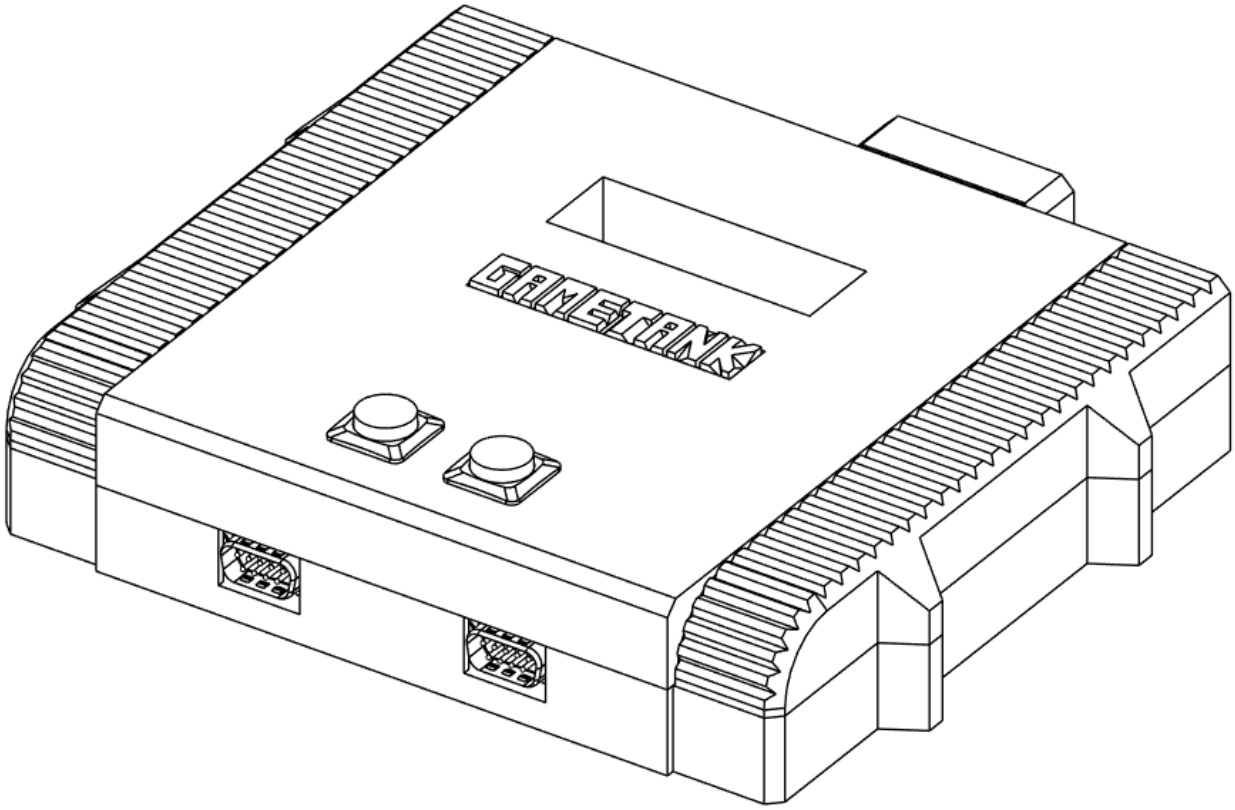
GAMETANK

Manufacturing Brief



Prepared by Clydeware, LLC
9/17/2025
Provided to Soldered for quotation

Table of Contents

Hardware Descriptions

Main Game Console Unit

A GameTank console consists of two PCBs inside a plastic enclosure. The two PCBs are connected electrically by a pair of flat flexible cables, and mechanically by four standoff fasteners. There is also a 3D-printed spacer placed in the center of the board stack. The enclosure consists of four printed parts, and two push-buttons. The buttons have a wire harness soldered on, which plugs into the motherboard in three places. The bottom half of the enclosure is one solid piece. The upper half of the enclosure has a printed decorative “badge” piece which is thermally bonded to the main upper part of the enclosure body. Lastly, a “vent” cover is placed at the rear of the console. The enclosure is held together by four screws which self-tap into the plastic.

Controller

The input device consists of an assembled PCB, a cable with an attached molded flangeless D-shape connector, four 3D printed parts, two screws, and two spacers. The printed parts include the main body of the controller in which the PCB rests, a faceplate with holes for buttons, a flexure holding four buttons and a plus-shaped directional pad, and an insert to be placed beneath the directional pad that prevents simultaneous opposite direction inputs. The cable is soldered directly to the PCB, and has a rubber strain relief boot that mates with a tab inside the controller body. The two screws are installed from the back of the controller through all other parts, and into the faceplate. The spacers support the center of the flexure, above the PCB. The faceplate is designed so that the screws self-tap.

Data Cartridge

The data cartridge consists of an assembled PCB, a 3D printed shell in two parts, and two screws. The PCB has plated finger contacts for use with the edge connector in the Console and the Flasher. The side of the PCB with mounted components is considered the front of the cartridge. The two halves of the shell have diagonal tabs to allow the cartridge to be stably held together by the two screws near the top. The screws should fit loosely through the back half of the shell, and self-tap into the front half. The cartridge may be affixed with a label bearing artwork for a particular game title. The front half of the shell has a gap to allow the label to be folded over for improved long term adhesion.

If being used as distribution media for software, the Cartridge Flasher Tool is used to load data into the flash memory of the cartridge.

Cartridge Flasher Tool

The cartridge flasher tool consists of an assembled PCB, a 3D printed base, and two screws. The AVR microcontroller on the PCB requires a bootloader and firmware. The programming header is exposed both as header pins and as Tag-Connect contacts. If the Tag-Connect header can be used for flashing at scale, the header pins may be omitted.

Bill of Materials

Main Game Console Unit – Motherboard

Qty	MPN	Description	Manufacturer
9	74HC257PW,118	Quad 2-to-1 multiplexer (HC series)	Nexperia
1	SN74HC640PWR	Octal bus transceiver, inverting	Texas Instruments
2	CD74HCT238PWR	3-to-8 line decoder/demultiplexer	Texas Instruments
61	CC0805KRX7R9BB104	Capacitor 0.1µF, 50V, X7R, 0805	Yageo
1	CC0805MRX5R5BB106	Capacitor 10µF, 6.3V, X5R, 0805	Yageo
1	CC0805KRX7R7BB104	Capacitor 0.1µF, 16V, X7R, 0805	Yageo
2	CC0805MRX5R5BB226	Capacitor 22µF, 6.3V, X5R, 0805	Yageo
1	860020273009	Capacitor 220µF, Electrolytic	Wurth
4	CD74HC08PWR	Quad 2-input AND gate	Texas Instruments
2	74HC40103PW,118	8-bit synchronous binary down counter	Nexperia
1	FR1M-LTP	Power Diode	MCC
3	74AHCT74PW,118	Dual D-type flip-flop	Nexperia
8	SN74HC163PWR	4-bit binary counter	Texas Instruments
1	AP63205WU-7	DC-DC buck converter, 5A	Diodes Inc.
11	SN74AHC573PWR	Octal latch, transparent, active-high	Texas Instruments
3	74HC04PW,118	Hex inverter	Nexperia
3	SN74HCS00PWR	Quad 2-input NAND gate	Texas Instruments
2	74AC32MTCX	Quad 2-input OR gate (AC series)	ON Semiconductor
1	74AHC30PW,118	8-input NAND gate	Nexperia
1	HDL26-SL-B	D-sub connector, 26-pin	3M / NorComp
1	DCJ200-10-A-K1-K	DC power jack	CUI Devices
3	TSM-102-01-L-SV-TR	2-pin header, 2.54mm	Samtec
1	CIGW252010GL4R7MNE	Inductor 4.7µH, 2520 size	Samsung Electro-Mechanics
2	LD09P13A4GX00LF	D-sub connector, 9-pin female	Amphenol
7	RC0805FR-073K3L	Resistor 3.3kΩ, 1%, 0805	Yageo
1	RC0805FR-07150RL	Resistor 150Ω, 1%, 0805	Yageo

