LEGO Boy Build Wiki

PCB Assembly & Module Instructions (Simplified) REV 0.1a

Covering: LEGO Boy Motherboard MGB-LEGO-CPU-01 | Screen Housing Module (Final Assembly Only)

WIKI SUBJECT TO CHANGE PRIOR TO FINAL PRODUCT SHIP DATE

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1. LEGO Boy Motherboard MGB-LEGO-CPU-01

PCB assembly instructions for the LEGO Boy Motherboard MGB-LEGO-CPU-01, covering CPU/SRAM scavenging, cartridge slot mounting, and external cable connections.

Bill of Materials

Item #	PN	Description	Qty
1	N/A	MGB-LEGO-CPU-01 Rev 1.0d	1
2	369200600	Molex Pico-EZmate 6-pin connector	2
3	369200500	Molex Pico-EZmate 5-pin connector	1
4	LR35902	CPU, MGB	1
5	LH52A64N-L	SRAM, MGB	1
6	N/A	32pin Cartridge Connector	1
7	N/A	Single backed adhesive foam protection strip	1
8	0369200300	Molex Pico-EZmate 3-pin connector (Power Switch cable)	1

Step 1 — Item #4: CPU MGB (LR35902) — Scavenge from Donor Board

Source: Stock Nintendo MGB-LCPU motherboard



Photo 1 — Donor board before removal. CPU MGB is the large black QFP IC in the center (U1, "CPU-MGB").



Photo 2 — Yihua 959D hot air rework station set to 790°F, airflow 4–5.

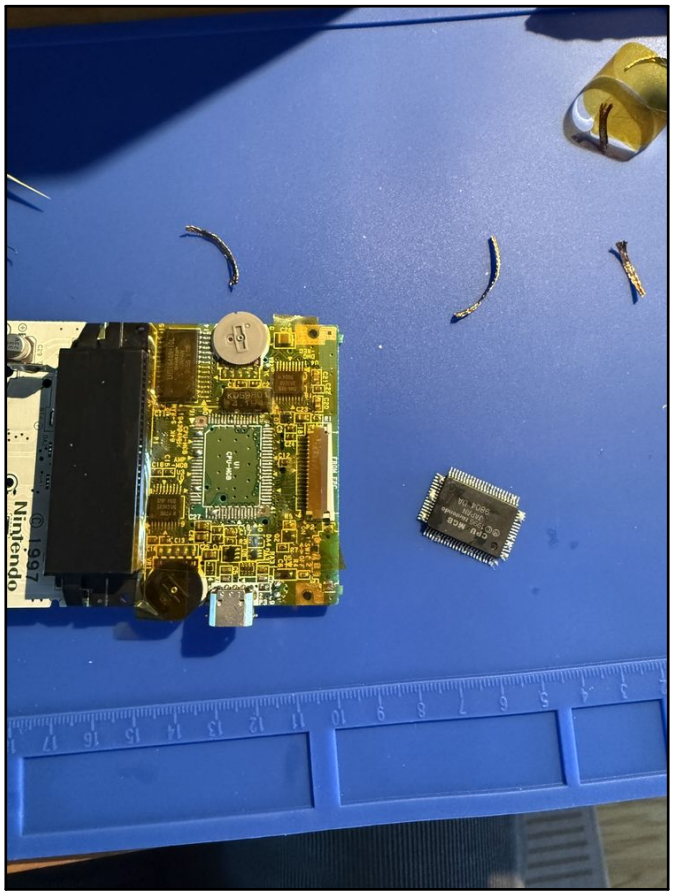


Photo 3 — CPU MGB successfully removed, sitting free next to the donor board.

Procedure

1. Wick as much solder as possible off all CPU pins before applying heat — this reduces thermal mass/time needed and lowers risk of lifting pads.
2. Set the Yihua 959D hot air station to 790°F, airflow setting between 4 and 5.
3. Place spring-loaded tweezers gently in one corner of the CPU (light contact, ready to lift).
4. Apply hot air evenly, working slowly around the entire perimeter of the chip — don't dwell in one spot.
5. Continue circulating heat until the CPU releases and lifts free on its own; avoid forcing it before the solder is fully reflowed on all pins.

