Disk to the original 1.6Mb capacity can be carried out exactly as listed in the S-Series manual or with the new Format User Program, to format a Work Disk to any of the new capacities you will need to load the new User Program located on the 1.44Mb Work Disk you created earlier. Place this Work Disk into the disk drive as normal and Press the DISK button on the front of the S-Series, then select Option **6** Load user program, hit ENTER, and then select Option **1** FORMAT, this loads the Format utility into the S-Series memory temporarily.

FORMAT

Before selecting any of the options, REMOVE the Work Disk containing the Format User Program and insert a new blank disk of the correct density to be formatted, (DD or HD).

Cancel (Option B)

Select this option to exit the Format User Program without formatting the disk currently in the drive. When you exit the Format User Program it will be removed from the S-Series memory.

720KB DD (Option C)

Select this option to format a double density 720Kb Work Disk, (standard PC capacity). This format can be used by RawWrite to create 720Kb image files with any type of floppy drive.

1.44MD HD (Option D)

Select this option to format a high density 1.44Mb Work Disk, (standard PC capacity). This format can be used by RawWrite to create 1.44Mb image files with any type of floppy drive.

1.6MB HD (Option E)

Select this option to format a high density 1.6Mb Work Disk, (standard S-Series capacity). This format can be used by Omniflop to create 1.6Mb image files with a legacy floppy drive.

1.76Mb HD (Option F)

Select this option to format a high density 1.76Mb Work Disk, (New S-Series capacity). This format can be used by the FDT to create a 1.76Mb image file with a legacy floppy drive.

After selecting Option B-F you will need to press <ENTER> to confirm or <EXIT> to cancel. When selecting cancel the S-Series screen will not refresh correctly, simply use the scroll wheel to correct. Once the floppy disk has finished formatting to the selected capacity the Format User Program will exit and be removed from memory. To format a new disk, start the process from the beginning. If there is a physical problem with the floppy disk and it can't be formatted, it will error and the Format User Program will exit and be removed from memory. To format a new disk, you will need to start the process from the beginning.

EMULATOR USER

FORMATTING A WORK DISK

Formatting a Work Disk is a bit different when using an emulator as you require a blank image file of the correct capacity on your flash drive before you begin the process. To do this you need to use an existing image or the HXC Floppy Emulator software available from the HXC site to create the correct blank image, and then copy it to your flash drive. If you have already been using a HXC emulator then you will be aware that standard 1.6Mb S-Series disks are created in HXC by clicking the Load Raw image button and selecting GeneralMusic GEM S3 HD, then the Create empty floppy button, followed by the Export button, you can then select the file extension you require, either (.hfe or .img) and then save the new blank image. Unfortunately, HXC have not included our new 1.76Mb capacity disk yet so blank files (FWD176.hfe and 176.gem.img) are supplied for HXC and Flashfloppy users. To use the new 1.44Mb or 720Kb Work Disk capacities you will need to use the HXC Floppy Emulator software to create a DOS/AmigaDOS disk by pressing ALT C or selecting the floppy image dropdown, then select 3.5" 1.44Mb DSHD Fat12 or 3.5" 720Kb DSDD Fat12 option from the file system type dropdown, then click the Create Disk button followed by the Save\Export button, and then save the new blank file in either (.hfe or .img), or use an existing image. You may have experienced that (.img) files sometimes require two attempts to load, (you select, then load, it fails, you select again and it loads ok, 2nd time of asking), we assume this is a problem with the Gotek emulator and not the HXC emulator but we don't have a HXC emulator to verify this, however due to this issue we have introduced a retry option to the Format User Program to prevent a disk error and subsequent exiting, however if you continue to experience problems with (.img) files use (.hfe) instead. Using (.img) files enables you to use RawWrite to convert form disk to image and back without having to convert from (.hfe to .img). If you do use (.hfe) instead of (.img), you will need to load the (.hfe) file into the HXC Floppy Disk software and export it as a (.img) before using RawWrite. Once you have the correct blank image on your flash drive you can proceed with formatting. Formatting a Work Disk to the original 1.6Mb capacity can be carried out exactly as listed in the S-Series manual or with the new Format User Program, to format a Work Disk to any of the new capacities you will need to load the new Format User Program located inside the supplied format.img file that you have also copied across to your flash drive. Select and mount format.img from the emulator front panel as normal. If you are using a Gotek drive that does not have a multi bit display screen mod kit fitted you will need to remember what file number you renamed it too. Press the DISK button on the front of the S-Series, then select Option **6** Load User Program, hit ENTER, and then select Option **1** FORMAT, this loads the Format User program into the S-Series memory temporarily.

Remember: Pre-formatted 1.76Mb Work Disk files are provided with the FDT as detailed above.

FORMAT

Before selecting any of the options, use the emulator front panel to select a blank image from your flash drive that has been created to match the format capacity you are going to use. If you select a disk image that is a different size than the format capacity it will create a disk error.

Cancel (Option B)

Select this option to exit the Format User Program without formatting the selected Work Disk. When you exit the Format User Program it will be removed from the S-Series memory.

