

**GOSOF**

**Gottlieb Soundboard on FPGA**

**Software Version 0.2**

**user manual**

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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€.

### What do you need?

- Basic soldering skills
- Possibility to read/write micro SD cards
- A PC with an USB port in order to be able to program the FPGA

## 2. Soldering

On my website I do provide bill of material and on the PCB each component is named. By using the preassembled PCB from JLC you need only solder a few components.

## 3. Quickstart

1. Order your preassembled Gosof PCB
2. Buy the additional components according to the shop cart provided
3. Do the soldering
4. Choose latest version of FPGA program fitting for your pinball game ( Appendix A )
5. Program the FPGA
6. Configure switch 'game select' according to your pinball ( Appendix A )
7. Write needed 'speeches' as wav or mp3 files to a micro SD card
8. Place the SD card into the Mini DF Player
9. Replace your original System80 or System1 Soundcard with Gosof
10. Switch the Game ON and enjoy

**Note:** steps 4&5 are only needed for game with speech, all sounds are generated by Gosof and not played from SD card.

## 4. 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.

Note: In case you exchange your export version soundcard to Gosof 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.

## 5. Dip Switch Settings

### 5.1. 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

#### 5.1.1. 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 completet list take a look to Appendix A

#### 5.1.2. options

Additional Gosof options. Not used yet!

## 6. programming the FPGA

To program the FPGA you need the Quartus Programmer.

### 6.1. programmer software

It can be downloaded from the Intel Website for free. You just need to create a user account.

<https://fpgasoftware.intel.com/13.0sp1/?edition=web>

Go to Additional Software and Download **Quartus II Programmer and SignalTap II**

Note: Use version 13.0sp1! **Do not use newer versions of the programmer.** The used FPGA for BallyFA is quite old (and therefore cheap) but is not supported by latest versions of the programmer.

### 6.2. install the driver for your USB Blaster

When connecting your USB Blaster the first time it will not be recognized correctly by Windows.



**You also need to install the driver for your USB Blaster.** The driver comes together with the installation of the programmer and is located in the 'driver' subdirectory.

- Right click on the entry in the device manager and choose 'update driver' (Treiber aktualisieren)
- Choose 'search for driver on this PC' (auf dem Computer nach Treibersoftware suchen)
- For a default installation select 'C:\altera\13.0sp1\qprogrammer\drivers'
- Confirm installation
- Now the Altera USB Blaster should be visible und 'USB-Controller'