Tips / Gotchas

- Desoldering pins first is key — it shortens hot air dwell time and protects the pads on both boards.
- Go slow and keep the air moving in a loop around the package rather than parking over one side.
- Let the tweezers lift the part passively once solder is molten — don't pry.
- The 790°F setting above was dialed in for a Yihua 959D specifically — hot air station temperature readouts aren't standardized across brands/models, so use a setting that reflows solder cleanly on your own station rather than matching this number exactly.

Step 2 — Item #5: SRAM MGB (LH52A64N-L) — Scavenge from Donor Board

Source: Stock Nintendo MGB-LCPU motherboard



Photo — Donor board before removal. SRAM MGB is the black SOP IC bottom-left, above the cartridge slot (U2, "S-RAM" / "64K").

Procedure

1. Wick as much solder as possible off all SRAM pins before applying heat.
2. Set the Yihua 959D hot air station to 790°F, airflow setting between 4 and 5.
3. Place spring-loaded tweezers gently in one corner of the SRAM.
4. Apply hot air evenly, working slowly around the entire perimeter of the chip.
5. Continue circulating heat until the SRAM releases and lifts free on its own.

Tips / Gotchas

- Same as CPU removal — desolder first, heat slowly and evenly, let the chip lift on its own.
- The SRAM sits close to the cartridge slot connector; be mindful of stray heat affecting nearby joints/plastic.
- As with Step 1, the 790°F setting was dialed in for a Yihua 959D — use a setting appropriate for your own hot air station rather than this exact number.

Step 3 — Items #4 & #5: Install CPU & SRAM onto Motherboard

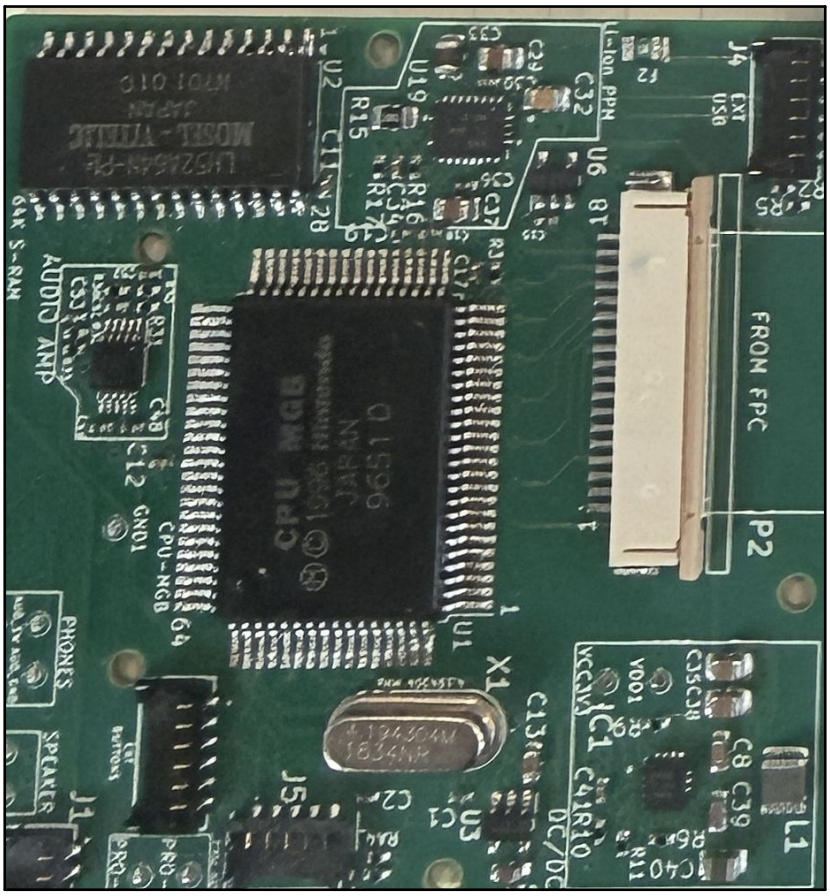


Photo — CPU MGB (U1) and SRAM (U2) placed on their footprints, ready for soldering.

