

Reverse Engineering Challenge: Eliflame Breakdown

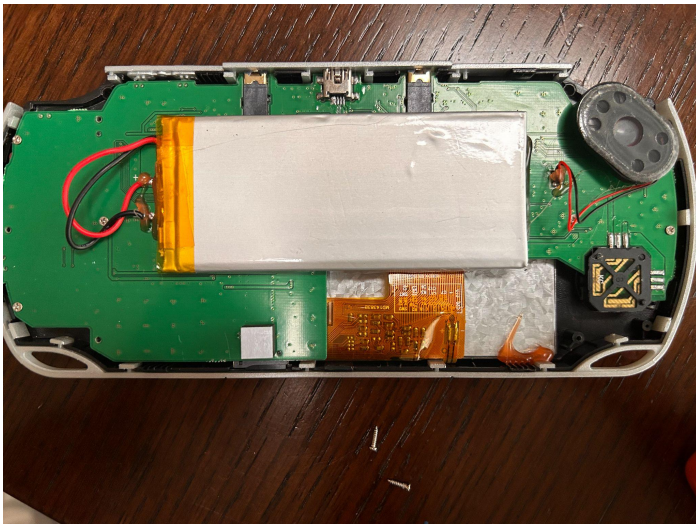
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For the VRC Middle School - Reverse Engineering Challenge, I have decided to take apart a handheld game system named the Eilflame. The Eilflame has 4800 classic games, a 5.1" HD full-color TFT screen and a 32 bit operating system. I chose to take apart and study the insides of this system since it intrigued me on how these types of handheld game systems functioned, especially since they are not the same as phone systems. In addition, they have fully functional joysticks and trigger systems all while still being able to fit the monitor in the middle. These types of machines always intrigued me on how they functioned and the inner workings.

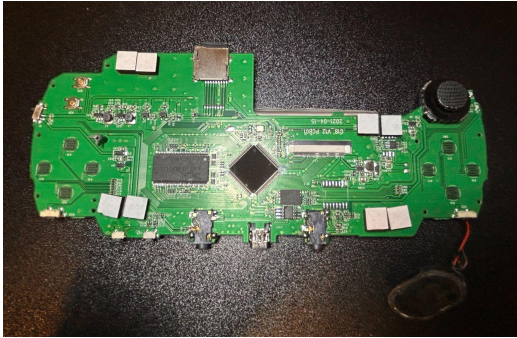


This is the Eilflame before I took it apart. There are four buttons on the left and right sides with a start and select button on the bottom right and a joystick near the bottom left. On the bottom there is a sim card port, and on the top of the system there is a sound button to increase and decrease the sound output from the console. Next to those are the audio jacks and a charging port. Finally, there is a power button on the side to turn the console on and off.

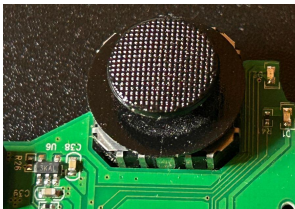
To take the console apart I had to remove 4 simple screws in the back which then allowed me to uncover the back of the console. From there there were screws connecting plastic from the motherboard onto the front frame of the console, once unscrewed and removed the main motherboard was easily accessible.



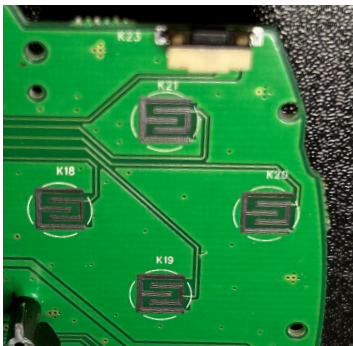
This is the back of the game console when taken apart. The main component of the back is a case which houses the battery which powers the other systems of the gaming console. The battery has a capacity of 2400 MaH



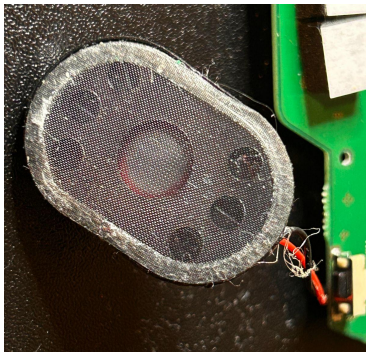
This is the motherboard. This is where all the components are housed. The motherboard allows all parts of the game system to be held and allows it for them to communicate and work together.



This is the joystick that enables movement from the user which is then displayed in game through the screen. This type of joystick is specifically a 2-axis analog joystick, which means that it lacks the x and y axis potentiometer that usual joysticks have on higher quality consoles.



These are the button sensors. There are two of these on each side of the motherboard; these are coupled with a pair of button covers that are made out of silicon plastic to protect the sensors and to allow buttons to bounce back up when pressed. These button sensors are similar to the joystick in that when they are pressed they send a signal into the monitor allowing the user to initiate an action in the game. The way these button sensors work is once they are pressed their electrical output is changed therefore giving signals to the console to do a certain action on the monitor.



This is the speaker; this is where all the noise is located. The speaker works by having the center of the speaker connected to a moving coil located on the inside which then pushes and pulls surrounding air thus creating sound.