5	74AHC86PW,118	Quad 2-input XOR gate	Nexperia
1	SN74HC139PWR	Dual 2-to-4 line decoder	Texas Instruments
2	F34G-1A7Q1-E8C40	Connector, Flex Cable	Amphenol Aorora
1	LFSPXO022134	Oscillator / clock generator	IQD
1	5530843-3	Card Edge Connector	TE Connectivity
1	AS6C4008-55TIN	SRAM, 512K x 8, 55ns	Alliance Memory
1	AS7C256A-15TIN	SRAM, 32K x 8, 15ns	Alliance Memory
1	CD74AC161M96	Binary counter, synchronous, 4-bit	Texas Instruments
1	W65C02S6TQG-14	WDC 65C02 CPU, 14MHz, QFP	Western Design Center
1	W65C22S6TQG-14	WDC 65C22 VIA, 14MHz, QFP	Western Design Center
1	74LVC2G07GW,125	Dual buffer, open drain	Nexperia
1	MCP130T-475I/TT	Voltage supervisor, reset IC, 4.75V	Microchip

(Main Game Console Unit- Motherboard, cont'd)

Main Game Console Unit – Audio/Visual Board

Qty	MPN	Description
2	SN74AHC573PWR	Octal D-type transparent latch
1	AD7524JRZ-REEL7	8-bit multiplying DAC
1	RCJ-013	RCA Connector, Yellow (Video Out)
1	74HC40103PW,118	4-bit synchronous up/down counter
37	CC0805KRX7R9BB104	0805 100kΩ resistor, 0.1%
1	CC0805JRNPO9BN101	0805 100Ω resistor, 1%
3	860020273009	Capacitor 220µF, Electrolytic
1	CC0805KRX7R9BB821	0805 8.2MΩ resistor
1	CC0805JRNPO9BN820	0805 8.2kΩ resistor
1	CC0805KRX7R9BB681	0805 680kΩ resistor
2	CD74HC08PWR	Quad 2-input AND gate
4	74HC4040PW,118	12-stage binary ripple counter
3	74AHCT74PW,118	Dual D-type flip-flop
1	74AC32MTCX	Quad 2-input OR gate
5	SN74HCS00PWR	Quad 2-input NAND gate
1	LM358APWR	Dual operational amplifier
1	74AHC30PW,118	8-input NAND gate
1	74AHC86PW,118	Quad 2-input XOR gate
2	SN74HC257PWR	Quad 2-input multiplexer
1	SN74ACT564PWR	Octal D-type flip-flop with tri-state outputs
1	74HC04PW,118	Hex inverter
2	F34G-1A7Q1-E8C40	Flex Cable Connector
1	SN74HC164PWR	8-bit serial-in parallel-out shift register
1	SN74HC151PWR	8-input multiplexer
14	RC0805FR-071KL	0805 1kΩ resistor, 1%
1	RC0805FR-07470RL	0805 470Ω resistor
1	RC0805FR-07150RL	0805 150Ω resistor

4	RC0805FR-073K3L	0805 3.3kΩ resistor
1	RC0805FR-0775RL	0805 75Ω resistor
1	RC0805FR-0710KL	0805 10kΩ resistor
1	RC0805FR-0768KL	0805 68kΩ resistor
1	RC0805FR-0716KL	0805 16kΩ resistor
2	MC74HC161ADTR2G	Synchronous 4-bit counter
1	8452-21A1-RK-TP	52 Pin PLCC Socket
1	W65C02S6TQG-14	65C02 CMOS microprocessor
1	THS7374IPWR	Quad, 2-channel video switch
1	8468-21B1-RK-TR	68 Pin PLCC Socket
1	RCJ-014	RCA Connector, White (Audio Out)
1	IDT7007	32Kx8 Dual ported SRAM, 55 ns or faster
1	IDT7134 or CY7C135	4Kx8 Dual ported SRAM, 20ns or faster

(Main Game Console – Audio/Visual Board, cont'd)

Main Console Unit – Combined Assembly

Qty	MPN	Description
2	15166-0434	Ribbon Cable, 0.5mm pitch, 40 pos, 127mm lg, opposite side contacts
1	RP3508ABLKYELYELNS	Pushbutton, Momentary, Yellow
1	RP3508BBLKREDREDNS	Pushbutton, Latching, Red
3	Custom (DirtyCables)	Wire Pair with JST header
4	R30-3011402	Standoffs, 14mm, M3 thread
4	Any matching	Cap screw, 8mm, M3 thread
4	Any matching	Cap screw, 20mm, M3 thread
4	Any matching	Hex Nut, M3 thread
1	SWI5-9-N-P5	9V DC Power Supply
1	Any matching	RCA Cable pair Yellow/White

Controller

Qty	MPN	Description
1	SN74HC157DR	Multiplexer IC
8	RC0805FR-073K3L	Resistor
8	KSC2 TE 01J LFS	Tactile Switch
1	Any matching	9-conductor cable with molded D-type flangeless connector
2	Any matching	Cap screw, 16mm, M3 thread

Data Cartridge

Qty	MPN	Description
4	CC0805KRX7R9BB104	Capacitor
1	M29F160FT55N3E2	NOR Flash, Parallel, 16Mbit
1	74HC595D,118	Shift Register
1	74HC244D,653	Non Inverting CMOS Buffer
1	74HC1G04GW,125	NOT Gate
2	Any matching	Cap screw, 8mm, M3 thread

Cartridge Flasher Tool

Qty	MPN	Description
7	CC0805KRX7R9BB104	Capacitor
2	CC0805JRNPO9BN470	Capacitor
1	TAJR475K010RNJ	Capacitor
1	CC0805KRX7R9BB103	Capacitor
1	CC0805JRNPO9BN220	Capacitor
2	LTST-C170KFKT	Orange LED
1	LTST-C170GKT	Green LED
1	MI0805K400R-10	Ferrite
1	USB4110-GF-A	USB-C Port
2	RC0805JR-075K1L	Resistor
3	RC0805JR-07270RL	Resistor
1	RC0805FR-0710KL	Resistor
1	EVP-BFAC1A000	Button
1	5530843-3	Card Edge Connector
1	AVR64DA64-I/PT	Microcontroller
1	FT232RNL-REEL	USB-UART Interface IC

3D Printed Parts

Main Game Console Unit

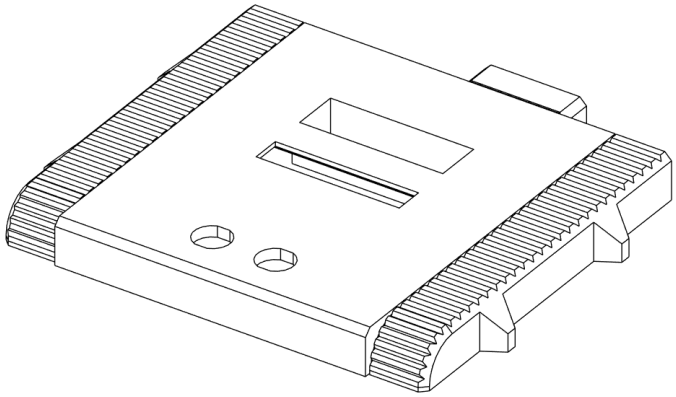


Figure 1: Upper Enclosure Body (Top view)

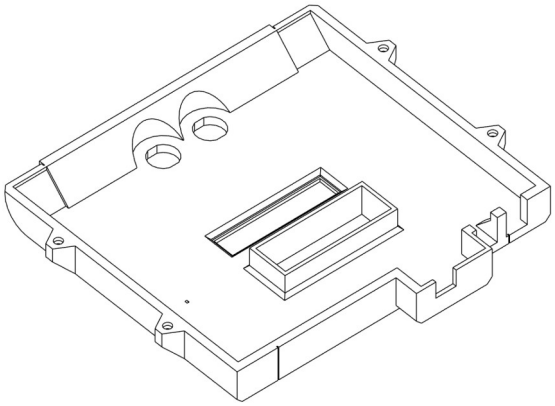


Figure 2: Upper Enclosure Body (Underside view)