Procedure

1. Place the CPU MGB (Item #4) onto footprint U1 ("CPU-MGB"), and SRAM (Item #5) onto footprint U2 ("64K S-RAM"). Confirm pin 1 orientation before tacking down.
2. Apply flux liberally across all pins on both ICs.
3. Drag-solder each leg: load the iron tip with solder, then drag along each row of pins.
4. Repeat for all four sides of each chip until every pin shows a clean, wetted joint.
5. Inspect closely for solder bridges between adjacent pins — reflow and wick away excess wherever found.
6. Clean off flux residue once soldering and inspection are complete.

Tips / Gotchas

- Tack two opposite corner pins first on each chip to lock alignment before drag-soldering the rest.
- Fine-pitch QFP/SOP pins bridge easily; go slow and re-check under good light/magnification.
- Double-check orientation before soldering — desoldering a bridged, misoriented fine-pitch chip is much harder than removal.

Step 4 — Item #6: GBA SP Cartridge Slot — Install onto Motherboard



Photo 1 — Close-up of cartridge slot pins seated into the motherboard footprint, mounting tab (P1) visible.

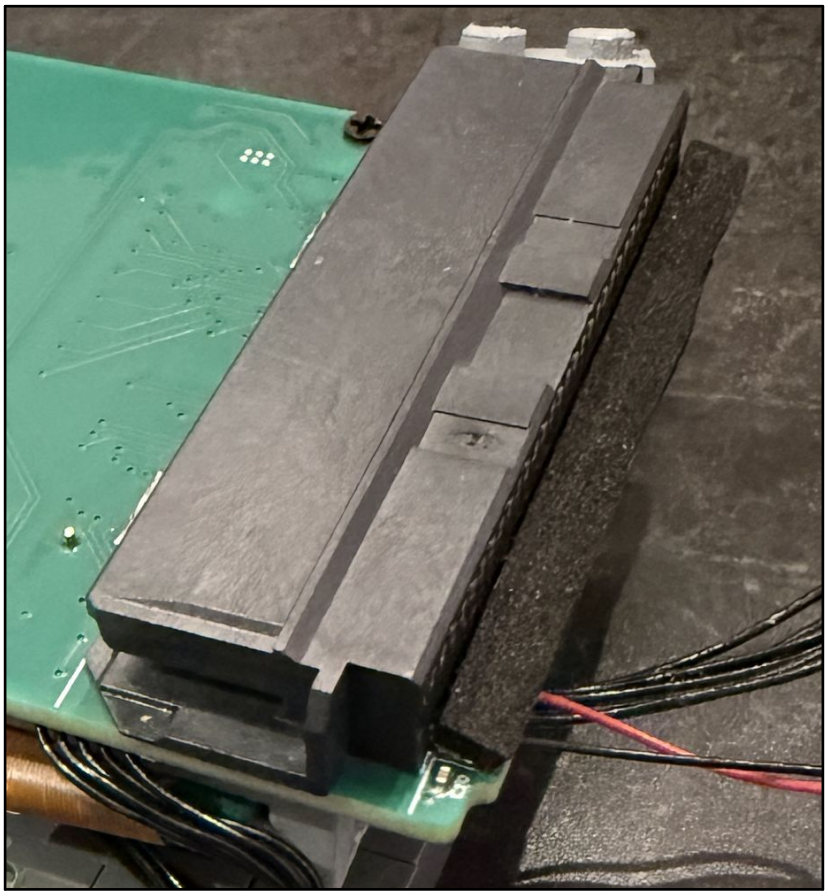


Photo 2 — Cartridge slot mounted in place, connector body seated against the board edge with wiring harness routed nearby.

