GOSOF

Gottlieb Soundboard on FPGA

HW 4.x.x / SW 4.01

user manual

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v1.01 17.04.2026

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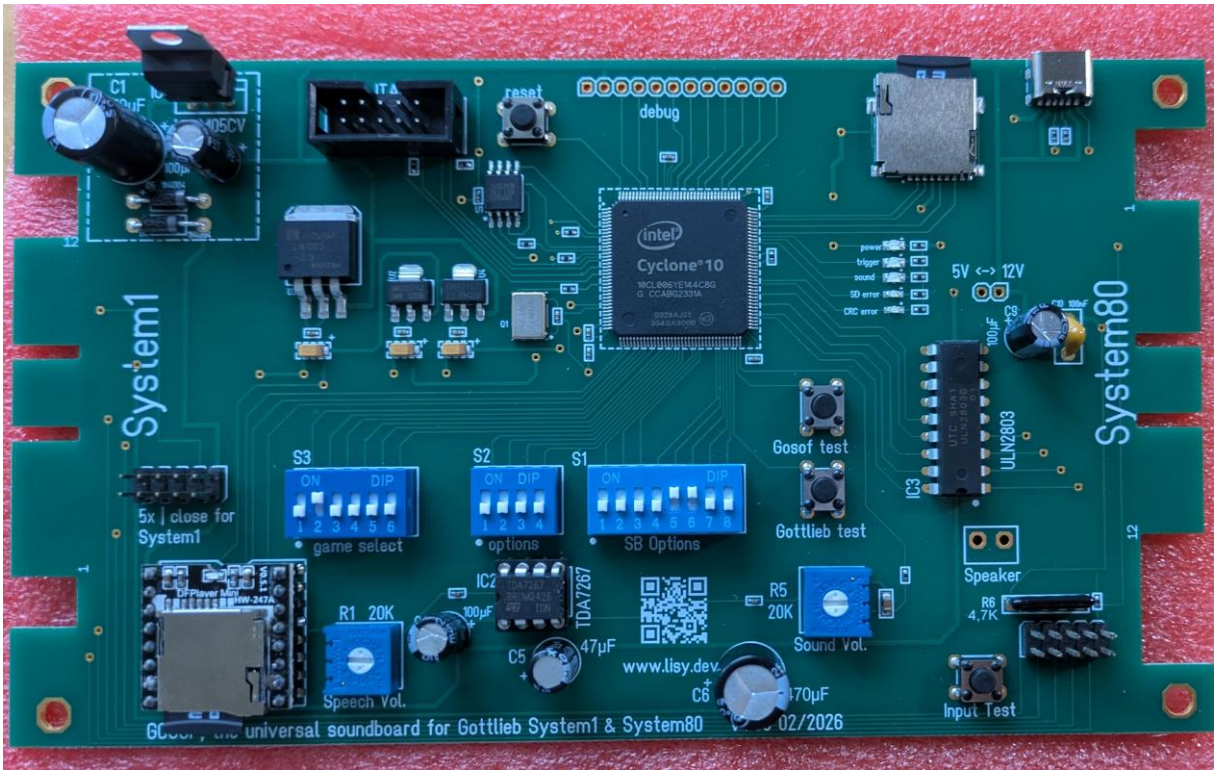
Important remark

By using GOSOF it is possible to damage your pinball machine. As this is a private project with NO commercial interest the author accepts no liability for any damage that may arise by using GOSOF!

1. Introduction

- GOSOF is a 100% hobby project. This makes the solution cheap, depending on where you buy your components it is possible to create your Gottlieb replacement Soundboard for less than 50€.

2. PCB



2.1. LEDs

Power LED -> ON if 3V power for FPGA is detected

Trigger LED -> ON if input sound signal from CPU is detected

Sound LED -> ON during sound output (LED on Miniplay goes ON when speech is running)

SD Error / CRC Error -> signals error with the SD card.

3. Installation

The Gosof board has the same connectors and same mounting holes as the original Gottlieb Soundboards, so replacing of the board can be done in seconds.