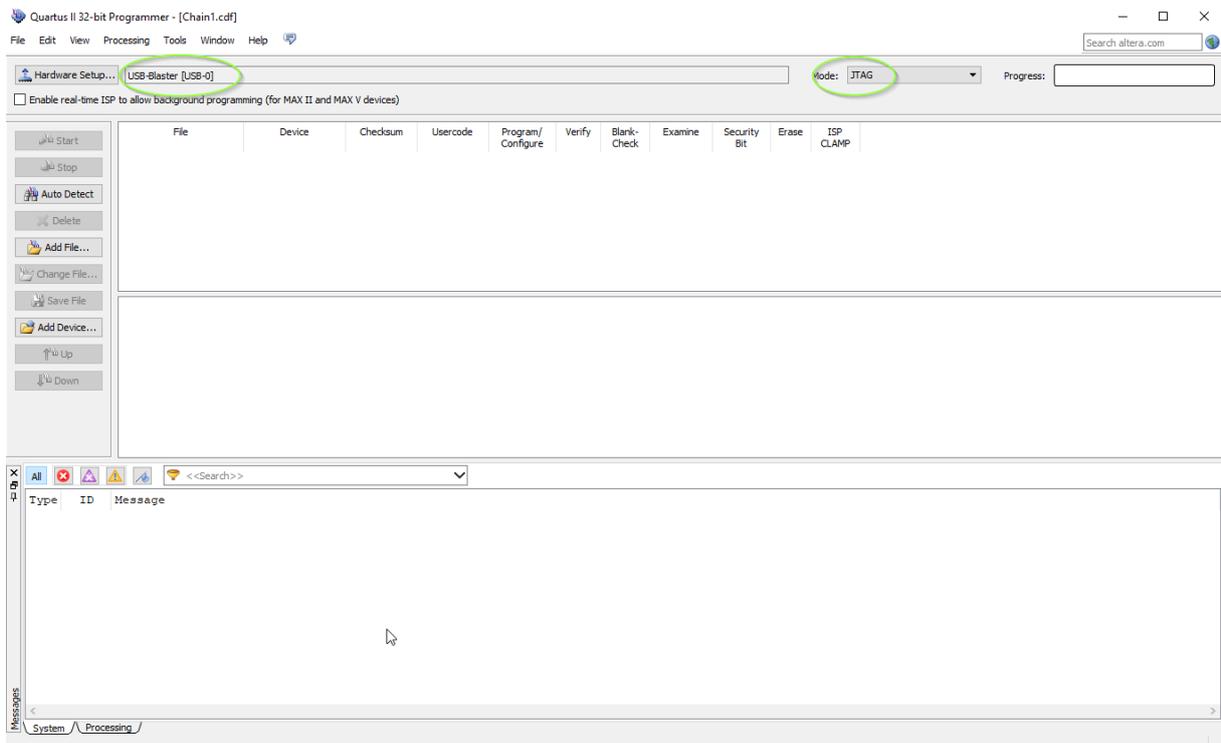


## 6.3. program your FPGA

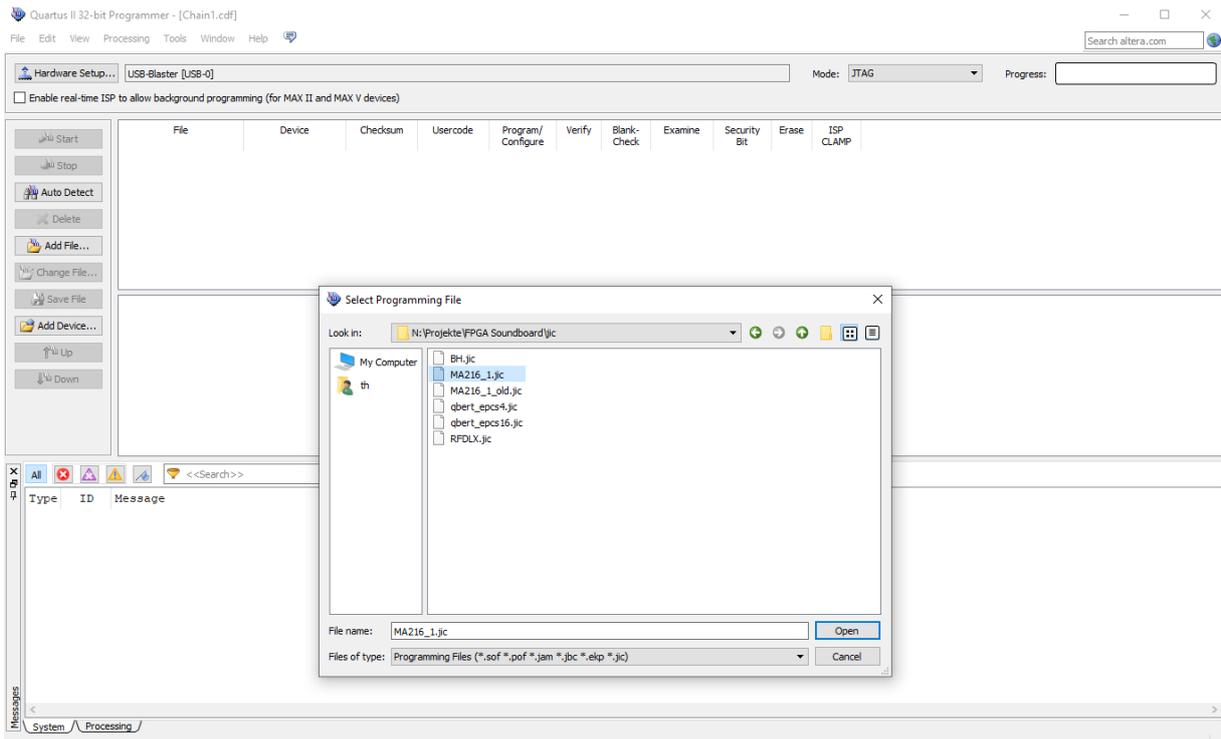
- 1) Connect the USB Blaster to the PC