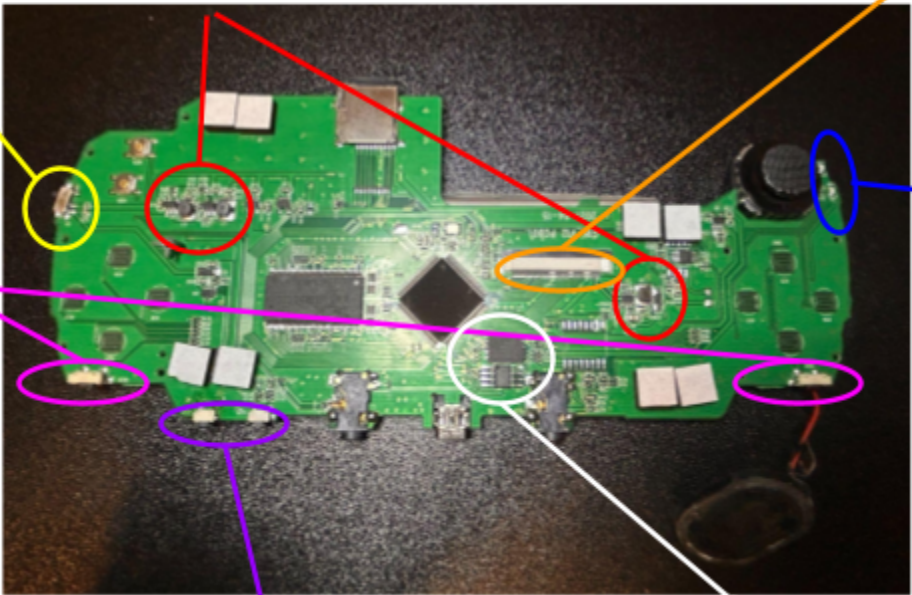
This is a switch button mechanism that turns the console on and off

These are inductors, these block out or filter high frequency noises in electrical circuits, they also store and transfer energy in power converters

This is the area where the monitor gets plugged in

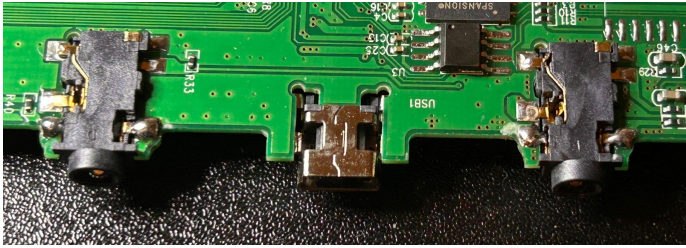
These are buttons for the triggers

These are LED units they light up based on the electrical signal they are given.

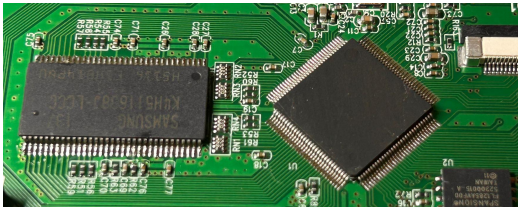


These are buttons for the volume component

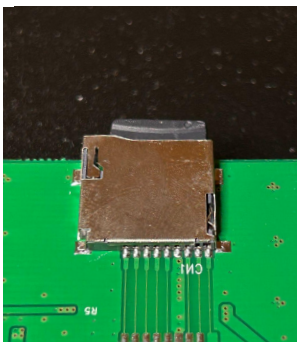
This is a flash memory component it stores data and information even when the device is powered off by earning data in units called blocks and rewriting the date at the byte level



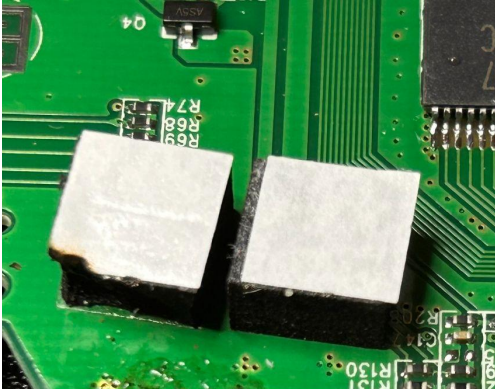
These are audio ports and the charger is in between the two, the audio ports allow for wired earphones to be plugged in or for an adapter cable that comes with the system to be plugged into a louder system, and the charger allows a cable to be plugged in to recharge the battery. The charger is a Usb mini A, which means it sends electromagnetic through inductive coupling to an electrical device which then gets stored in the battery allowing it to be used for longer uses.



These are microchips, these microchips contain data and are basically the brain of the system. The chips are from samsung, The manufacturer of the samsung chips are from TSMC through a microchip company located in Taiwan this company manufactures 54% of all the world's microchips. This specific microchip, the Id of the microchip is K4H511638J-LCCC. There are four banks operation, it includes auto & self refresh with a 7.8us refresh interval (8K/64ms refresh), the burst type is sequential & interleave while having a burst length of 2, 4, & 8, it also has a Double data rate architecture; two data transfers per clock cycle. There is only one microchip in this system but it can also be used for almost every other electronic device that requires to hold memory, although this is a cheaper microchip coming out to only 67 cents per piece, so this specific chip would most likely not get used in higher quality electronics.



This is where the memory card is housed. The sim card is 32 GBs and it stores information on the console. These types of memory cards can also be used for storing information on other devices such as cameras and other mobile devices. There are 4 main types of memory cards that are used in most electronic devices. SD, SDHC, SDXC, and SDUC, this specific memory card is a SDHC card, the main difference between all the SD cards is the storage they can hold.



The white blocks you see around the motherboards are simple foam blocks to make sure the monitor does not get damaged by any of the components in the motherboard. Since the game console is mobile these foam blocks have to ensure that nothing damages the motherboard even if the whole console is moving. So by having these foam blocks with stickers on them is a simple way to fix that problem.

This experience allowed me to learn about what each component does in the device that I play with, furthermore it amazes me how every one of these components were separately made and put together to unify and work to power a single system, this is very similar to our robots that we build in how we put different components like the drivetrain and the intake to make a complete robot that we use to compete.