Gosof does fit for Gottlieb 'export' and 'non export' versions. In contrast to the Gottlieb Soundboard Gosof **does not need an additional power supply**. It will work **with or without** the additional power supply. No need to change your game!

Note: In case you exchange your export version soundcard to Gosof80 and choose the 'speech' version you need to replace your MPU rom! Games with export versions of Gottlieb Soundcards have roms installed which can only play 15 different sounds, where the speech soundboard can play up to 31 different sounds.

4. Dip Switch Settings

4.1. 'S1' SB options

This DIP switch bank is has the same functionality as the DIP switch bank on your original soundboard. Take a look at your Gottlieb Manual.

For 'small' soundboards which have only two dip switches use dip switches 1 & 2 of the dip switch bank (usually OFF). For 'big' soundboards it is the complete DIP bank. Usually you have to switch ON Dip#5 & #6 (speech & background sound enable)

4.2. 'S2' options

These are the options for your Gosof board

4.2.1. DIP 1 (fast clock)

With DIP#1 you can adjust the CPU clock speed and with this the speed of the tones. By default is the cpu clock is 892 KHz, with Dip#1 ON it is 1042 KHz.

4.2.2. DIP2 & 3 (not used)

4.2.3. DIP4 (Test)

With DIP4 to ON Gosof do 'speak' the voice numbers. This is useful for testing, see Chapter 'Tests' for details.

4.3. 'S3' game select

With each program a number of different Gottlieb soundcards can be emulated. With this dip switch bank, you select which game will be emulated. For a complete list take a look to Appendix A

5. Testing

Gosof do provide several options for testing

5.1. 'Gosof test' switch

By pressing the 'Gosof test' witch Gosof will play all possible 30 sounds (15 in case of 'small' soundboards) for the configured game.

5.2. SB option Dip#4

With SB option Dip#4 to ON the soundnumber to play (signal from the CPU) will be said via the Miniplayer instead of playing the specific sound. (pressing 'Gosof test' with this option ON will say the numbers from 1 to 31.)

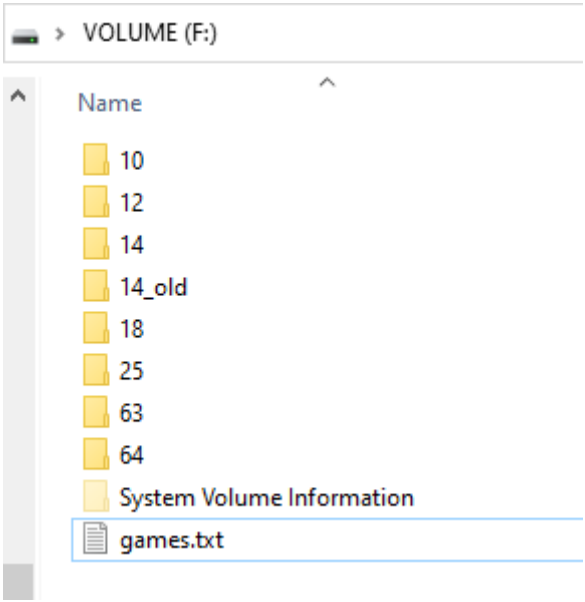
6. DFPlayer Mini

Gosof80 use a small device (‘DFPlayer’ Mini) for the speeches used by some games. The speeches are stored on a standard micro SD card in the Mini player.

You only need the DFPlayer Mini if you want to emulate a Gottlieb soundboard which is capable of producing speech (Votrax chip). Gottlieb games with speech are: Mars - Volcano - Black Hole - Devil's Dare - Rocky - Striker - Q*Bert's Quest – Caveman

6.1. speechfiles on the SD card

I do provide a ZIP file containing all speeches on my website. Just extract the ZIP archive and write it on a micro SD card. The structure should look like this:



Speech

10 - Mars

12 - Volcano

14 - Black Hole

18 - Devils Dare

20 - Rocky

23 - Striker

25 - Q*Bert's Quest

63 - Caveman

64 - Test (numbers as wav)

7. programming the on board FPGA

The FPGA on Gosof (Cyclone 10) needs to be programmed. You find a link to the current FPGA software on my web page.