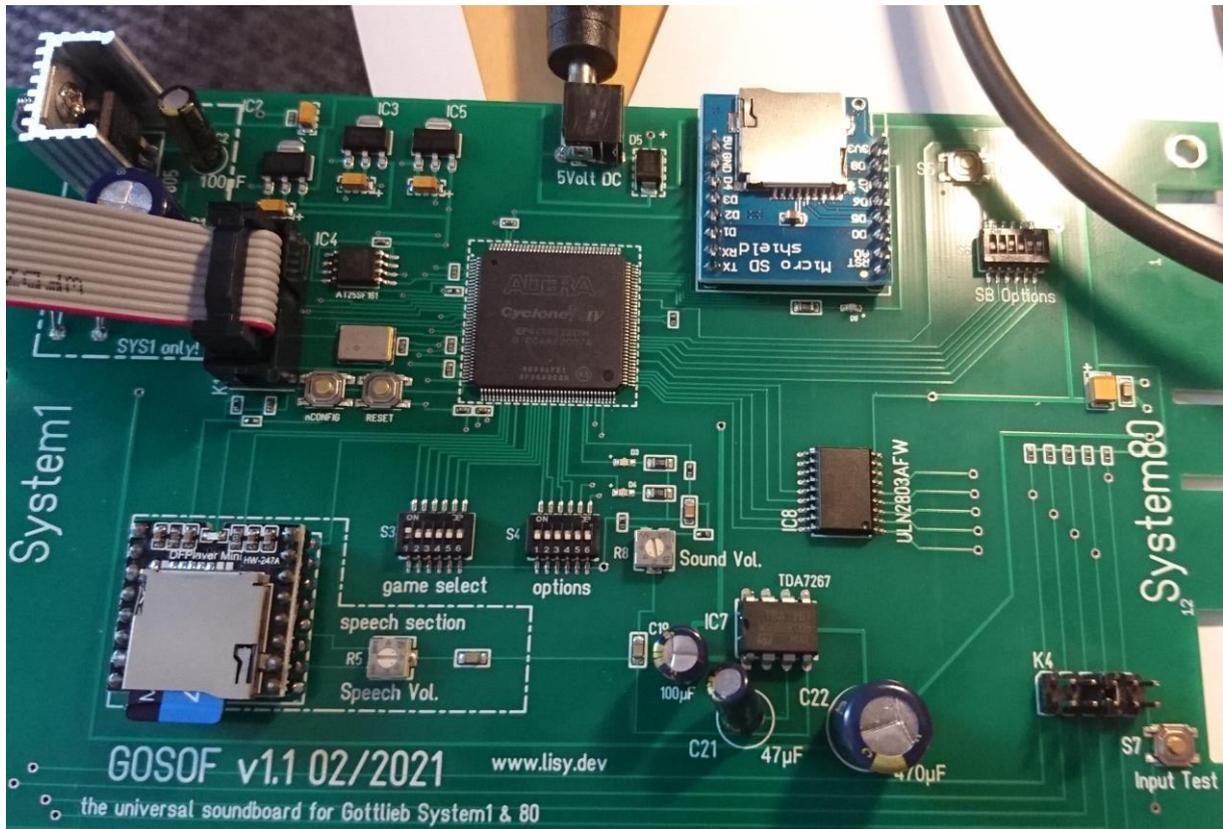
- 2) Start the programmer, make sure in the Hardware setup ,USB-Blaster' is visible and the Mode is set to ,JTAG'



