MegaSD supports CD dumps with a file per track, or using a single .BIN file for the entire disc. **MegaSD doesn't support compressed audio tracks** (in MP3, FLAC, etc) and any audio tracks must be in uncompressed format (CDDA/WAV)

In order to run CD games, **MegaCD/SegaCD BIOS files are required.** BIOS files must be placed in a BIOS folder in the root of the microSD card. A proper BIOS for each region then must be selected in the options menu. MegaSD recognizes all supported BIOS files and will show a descriptive name, regardless of the file name you used. (Example: "Mega CD 2 (EU) V2.00w") When selecting a BIOS, MegaSD will only show the BIOS files compatible with the region you are configuring, that is, for EU region, only EU based BIOS will be visible (including region free patched EU and non-EU BIOS)

It's highly recommended that a BIOS corresponding to each region is selected, as some games will not work properly if using a BIOS not designed for its region. (Example: For Japan region, use an original Japanese or region free Japanese based BIOS) MegaSD will choose which BIOS to run based on the security sector of the CD you are loading. If the "Auto region patch" option is enabled, it will also try to patch the console region (not the CD region!) for non-region free BIOS. Keep in mind that running games from a different video format region (NTSC vs PAL) may cause issues such as out of sync videos, stuttering, slowdowns, etc.

Due to the way the 32X sends the data to the cartridge, **it's not possible to run CD games when MegaSD is plugged into a 32X.** In order to run CD (or 32X CD) games with a 32X, the MSDEXP adaptor (sold separately) is required and in conjunction with MegaSD will plug into the Mega Drive /Genesis expansion port.

Data bus conflicts with original Sega CD/ Mega CD hardware prevent running CD games from the MegaSD when the Sega CD1/2 or Mega CD1/2 hardware is attached to the Mega Drive/Genesis console. Removing the Sega CD1/2 or Mega CD1/2 hardware from the Genesis/Mega Drive console is required in order to play CD Games from the MegaSD. If any CD hardware model or variant is present, MegaSD will not list CD games in order to avoid bus conflict with the original CD unit. Running CD games from the MegaSD on the Multi-Mega / CDX is not possible due to this.

Backup memory
The CD backup memory will be automatically formatted to its empty state when there is no previous backup data. If the option to use a backup file per game is enabled, a file will be created for each game in the "BUP" folder inside the microSD card. If it's not enabled, a file named MEGASD.SRM will be used for all games and stored on the same folder.

MegaSD supports the internal 8KB BACKUP RAM, and an external 16KB BACKUP RAM CARTRIDGE.

You can use the built-in BACKUP RAM manager to erase, copy, format... the BACKUP RAM data. In order to access the BACKUP RAM manager, press **Ⓐ Ⓑ** or **Ⓒ** while the Mega CD / Sega CD BIOS boot animation is showing, and choose "Memory" or "Options" (depending on the BIOS version and region) to access the memory manager.

Running multi disc games
Some CD games use more than one disc, and will request the user to swap discs when needed. In order to support multi disc games, all CUE+BIN files for all the discs of a game must be placed in a single directory. That is, for a two disc game, two .CUE files and all .BIN files listed in both .CUE files must be placed in a single directory. This directory will show as a single CD game as usual in the game list. Care, however, should be taken while naming the .CUE files. When loading a game, MegaSD will scan all the .CUE files inside a folder, and will alphabetically sort them, loading the first one. Ensure your games are properly named to get the discs sorted alphabetically. Games will be listed in the intended order ("Disc 1" will come before "Disc 2", but after "disc 2", so pay special attention to capitalization).

While in game, if In-Game Menu is enabled, you can quickly tap **⬆ + START** to bring up the In-Game Menu, and choose "Change Disc" to switch to the next disc in the list.
If the in-game menu is not enabled, just do a quick press to the MegaSD button and it will switch to the next disc. You'll hear a number of beeps when switching discs, those beeps are the number of the currently inserted disc.

Running Mega Drive/Genesis/32X games
For Mega Drive/Genesis/32X games, MegaSD supports the following ROM extensions: .BIN, .MD, .SMD, .32X . Using non-byteswapped, headerless files is recommended, but MegaSD will attempt to detect the format and will properly process interleaved .SMD files, or byteswapped files. If the "Auto region patch" option is enabled, MegaSD will try to patch the console region by using the same technique that the Megakey cartridge uses.

Keep in mind that running games from a different video format region (NTSC vs PAL) may cause issues, like out of sync music, slowdown or too fast gameplay.

The region patch is not compatible with 32X hardware, so it will not work if MegaSD is plugged into a 32X unit.

Battery Backup Cartridges
MegaSD does not require nor use a battery in order to store saves for the games containing a battery backup cartridge. Instead it saves those directly on the microSD card.

Running CD enhanced Mega Drive/Genesis games
MegaSD allows enhancing Mega Drive/Genesis games with CD audio with minimal work on the original game rom. In order to enhance these modified ROMs, they must be placed in the same folder with .CUE + .BIN files for the CD data to use. Thus in the same folder there is a .CUE, one or more .BIN files, and a .MD file. Modified ROMs must always have the .MD extension. The name doesn't matter but there must be only one .MD file in the folder. If the folder contains a .MD file along with one .CUE + .BIN files for the CD data, the folder will show in the game selection list with a "MD+" icon.