You need:

- an USB Blaster which supports JTAG
- add a power supply to the USB-C connector while programming
- at least v21 of the programmer (Gosof v4 do use Cyclone 10)

(v21.1 of the Quartus programmer software for Windows can be found on my repository server https://lisy.dev/swrep/FPGA/Quartus/)

Have a look into the documentation on my web page: https://lisy.dev/documentation-01.html

8.Win32DiskImager

This article uses content from the eLinux wiki page RPi_Easy_SD_Card_Setup, which is shared under the Creative Commons Attribution-ShareAlike 3.0 Unported license

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- Insert the SD card into your SD card reader. You can use the SD card slot if you have one, or an SD adapter in a USB port. Note the drive letter assigned to the SD card. You can see the drive letter in the left hand column of Windows Explorer, for example **E:**
- Download the Win32DiskImager utility from the Sourceforge Project page as an installer file, and run it to install the software.
- Run the `Win32DiskImager` utility from your desktop or menu.
- Select the LISY image file you extracted earlier.
- In the device box, select the drive letter of the SD card. Be careful to select the correct drive: if you choose the wrong drive you could destroy the data on your computer's hard disk! If you are using an SD card slot in your computer, and can't see the drive in the Win32DiskImager window, try using an external SD adapter.
- Click 'Write' and wait for the write to complete.
- Exit the imager and eject the SD card.

Appendix A

game sel.						MA 216
S1	S2	S3	S4	S5	S6	
off	off	off	off	off	off	Mars
on	off	off	off	off	off	Volcano
off	on	off	off	off	off	Black Hole
on	on	off	off	off	off	Devils Dare
off	off	on	off	off	off	Rocky
on	off	on	off	off	off	Striker
off	on	on	off	off	off	Q*Bert's Quest
on	on	on	off	off	off	Caveman

game sel.						MA309 Soundboard
S1	S2	S3	S4	S5	S6	
off	off	off	on	off	off	Haunted House
on	off	off	on	off	off	Spirit
off	on	off	on	off	off	Krull
on	on	off	on	off	off	Goin'Nuts
off	off	on	on	off	off	Super Orbit
on	off	on	on	off	off	Royal Flush Deluxe
off	on	on	on	off	off	Amazon Hunt
on	on	on	on	off	off	Punk!

game sel.						MA 55 Soundboard
S1	S2	S3	S4	S5	S6	
off	off	off	off	on	off	Panthera
on	off	off	off	on	off	Spiderman
off	on	off	off	on	off	Circus
on	on	off	off	on	off	Counterforce
off	off	on	off	on	off	Star Race
on	off	on	off	on	off	James Bond
off	on	on	off	on	off	Timeline
on	on	on	off	on	off	Force II
off	off	off	on	on	off	Pink Panther
on	off	off	on	on	off	Volcano
off	on	off	on	on	off	Black Hole
on	on	off	on	on	off	Eclipse
off	off	on	on	on	off	Devils dare

game sel.		MA 490 Soundboard

S1	S2	S3	S4	S5	S6	
off	off	off	off	off	on	**Rack'Em UP**
on	off	off	off	off	on	**Ready... Aim... Fire!**
off	on	off	off	off	on	**Jacks to Open**
on	on	off	off	off	on	**Touchdown**
off	off	on	off	off	on	**Alien Star**
on	off	on	off	off	on	**The Games**
off	on	on	off	off	on	**El Dorado City of Gold**
on	on	on	off	off	on	**Ice Fever**
off	off	off	on	off	on	**Bounty Hunter**
on	off	off	on	off	on	**Chicago Triple Play**
off	on	off	on	off	on	**Tag Team Pinball**

game sel.						System1 Multisound
S1	S2	S3	S4	S5	S6	
off	off	off	off	on	on	**Totem**
on	off	off	off	on	on	**Hulk**
off	on	off	off	on	on	**Genie**
on	on	off	off	on	on	**Buck Rogers**
off	off	on	off	on	on	**Torch**
on	off	on	off	on	on	**Roller Disco**
off	on	on	off	on	on	**Asteroid Annie**