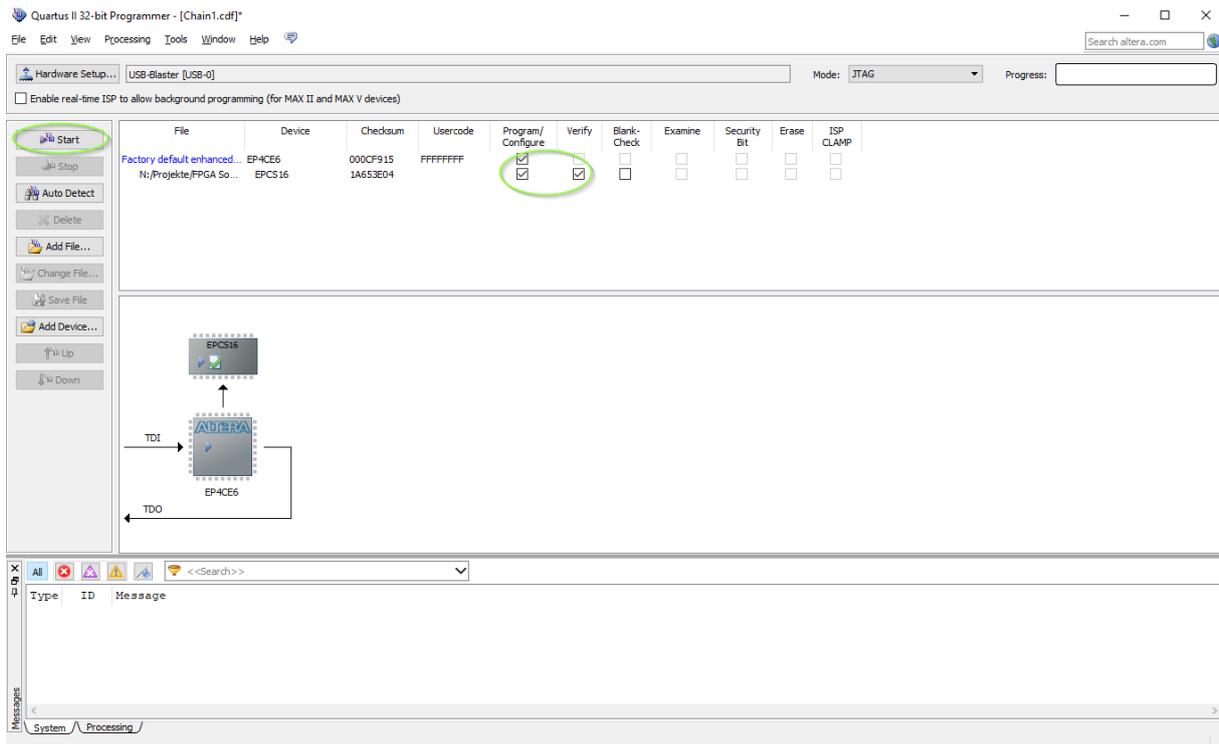
- 3) Select ,Add File' and choose the right ,jic' file for your game



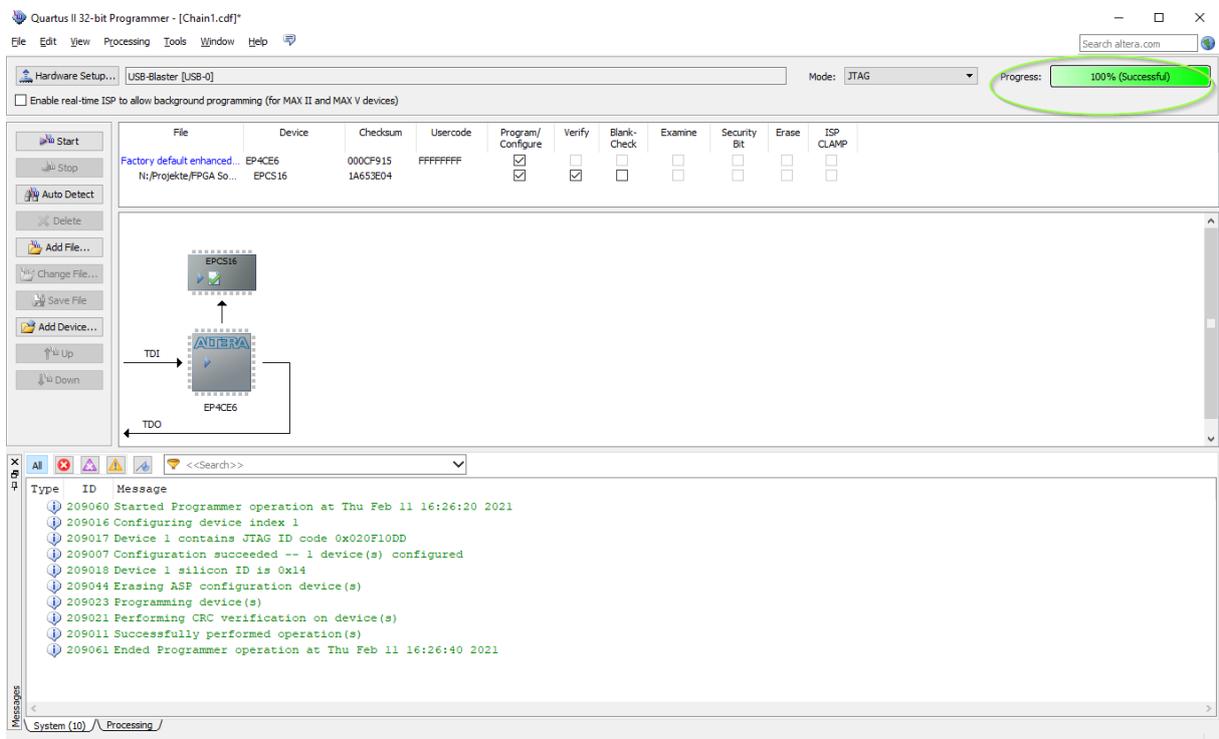
4) Power the FPGA with 5 Volt ( middle pin ,+‘, outer pin ,-,) and connect the USB Blaster to the ,programming‘ connector on the Gosof PCB