Procedure

1. Seat the cartridge slot (Item #6) into position and solder the top mounting pins/tabs first to anchor it mechanically.
2. Apply flux along all cartridge slot legs.
3. Drag-solder each leg, working in one direction along the row.
4. Inspect closely for bridged pins between adjacent legs — rework/wick any bridges found.
5. Once soldering is complete and inspected, apply a strip of Item #7 (adhesive foam protection strip) along the bottom of the pins.

Tips / Gotchas

- Anchoring the mechanical mounting pins first keeps the connector from shifting while soldering the finer signal legs.
- The cartridge slot has tightly spaced legs — go slow and re-inspect under magnification for bridges.
- The foam strip protects exposed solder joints on the underside from shorting once assembled.

Step 5 — Items #2, #3 & #8: Connect EXT USB, EXT VOLUME, EXT BUTTONS & Power Switch Cables

Parts used: Item #2 (Molex Pico-EZmate 6-pin) ×2 → EXT USB and EXT BUTTONS | Item #3 (Molex Pico-EZmate 5-pin) ×1 → EXT VOLUME | Item #8 (Molex Pico-EZmate 3-pin) ×1 → EXT SWITCH

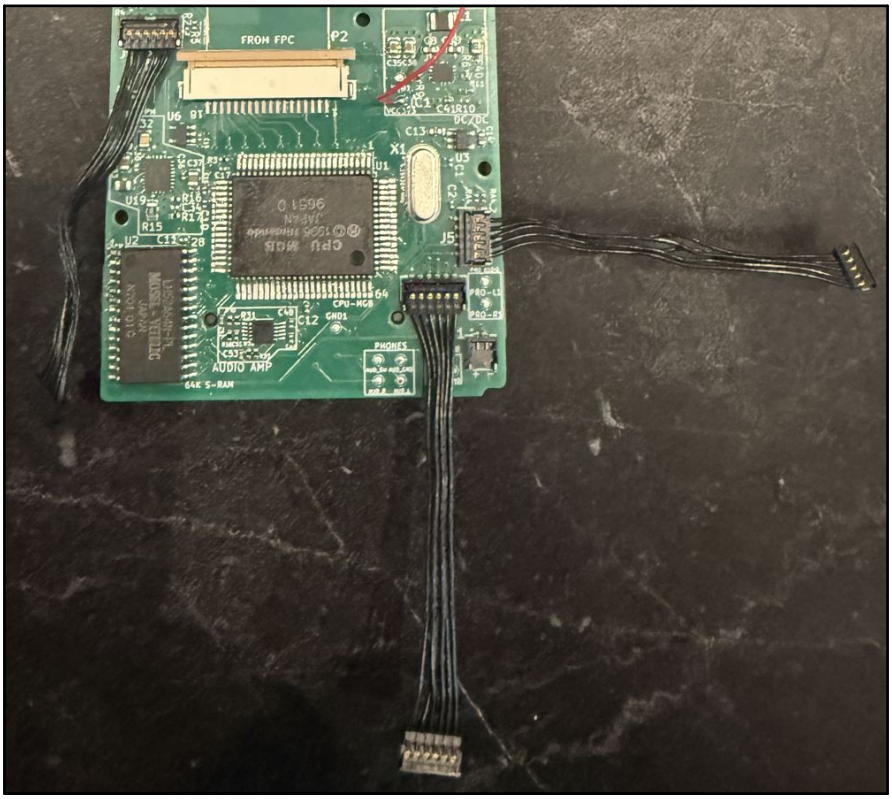


Photo — Motherboard with all three cables connected: 5-pin at J5 (EXT VOLUME), two 6-pin cables routed near bottom-right (EXT USB and EXT BUTTONS).

Procedure

1. Connect one Item #2 (6-pin Pico-EZmate) cable to the EXT USB connector on the motherboard.
2. Connect the second Item #2 (6-pin Pico-EZmate) cable to the EXT BUTTONS connector on the motherboard.
3. Connect the Item #3 (5-pin Pico-EZmate) cable to the EXT VOLUME connector (J5) on the motherboard.
4. Connect the Item #8 (3-pin Pico-EZmate) cable to the EXT SWITCH connector on the motherboard.
5. Confirm each cable is fully seated and latched, and check keying/orientation before applying any strain.