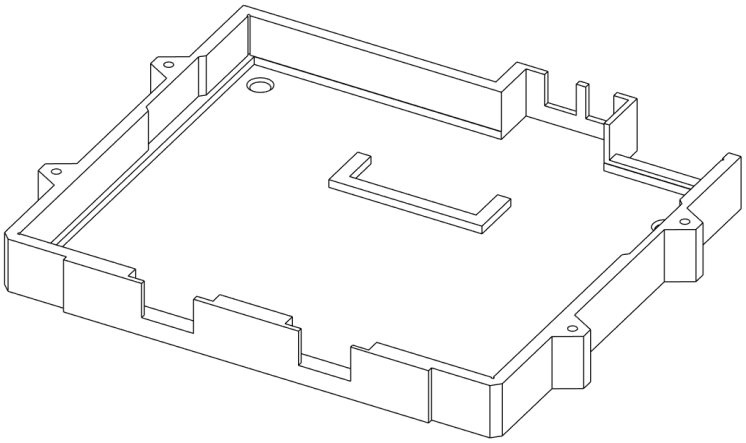


Figure 3: Lower Enclosure Body

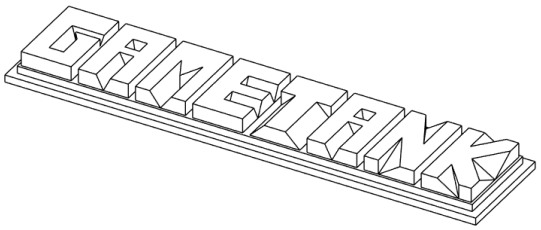


Figure 4: Badge

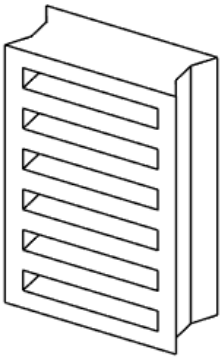


Figure 5: Vent Cover

Controller

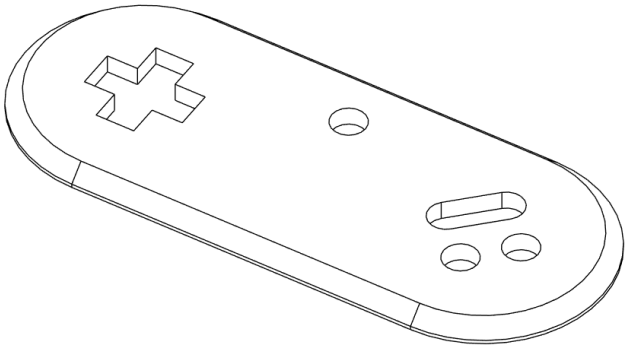


Figure 6: Controller Faceplate

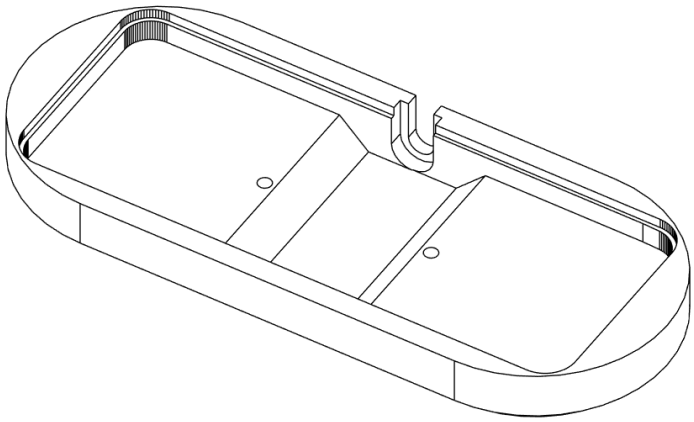


Figure 7: Controller Body

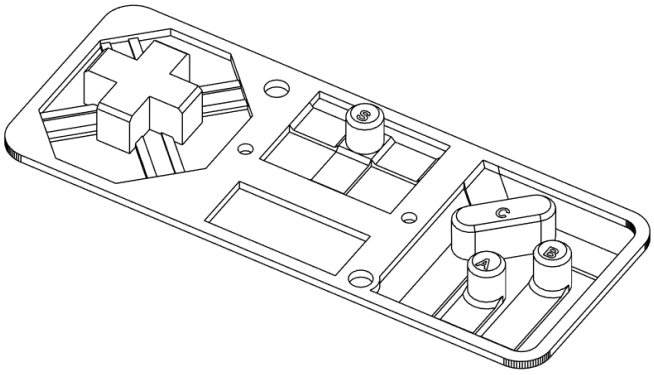


Figure 8: Button Flexure, Multi Material Print Labels

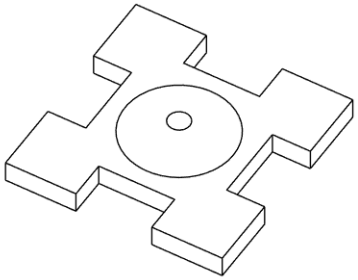


Figure 9: Directional Pad Pivot

Figure 10: Spacers (If printed)

Data Cartridge

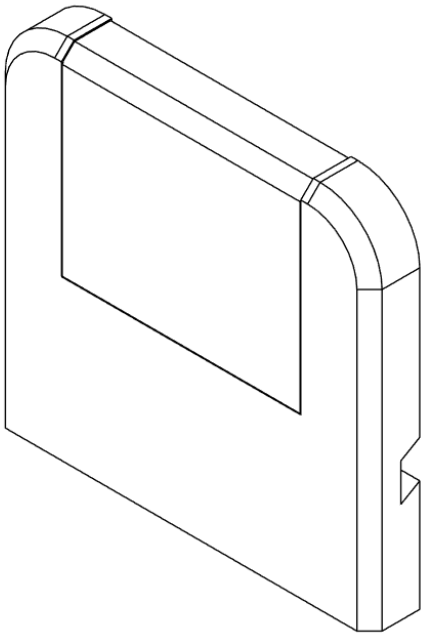


Figure 11: Cartridge Front (Outside)

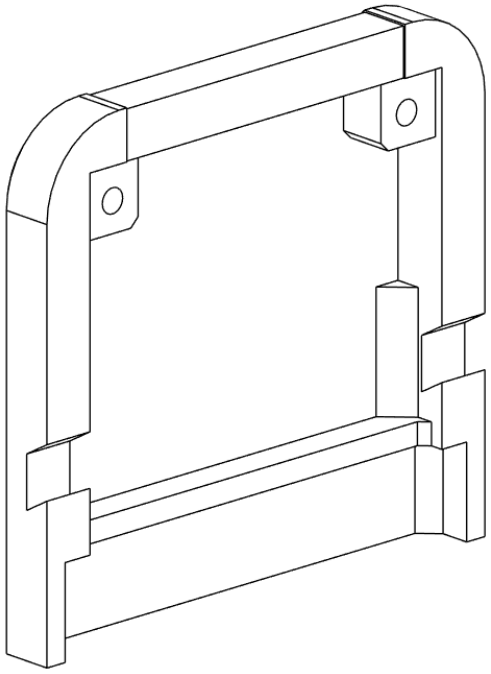


Figure 12: Cartridge Front (Inside)

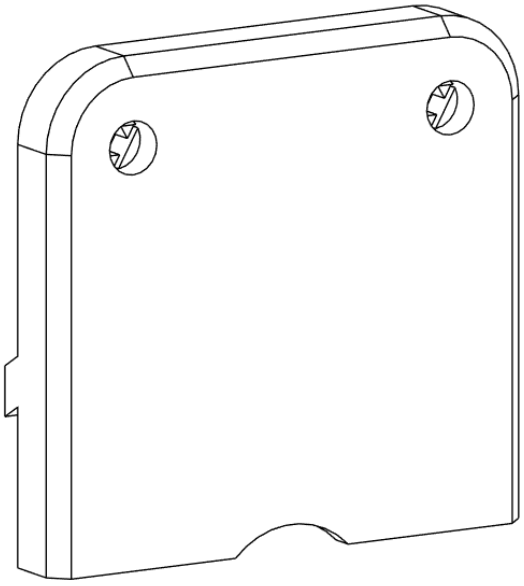


Figure 13: Cartridge Back (Outside)

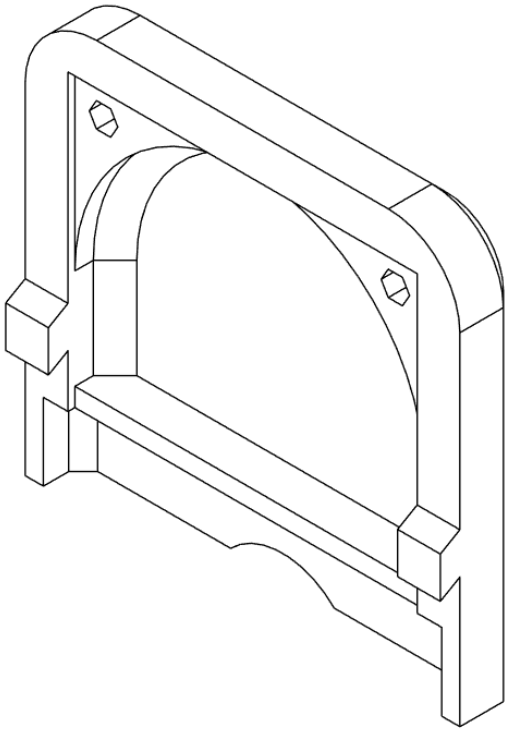


Figure 14: Cartridge Back (Inside)