Running Master System games
For Master System games, the supported ROM extension is .SMS.
MegaSD will boot the games through a simple boot code that will properly set the initial values for games requiring it (as if they were loaded from a BIOS).
While running Master System games, the MegaSD hardware button will act like the "Pause" button on a real Master System console. Use it to pause/unpause the game or access special screens that some games have when pressing the "Pause" button.

Running Master System games is not possible when 32X is plugged due a 32X hardware limitation, so 32X hardware must be removed in order to play Master System Games.

Analogue Mega Sg settings
The MegaSD cartridge is fully supported on the Analogue console, however there a couple settings that need to be changed. In the Mega Sg settings menu, under Audio, checkmark "enable cartridge & cd audio" and uncheck the option "automatically enable cd audio". Then, in the options menu on the MegaSD cart, make sure "Game Load Reset Type" is set to HARD.

Limitations
Due to internal ARM processor RAM limit, only the first 1,000 files in a folder are displayed. In order to list more than 1,000 files, these must be placed in separate folders. MegaSD will display FILE LIMIT EXCEEDED after the first 1,000 items are displayed.

A few CD Games may present issues with different CD BIOS versions. An example is "The Terminator" CD USA version where the game starts without CD audio music until the game is paused and un-paused if launched with 2.11X USA BIOS.

This issue is BIOS dependent and happens on original Sega CD hardware using the same 2.11X USA BIOS, but does not happen using a different BIOS version. Before submitting an issue report, replicating the issue with a different BIOS is required. The recommended BIOS versions are 2.00C or 2.00W and proper region (either fixed region or region free).

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INSTRUCTION MANUAL

MegaSD is an all in one flashcart and optical disc emulator cartridge for your Sega Genesis or Mega Drive console.

Key Features

• Complete FPGA recreation of the Sega CD/Mega-CD hardware.
• Fully supports original Genesis/Mega Drive consoles (Nomad included) and Analogue Mega Sg.
• Supports Genesis/Mega Drive cartridge games, Sega CD and Mega-CD, 32X and 32X CD (requires 32X addon) and Sega Master System games.
• Easy to use interface.
• Built in FM audio core for SMS games.
• Emulates all known cartridge mappers.
• Save State support for Genesis/Mega Drive cartridge games (8 slots per game).
• Built in cheat engine for Genesis/Mega Drive cartridge games.
• Cartridge saves to microSD card.
• Per game Sega CD/Mega-CD backup RAM and cartridge RAM saved to microSD card.
• Supports large 400GB+ microSD cards.

Requirements

MegaSD requires a FAT32 or EXFAT formatted microSD card inserted in order to play games. User must provide their own microSD card, BIOS, ROMs and CD images.

Navigating games selection menu and basic controls

The MegaSD games selection menu will display a list of the games and folders present on the microSD card.

⬆ ⬇ - Moves the cursor one game at a time, use ⬅ and ➡ to move the cursor a page up or down.

Ⓐ - MegaSD will scan the contents of the folders and display them.

Ⓐ - On a game will launch the game.

Press and hold Ⓐ - Will launch the game to the preload screen with extended game info, releasing Ⓐ will launch the game.

Ⓑ - Go back to the previous folder (unless in the root folder).

Ⓒ - Displays options menu.

Hardware Button

MegaSD has a physical button located on the right side of the cartridge, just under the microSD socket.

• Clicking this button while playing a Master System game will act like the physical PAUSE button that the Master System console has.
• Clicking this button while playing a CD or 32XCD multi disc game, will cycle through discs.
• Clicking this button while playing a Genesis/Mega Drive cartridge or 32X game doesn't perform an action.

In all cases, pushing and holding this button will exit the current game and bring up the main MegaSD games selection menu.

Options menu

• To access the options menu, press Ⓒ in the game selection screen.
• Move the cursor using ⬆ ⬇
• For On/Off options, pressing the Ⓐ button switches the value.
• For multi value options, use ⬅ ➡ to change the values
• For sub menus, press Ⓐ to enter the menu.
• Press Ⓑ to exit and save options, or scroll down until the "Back" text is selected and press Ⓐ

• **Boot to last game:** When disabled (default), the console will boot to the game selection menu when it's powered on. When enabled, the console will load and run the last selected game when powered. Hold START or the MegaSD button while booting to boot to the MegaSD selection menu to bypass this if it's enabled.
• **Auto region fix:** (default off) Attempts to automatically detect and correct the required region by the game if the game requires a different region than hardcoded on the console. MegaSD will inspect the game header to know which regions are supported, and will use a Megakey like hardware trick to alter the console region read by the game to one of the supported ones.
• **In-Game Reset:** (default on) Press and hold ⬆ + START on the controller gamepad for several seconds and you will exit your game and return to the MegaSD game selection menu.
• **In-Game Menu:** (default off) Quickly tap ⬆ + START on the controller to display an in game menu. More details on this feature later in the manual.