720KB DD (Option C)

Select this option to format a 720Kb image to a 720Kb Work Disk, (standard PC capacity). Remember if you are using (.img) files, RawWrite can create a 720Kb floppy disk without conversion. If you receive disk errors using (.img) files, try using (.hfe) files instead.

1.44MD HD (Option D)

Select this option to format a 1.44Mb image to a 1.44Mb Work Disk, (standard PC capacity). Remember if you are using (.img) files, RawWrite can create 1.44Mb floppies without conversion. If you receive disk errors using (.img) files, try using (.hfe) files instead.

1.6MB HD (Option E)

Select this option to format a 1.6Mb image to a 1.6Mb Work Disk, (standard S-Series capacity). This format can be used by Omniflop to create 1.6Mb floppy disks with a legacy floppy drive.

1.76Mb HD (Option F)

Select this option to format a 1.76Mb image to a 1.76Mb Work Disk, (New S-Series capacity). HXC Emulator users may find this process fails, if this occurs skip the formatting process and use a copy of the pre-formatted file (FWD176.hfe) supplied with the FDT. Flashfloppy users need to rename any existing 1.76Mb Work Disk images from (.img to .gem.img) or a Disk Error will occur.

After selecting Option B-F you will need to press <ENTER> to confirm or <EXIT> to cancel. When selecting cancel the S-Series screen will not refresh correctly, simply use the scroll wheel to correct. Once the image has finished formatting to the selected capacity Work Disk, the Format User Program will exit and be removed from memory. To format a new Work Disk, the process will need to be started from the beginning.

If there is a problem formatting image files to Work Disks it may be the speed of your flash drive. We found when using a 4Gb unbranded flash drive we received timeout errors, and HXC recommended using a different flash drive. After changing to a Sandisk 32Gb flash drive the timeout errors no longer occurred. As mentioned above, we recommend (.img) files for ease of use, but if you encounter problems with (.img) files try using (.hfe), if this does not help, please contact us.

Flash Drives

We are currently using SanDisk Ultra Fit USB3.1 32Gb flash drives as they are low profile and very reliable. We have used Mini Micro USB2.0 4Gb flash memory stick pen drives 51004694, but experienced errors with them. It is likely that non branded USB devices experience flash lagging and we recommend reliably sourced branded devices.

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Gotek Floppy Emulator.

We are now using the Gotek floppy emulators that have been flashed with HXC or Flashfloppy firmware. They have then been fitted with the 128*32-pixel Display Module plus the additional rotary push switch for quicker file selection, and fitted with a small piezo speaker for disk access noises. If you are interested in building one of these units or purchasing one, please contact us. When using the new Work Disk capacities 1.44Mb and 720Kb only, it should be possible to fit the Gotek into an S-Series without using custom firmware. We have not tested this but the drive supports these capacities as standard but without a custom firmware upgrade it will not support the S-Series 1.6Mb and new 1.76Mb capacities, or any of the mod upgrades.

SAVING FILES TO DISK

Saving files to disk is slightly different for floppy disk users than it is for emulator users but the principles remain the same. All Work Disks can be used exactly the same as standard 1.6Mb Work Disk, using the S-Series Disk menu's (see S-Series manual), except the new 1.76Mb Work Disks. To save files to the new 1.76Mb Work Disks you need to load the EDISKFIX User Program Supplied with the FDT, you may have noticed this Option then you loaded the FORMAT User Program.

EDISKFIX
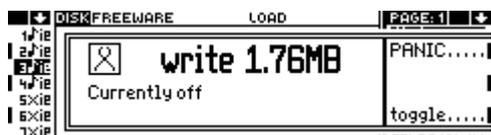
Load the EDISKFIX User Program as you did with the FORMAT User Program, just select Option 2 EDISKFIX. This User Program is loaded into memory until the S-Series is switched off and is used to toggle the S-Series standard Work Disk size from 1.6Mb to the new 1.76Mb capacity; just simply select toggle... Option F to change from currently off, to currently on.   Once you have toggled the write 1.76MB patch on, you can use the S-Series Disk menus as normal to save your files to a 1.76Mb Work Disk. EDISKFIX hooks the S-Series PANIC Button so once it is loaded into memory the S-Series PANIC button has two functions, (see diagram above). Press PANIC to enter new PANIC Options.

PANIC Option A

Emergency button as it was before (see S-Series manual), press A to send PANIC data and exit.

Toggle Option F

Toggles the write 1.76MB patch on\off, Press F to toggle off\on or on\off and exit.

Remember: - A Work Disk is a Work Disk, the S-Series will write to a 1.76Mb Work Disk without the patch Toggled on but if you want to use the additional 10% the patch needs to be Toggled on.

FLOPPY DISK USERS

When using floppy disks to save the S-Series data, simply put the formatted Work Disk in the disk drive and follow the S-Series user manual for saving different data types. If you want to use a new 1.76Mb Work Disk, just put it in the drive and Toggle the patch on before saving as normal.

Remember: - To Toggle the patch off after saving to a 1.76Mb Work Disk to avoid any issues.