Cartridge Flasher Tool

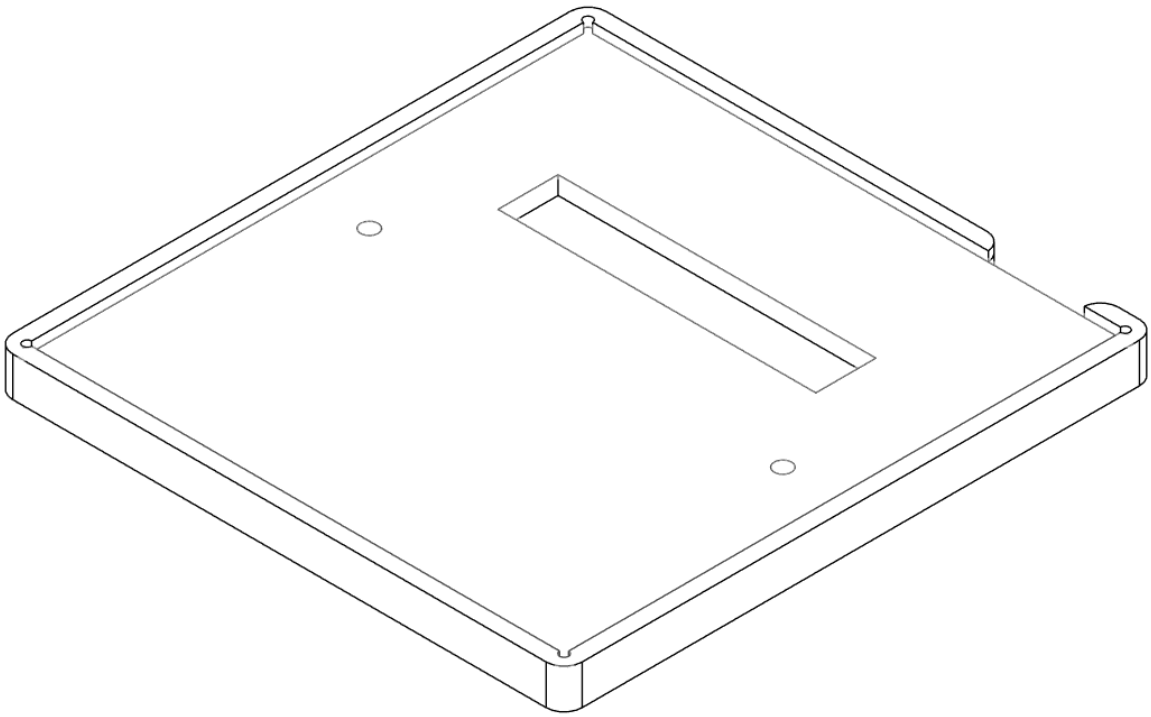


Figure 15: Cartridge Flasher Base

Assembly Procedure

Main Console PCB Stack

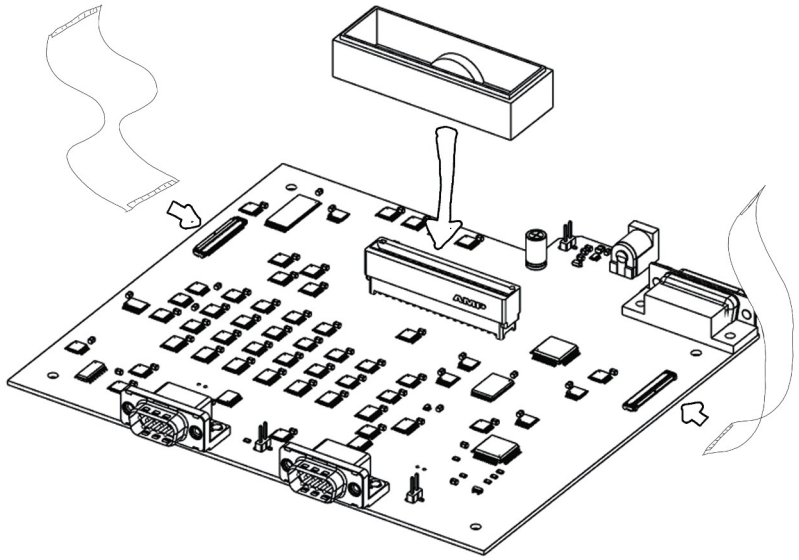


Figure 16: Install FFCs and Cartridge Slot Spacer (Ensure Bump is towards rear)