• **Game load reset type:** "HARD" (default), does a hard reset when loading a game and booting the menu. "SOFT" will load the games using a soft reset. HARD mode is more compatible, and it's usually required when running through a 32X hardware or FPGA clone console. The downside is that HARD reset mode always shows the "Produced by or under license..." screen on consoles with TMSS, resulting in longer game boot time. Analogue Mega Sg owners should always leave this set to HARD.
• **Per game CD Backup RAM:** When enabled (default), stores the internal BACKUP RAM and BACKUP CARTRIDGE RAM in a separate file for each game. When disabled, the internal backup ram and backup cartridge ram are stored in a file named MEGASD.SRM
• **Select CD BIOS:** Choose the CD BIOS to use for CD games of each region. While loading a Mega-CD/Sega CD game, MegaSD will detect the region based on the CD security sector and will load the configured BIOS file for that region.
• **Emulate seek time:** (default off) Enabling this option makes MegaSD simulate the time the CD read header takes to move from a part of the disc to another. Loading data will take a bit longer, but will fix some CD audio desyncs in some games. Regardless of this option, the CD read speed will be the same as the original hardware as it only affects the seek time. There should be no need under normal circumstances to enable this as MegaSD will automatically enable and disable it as required per game.
• **Enable Master System FM:** (default on) Enabling this option activates the emulation of the Master System FM sound expansion board. Some Master System games will have enhanced sound when this option is turned on.
• **CDDA audio volume:** (default 80%) Allows setting the CD audio volume in the final mix.
• **RF5c164 PCM audio volume:** (default 80%) Allows setting the CD hardware PCM chip volume in the final mix. Both CDDA and PCM audio at 80% mimics the same audio volume levels as found on an actual Sega CD/Mega-CD unit. Setting them above 80% may lead to audio distortion.
• **Version:** Shows a screen with the cartridge serial number and firmware versions.

Accessing the game selection menu

If "Boot to last game" option is not enabled, the game selection menu will always show when booting the console.

If "Boot to last game" option is enabled, you must hold START on PLAYER 1 gamepad or hold the MegaSD hardware button while the console starts in order to access the game selection menu.

Note that you must hold the START button the entire time the "Produced by or under license..." screen is showing, until it disappears, to access the menu.

While in game, if the in-game menu is enabled, you can return to the game selection menu by entering in-game menu and selecting the "Return to Menu" option. Also you can hold the MegaSD hardware button for several seconds until the menu shows.

In-Game Menu details

When enabled, quickly tapping ⬆ + START on your controller will bring up an in game menu screen.

During Mega Drive or Genesis cartridge games:

• **Load State and Save State –** There are 8 slots per game to choose from.
• **Edit Cheats –** Built in Game Genie / Pro Action Replay like cheat system. RAM cheats are supported. Configured cheats are stored in the SD card so they are preconfigured the next time you boot a game (although they will all start disabled).
• **Reboot Game –** Functions just like pressing the reset button on your console.
• **Return to Menu –** Exits game and returns to the MegaSD game selection menu.

During CD games:

• **CDDA VOL and PCM VOL –** Just like in the options menu, you can adjust their levels in game.
• **Change Disc –** If the game is a multi disc game, you can change which disc is "inserted".
• **Reboot Game –** Functions just like pressing the reset button on your console.
• **Return to Menu –** Exits game and returns to the MegaSD game selection menu.

Neither SMS nor 32X games take advantage of the In-Game Menu option. In Game menu trigger requires the game to actively read the gamepads and use the vblank interrupt. It will not trigger in some scenes where the gamepads aren't read, or in games that don't use the vblank interrupt.

Running CD games

To run CD games, .CUE + .BIN or .CUE + .ISO formatted files of the games are required. These files must be placed inside a folder. You must use a separate folder for each different CD game and that folder will show as a game, instead of as a folder, in the game list.

Hardware support chart

System Hardware	Mega CD Sega CD	Mega Drive Genesis	32X	Master System
Mega Drive / Genesis (model 1 or 2)	Yes	Yes	No (requires 32X unit attached)	Yes
Nomad	Yes (needs mod for CD audio output)	Yes	No	Yes (needs mod for Master System)
Genesis 3	Yes (needs mod for CD audio output)	Yes	No (32X mod untested, it should work)	No (Master System mod untested, it should work)
Mega Drive + MegaCD	No (requires MegaCD to be removed)	Yes	No (requires 32X unit attached)	Yes
Mega Drive + 32X	No (requires MegaCD to be removed)	Yes (no region patch available)	Yes	No (requires 32X removed)
Mega Drive + MegaCD + 32X	No (requires MegaCD to be removed)	Yes (no region patch)	Yes	No (requires 32X removed)
Mega Drive + 32X + MSDEXP adaptor	Yes	No (requires MegaSD plugged on cartridge port)	Yes 32X enhanced CD games (six 32XCD games)	No (requires MegaSD plugged in cartridge port)
Multi-mega/CDX	No	Yes	No (requires 32X unit attached)	Yes
Multi-mega/CDX + 32X	No	Yes	Yes	No (requires 32X removed)
Analogue Mega Sg	Yes	Yes	No	Yes