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EMULATOR USERS

When using a flash drive to save the S-Series data, simply locate the image of the formatted Work Disk from the emulator front panel and select to mount it, then follow the S-Series user manual for saving different data types. If you want to use a new 1.76Mb Work Disk, just locate the image you want and mount as normal and then Toggle the patch on before saving as normal. Don't forget to Toggle the patch off, after you have finished saving to avoid any issues.

Remember: we mentioned above that the S-Series disks are force formatted to the 1.6Mb capacity and written to that size when saving, this remains the same when writing to all of the Work Disk capacities and another reason why you can't trust the displayed disk free memory, you will need to calculate the free space yourself by using the Work Disk Equations below. If you try to save more data to a Work Disk than fits, it will error as it always has, due to insufficient space. You can still use the compression function to help the data fit or simply swap to a different Work Disk capacity.

S-SERIES DISK DIRECTORY

The S-Series can display the amount of memory used by different areas, Internal, Disk or Ram Disk, (as listed in the S-Series manual under directories). By selecting the Save All Option in the disk menu and clicking directory... Option G, the S-Series will display the amount of memory used by the four listed Options, 1 Setup, 2 Bank\Song, 3 User Program & 4 Data. These values can be added together to give the total amount of space used on the selected Work Disk, RAM disk or Internal RAMFS. If you need to know exact amounts for different elements like sound or effect libraries you can do this by looking at the directories of the different Save Options, (see the S-Series User Manual).

Remember: If EDISKFIX is Toggled on, the memory sizes will not display correctly, Panic Toggle off and then use new disk... Option D to rescan the disk and refresh the memory sizes.

WORK DISK EQUATIONS

Using the directory listing mentioned above and adding the displayed memory from Options 1,2,3,4, you are given the total memory used, (U).
The Total amount of Work Disk memory is defined by its capacity size, (S), see sizes below.
The total amount of free disk space, (F) is calculated by the following equation (S-U=F).

Capacity Sizes (S)
Work Disks actually have less physical space on them than the format size suggests due to the file structure, the actual sizes are listed below.
1.76MB=1751Kb
1.6Mb=1587Kb
1.44Mb=1423Kb
720Kb=713Kb

Example
Work Disk=1.44Mb, Internal mem, Setup=1053Kb, Bank\Song 128Kb, User Program 17Kb, Data 0Kb.
Internal memory used 1053+128+17+0= 1198Kb (U=1198).
Work Disk 1.44Mb, (S=1423).
S-U=F (1423-1198=225Kb)

All data loaded in the S-Series Internal memory will fit on the current Work Disk with 225Kb free.

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PC DISK IMAGER

This is the last piece of the FDT and is used to convert 1.76Mb Work Disks from floppy disk to image and from image to floppy disk. Please extract the file PC.zip and run the floppy disk driver installer, (FdInstall.exe), after the installer completes run (fd1760rw.exe), the 1.76MB Floppy Read/Write application. Like RawWrite this application does not need installing, it runs from the extracted location, this is also the location the application stores the converted images.

1.76MB Floppy Read/Write
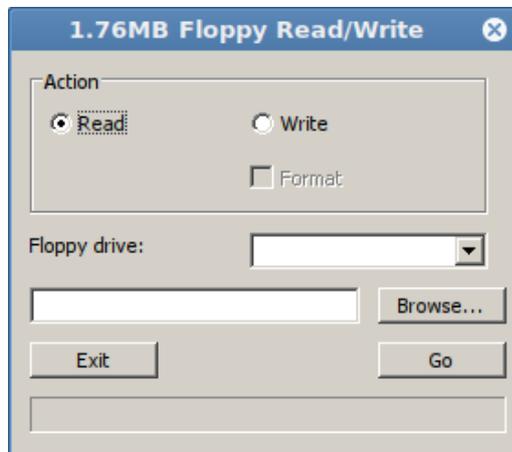
ACTION

This is the section where you select if you are reading a floppy disk to convert to an image or writing a floppy disk from an image.

Read

Select this item if you want to Read a floppy disk and create an image file.

Write

Select this item if you want to Write a floppy disk from an image file.

Format

Function not available at point of release.

Floppy Drive

Click the Floppy Drive Drop down and select the floppy drive containing the Work Disk you want to Read from, (in Read ACTION) or Write to, (in Write ACTION). Four floppy drives are supported.

Remember: If you want to Write a Work Disk, please make sure the disk in the floppy drive is pre-formatted. If the disk is not formatted, please format the disk in the S-Series floppy drive using FORMAT (see page 4), or the operation will error.

Browse

When in Write ACTION, use this button to locate and select the Work Disk image file you want to Write to the floppy disk currently loaded in the selected Floppy Drive, files can be either (.img or .gem). When in Read ACTION, use this button to select the location and input a name for the image file to be created, from the floppy disk currently loaded in the selected Floppy Drive, files can be either (.img or .gem), just remember to input filename ".gem", if left blank the default is (.img).

Exit

Click Exit, to close 1.76MB Floppy Read/Write without implementing any of the selection.

Go

Click Go, to create the selections above, either a 1.76Mb Work Disk image or a floppy disk.