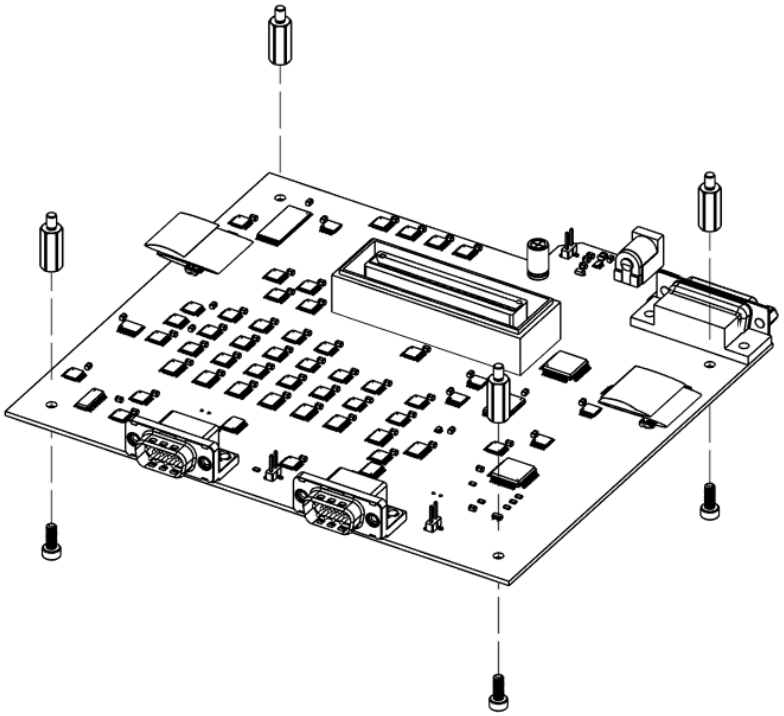


Figure 17: Install standoffs at corners with 8mm screws

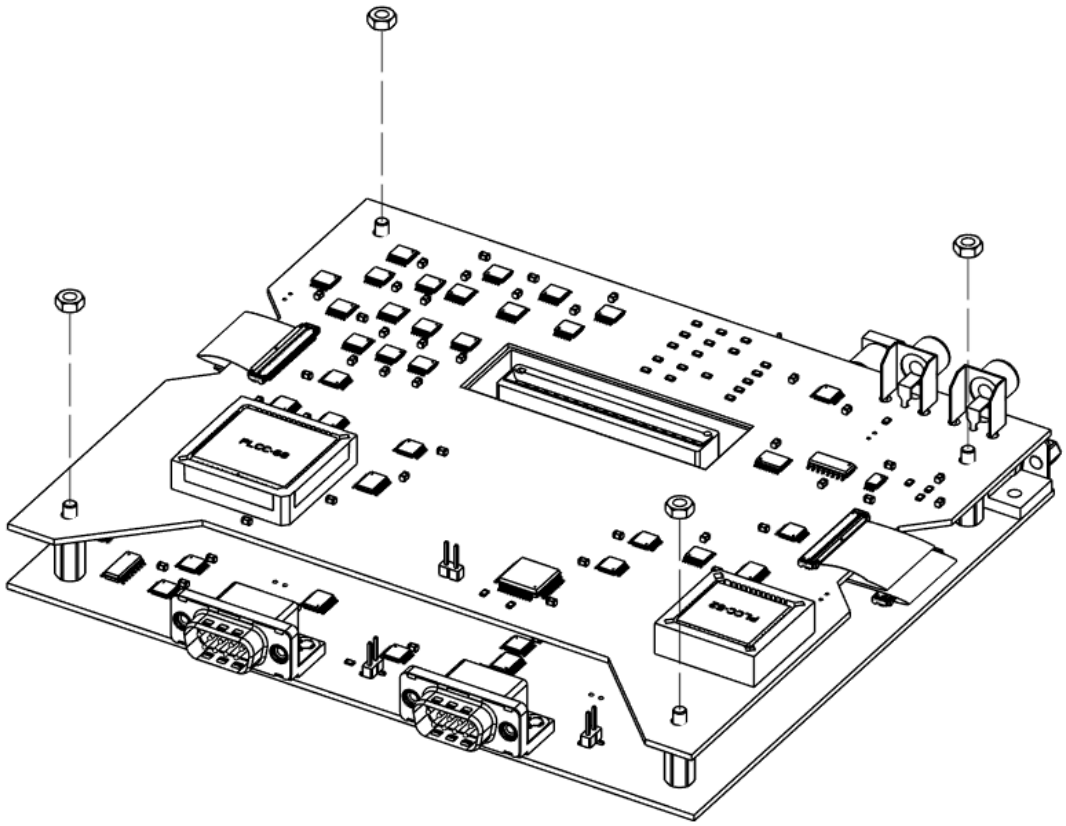


Figure 18: Place video board on standoffs, connect FFCs, and fasten with nuts

Enclosure Top Half Preparation

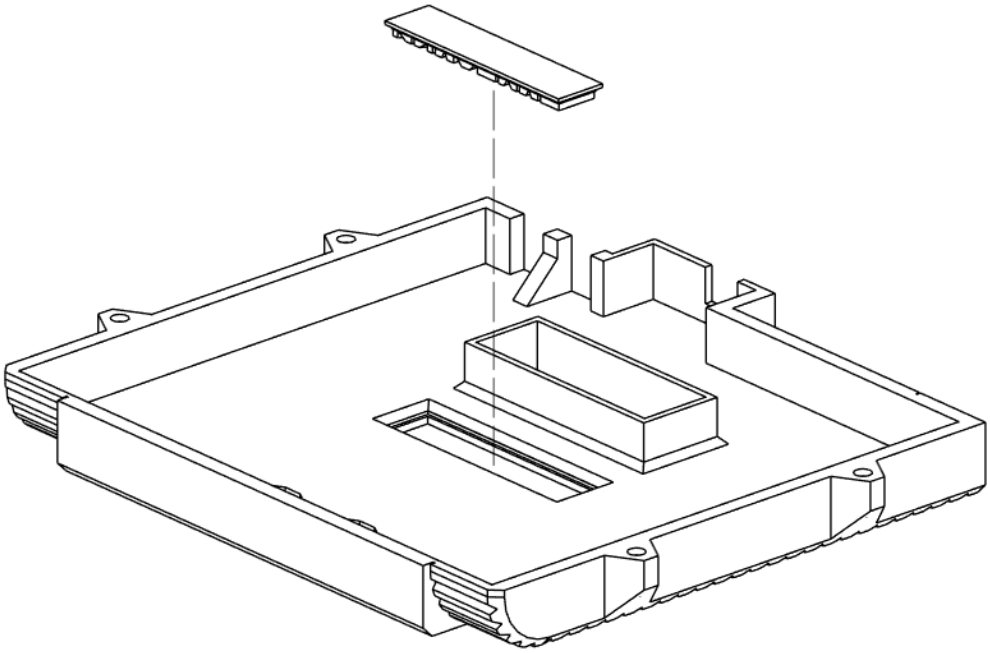


Figure 19: Snap GAMETANK badge into place from inner side

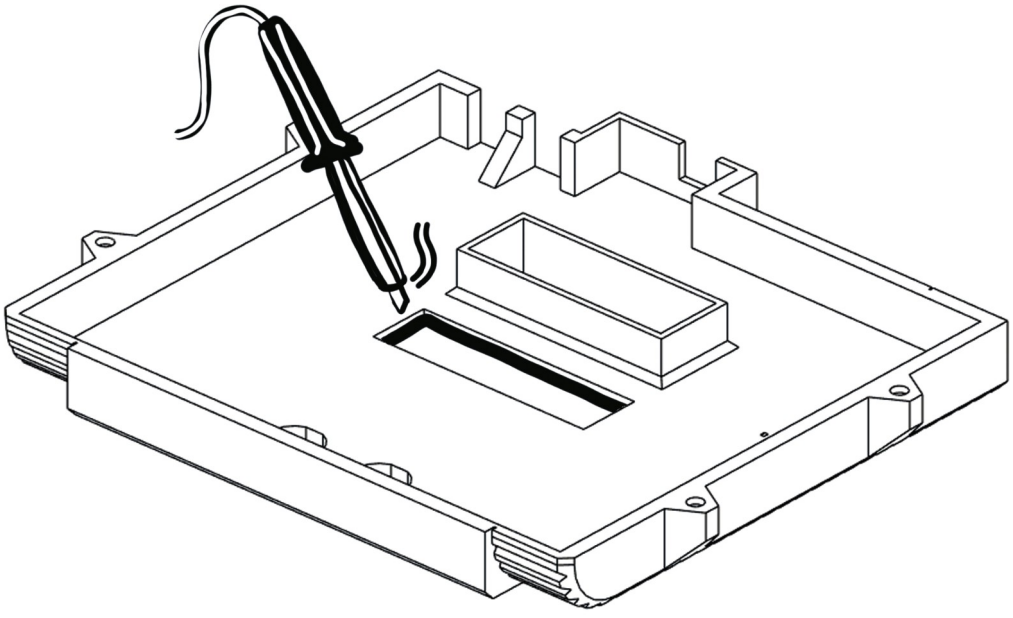


Figure 20: Thermally bond at edges

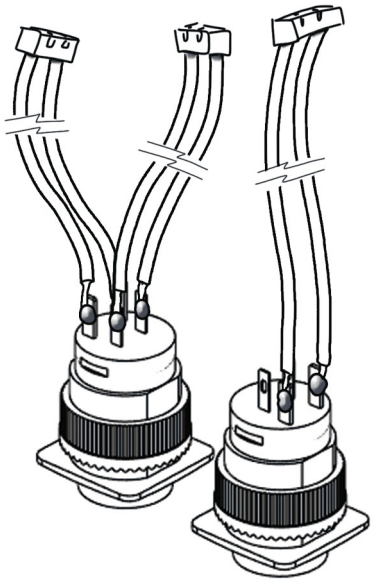


Figure 21: Soldering button wires. Red button gets wires on all terminals. Yellow button gets wires on switched terminals only.

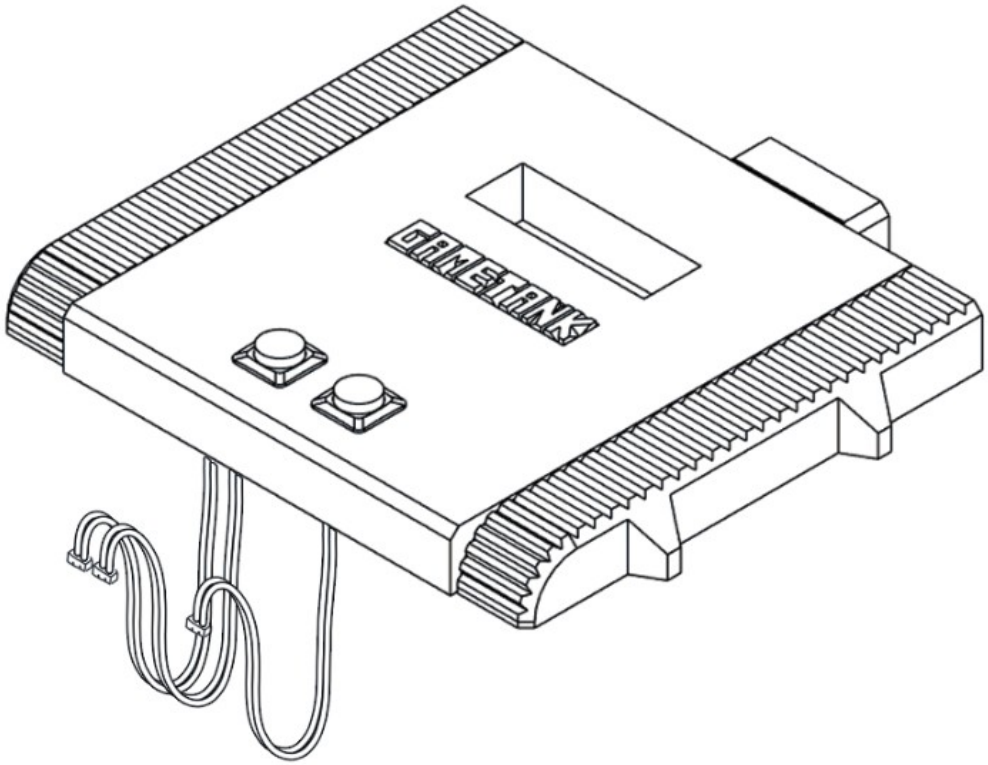


Figure 22: Thread button wires through button holes, fasten buttons with threaded collars