## 5) Select 'Program/Configure' and 'Verify'



## 6) Push start, wait for progress 100%



That's it!

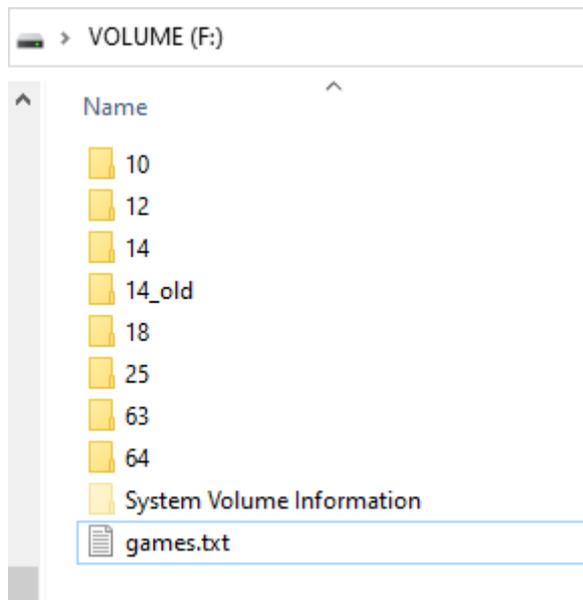
## 7. DFPlayer Mini

Gosof 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

### 7.1. 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)

## Appendix A

game sel.				System1 Multi Sound
S1	S2	S3	S4	
off	off	off	off	Totem
on	off	off	off	Hulk
off	on	off	off	Genie
on	on	off	off	Buck Rogers
off	off	on	off	Torch
on	off	on	off	Roller Disco
off	on	on	off	Asteroid Annie

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

game sel.				MA 216 Soundboard Image 1
S1	S2	S3	S4	
off	off	off	off	Mars
on	off	off	off	Volcano
off	on	off	off	Black Hole
on	on	off	off	Devils Dare

game sel.				MA 216 Soundboard Image 2
S1	S2	S3	S4	
off	off	off	off	Rocky
on	off	off	off	Striker
off	on	off	off	Q*Bert's Quest
on	on	off	off	Caveman

game sel.				MA309 Soundboard
S1	S2	S3	S4	
off	off	off	off	Haunted House
on	off	off	off	Spirit
off	on	off	off	Krull
on	on	off	off	Goin'Nuts
off	off	on	off	Super Orbit
on	off	on	off	Royal Flush Deluxe

game sel.				MA 490 Soundboard
S1	S2	S3	S4	
off	off	off	off	Amazon Hunt
on	off	off	off	Rack'Em UP
off	on	off	off	Ready... Aim... Fire!
on	on	off	off	Jacks to Open
off	off	on	off	Touchdown
on	off	on	off	Alien Star
off	on	on	off	The Games
on	on	on	off	El Dorado City of Gold
off	off	off	on	Ice Fever
on	off	off	on	Bounty Hunter
off	on	off	on	Chicago Triple Play
on	on	off	on	Tag Team Pinball