Combining Top Shell, PCB Stack, and Bottom Shell

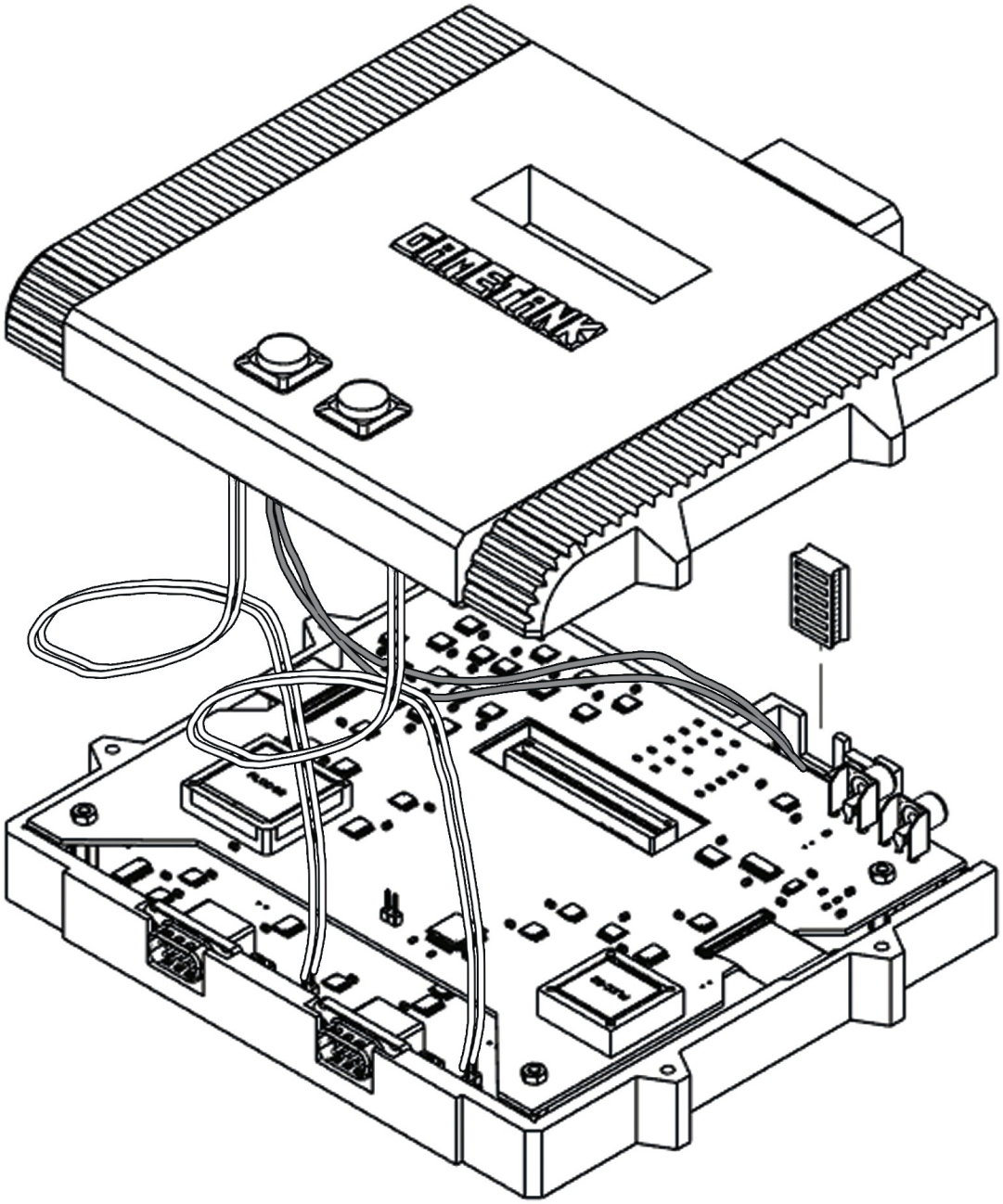


Figure 23: Wires from buttons plug into headers on board. Vent piece is also added.

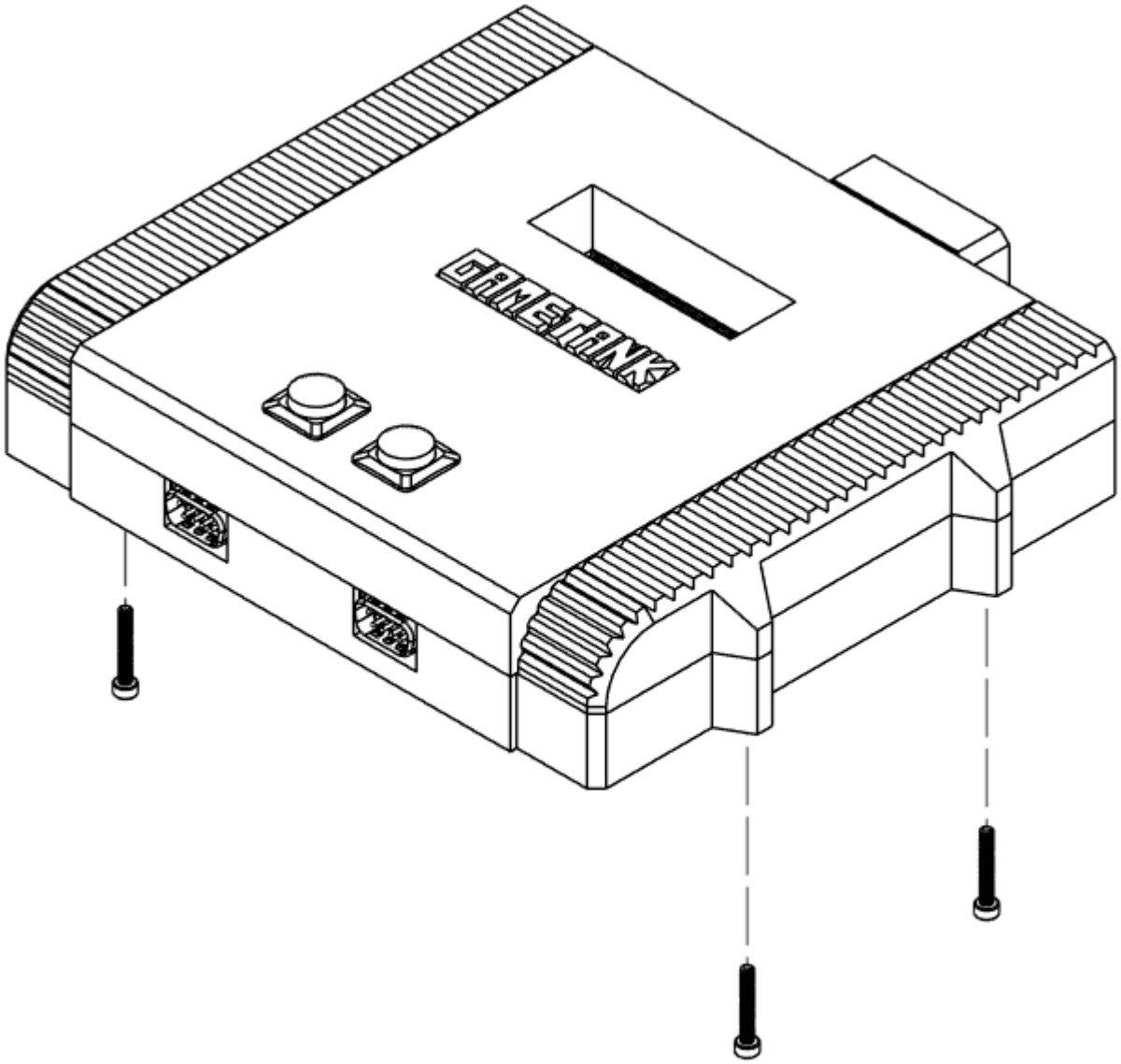
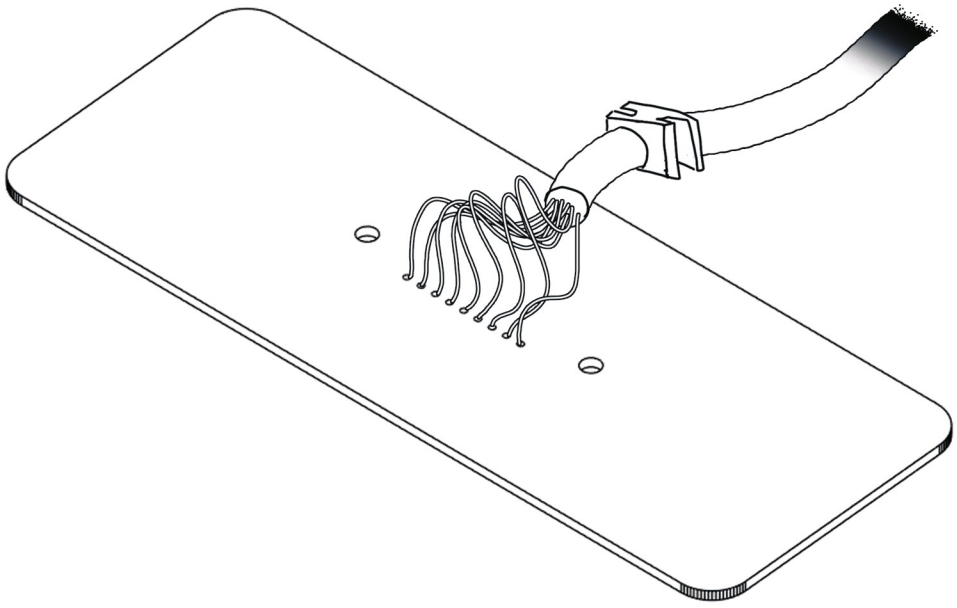


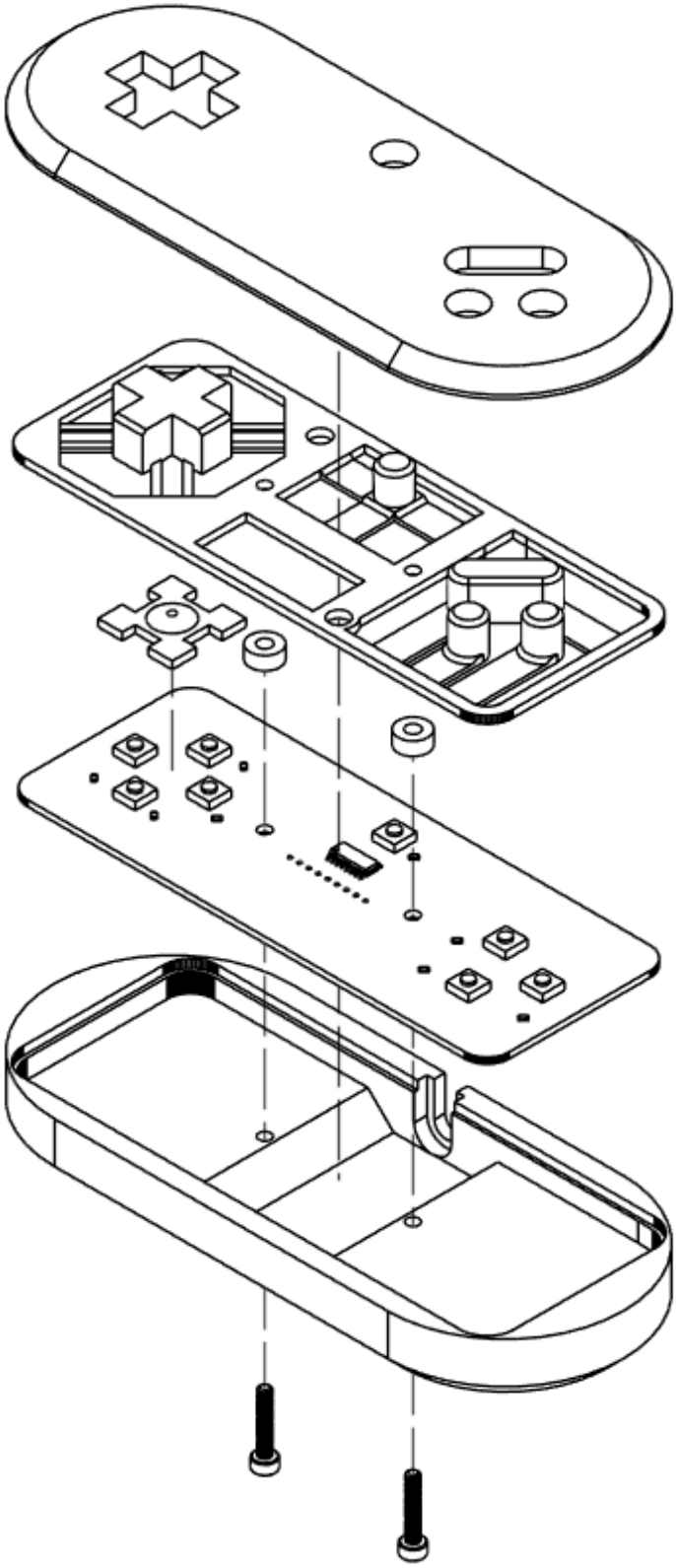
Figure 24: Fasten enclosure together with M3x20mm screws

Controller Wiring

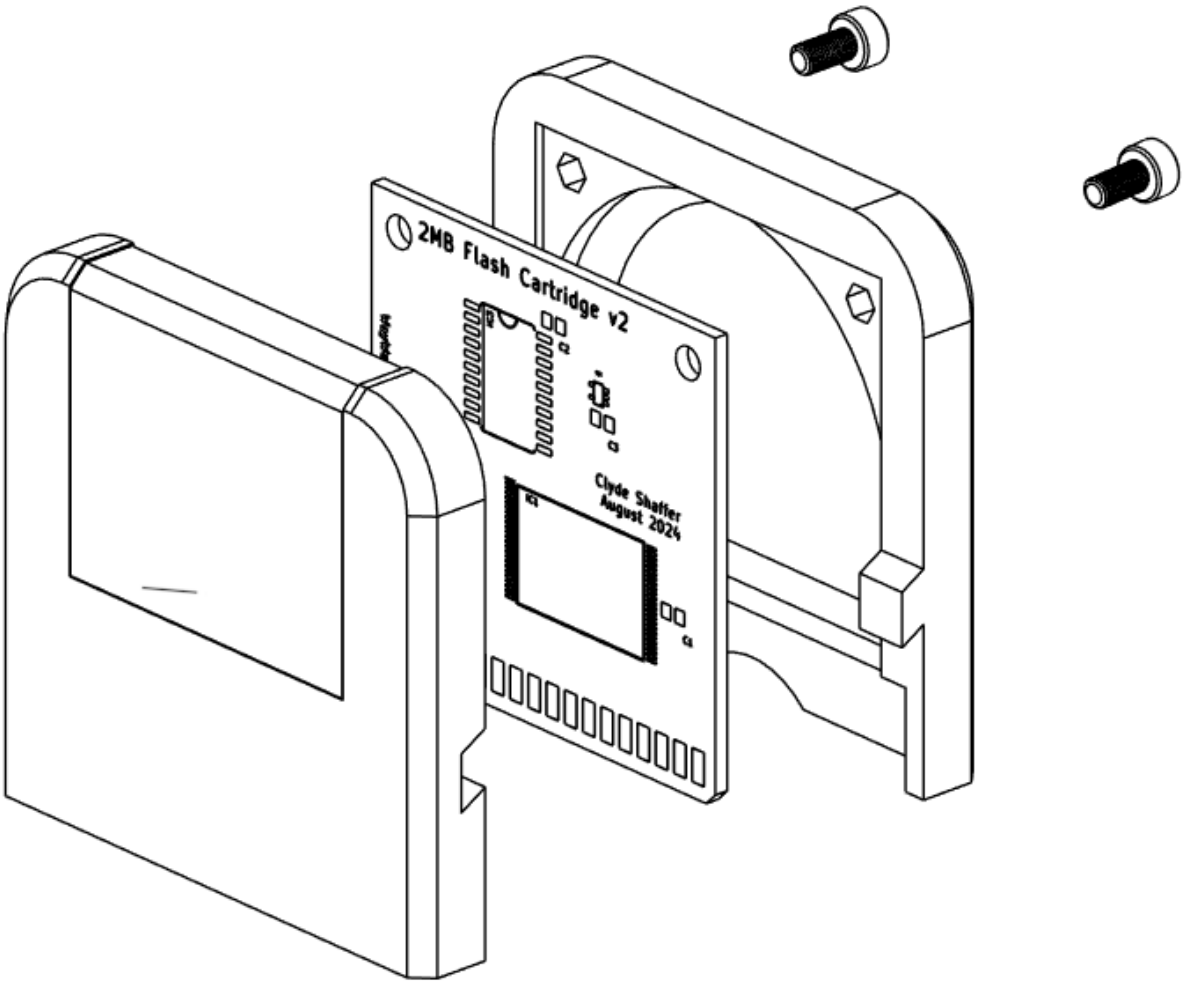


9 Wires soldered from cable

Controller Assembly

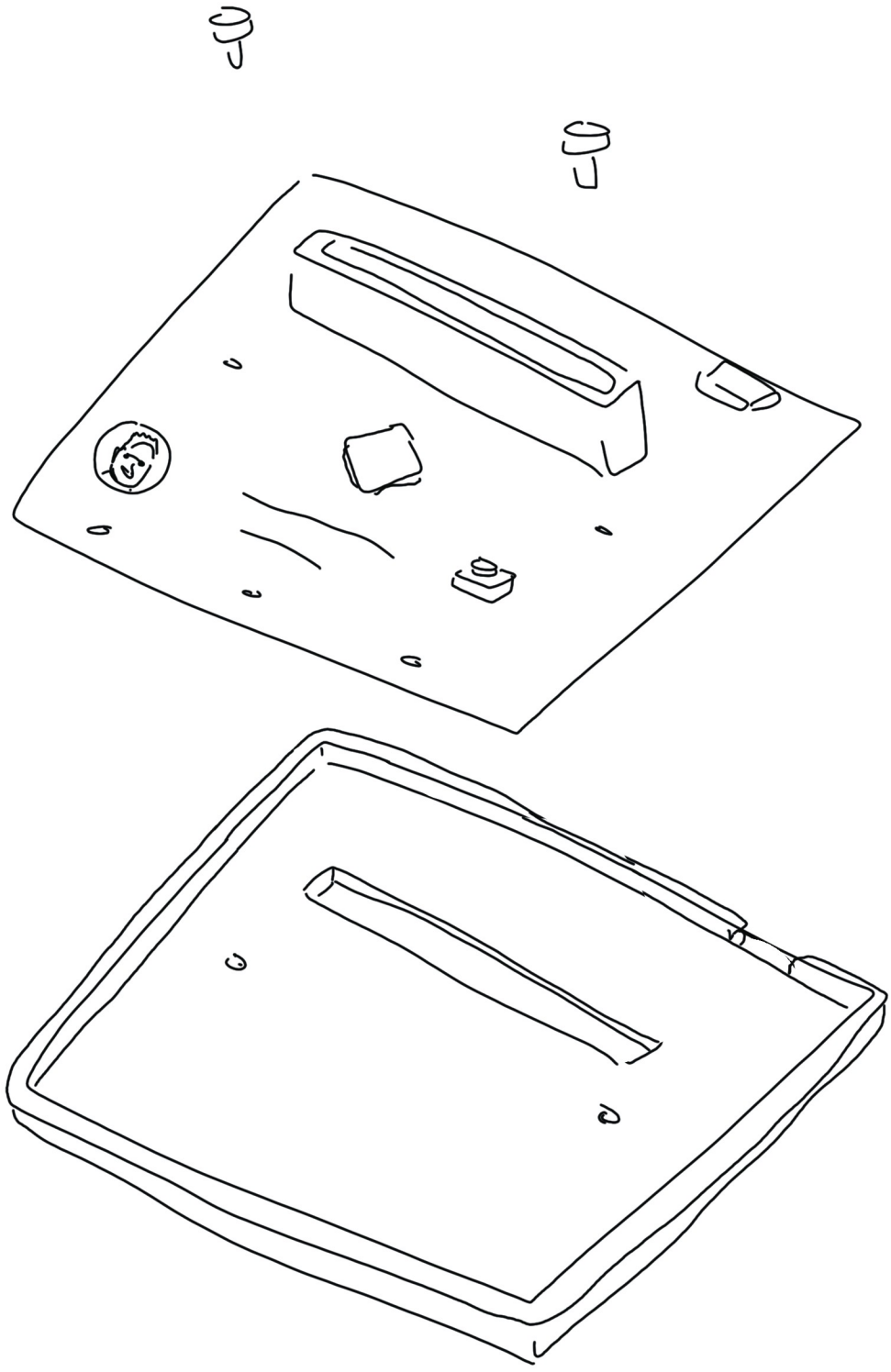


Data Cartridge



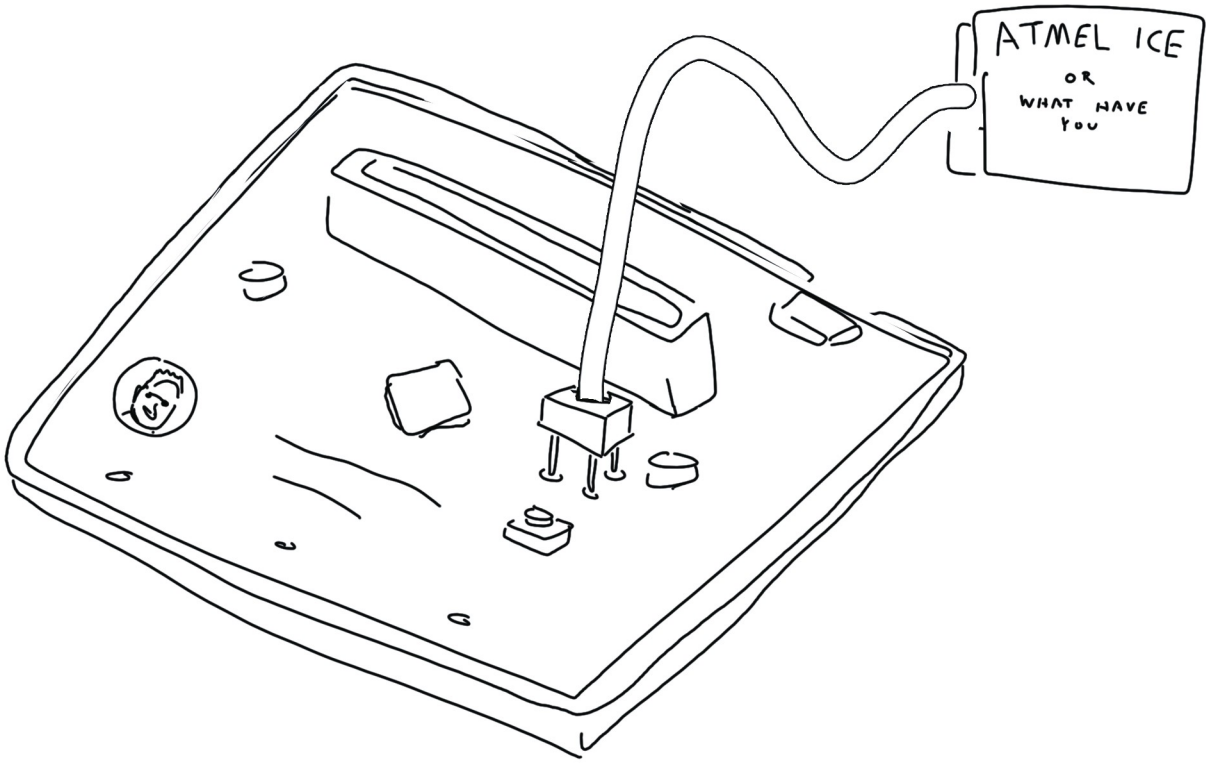
Two screws hold together the cartridge shell at the top, angled tabs stabilize the middle.

Cartridge Flasher Tool



I don’t have a CAD model handy for the flasher but it just drops in to the base plate

Cartridge Flasher Firmware



Tag Connect or generic header can be used for programming. Optiboot firmware is flashed, then over USB-C avrdude is used to load the firmware. Afterward the cart flasher should respond to “help”command over serial.

Parts Sourcing Notes

Dual-Ported SRAM IDT7007

This part has a large disparity in price between new cost from mainstream distributors (Mouser, Digikey) vs AliExpress where I've been sourcing it. A test rig may be needed to verify components are fit for purpose if sourced this way. This component is socketed on the board in case sourcing it needs to be unchained from assembling the rest of the board.

IQD 28.6363MHz Oscillator

This part has a large minimum order. I can send in a partial reel with at least 400 left, if needed.

Controller Cable

I've been using this one:
https://www.aliexpress.us/item/3256805973899559.html?spm=a2g0o.order_list.order_list_main.4.2ed51802n2melR&gatewayAdapt=glo2usa

Out of a box of 40, only two of them were random scooter turn signals so yield was 95% good. Another source if known is okay to use, though it might call for the mating features of the controller body to be redesigned if another cable has a different strain relief boot.