Tips / Gotchas

- Pico-EZmate connectors are polarized/keyed — don't force a connection; flip the cable and recheck orientation if needed.

2. Screen Housing Module

Instructions for installing the screen and screen PCB into the 3D-printed housing, culminating in mating the completed LEGO Boy Motherboard assembly into the housing.

Bill of Materials

Item #	PN	Description	Qty
1	N/A	MGB IPS display w/ color and capacitive brightness select	1
2	N/A	Round pan head tapping screw, M1.5×3	5
3	N/A	Round pan head tapping screw, M1.5×4	1
4	N/A	Flat head tapping screw, M1.7×4	4
5	N/A	Screen mounting bracket	1
6	N/A	Screen mounting stud brick	1
7	N/A	LEGO MGB Motherboard PCB standoff / screen mounting plate	1
8	N/A	12mm Kapton tape	1
9	N/A	8-ohm speaker	1
10	N/A	Speaker LEGO housing	1
11	N/A	Nintendo Switch 3.7V battery	1

Step 10 — Final Assembly: Mate Screen Module to LEGO Boy Motherboard

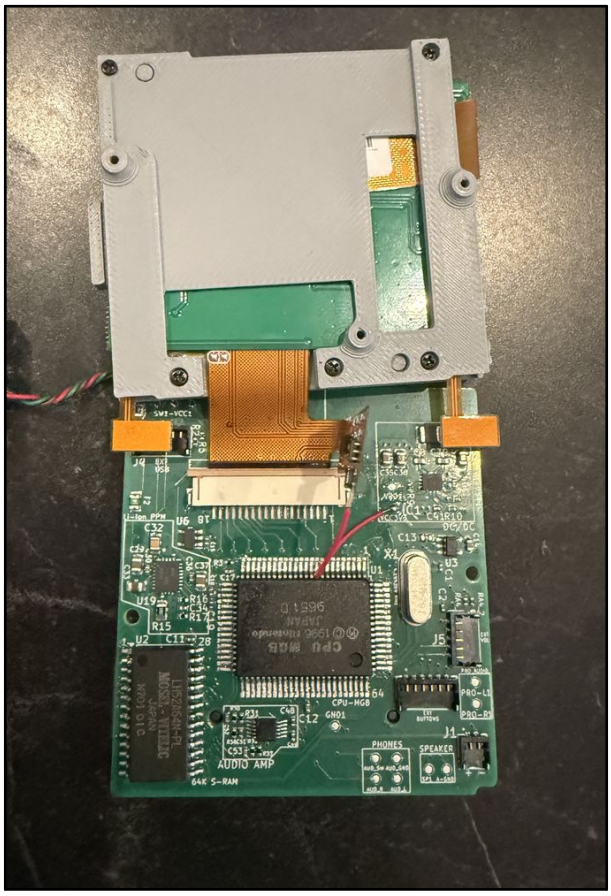


Photo — Screen housing module positioned above the LEGO MGB Motherboard, FPC ribbon routed into the motherboard's FPC connector, red wire dressed toward the CPU area.

Procedure

1. Take the fully assembled LEGO MGB Motherboard and position the screen housing module above it as shown.
2. Open the FPC connector latch on the motherboard.
3. Insert the display module's orange FPC ribbon fully and squarely into the motherboard's FPC connector.
4. Close the latch to lock the ribbon in place; gently tug-test to confirm it's seated.
5. Trim the red wire coming off the display assembly down to 35mm.
6. Solder the trimmed red wire to the VCC3V3 pad on the LEGO MGB Motherboard.
7. Inspect the solder joint and dress the wire neatly so it doesn't strain the connection or interfere with other components.

Tips / Gotchas

- Open the FPC latch fully before inserting the ribbon — don't force it in with the latch partially closed.
- Trim the wire to length before soldering, not after, to avoid excess slack that could snag or short.

Step 11 — Fold Motherboard onto Screen Standoff Plate

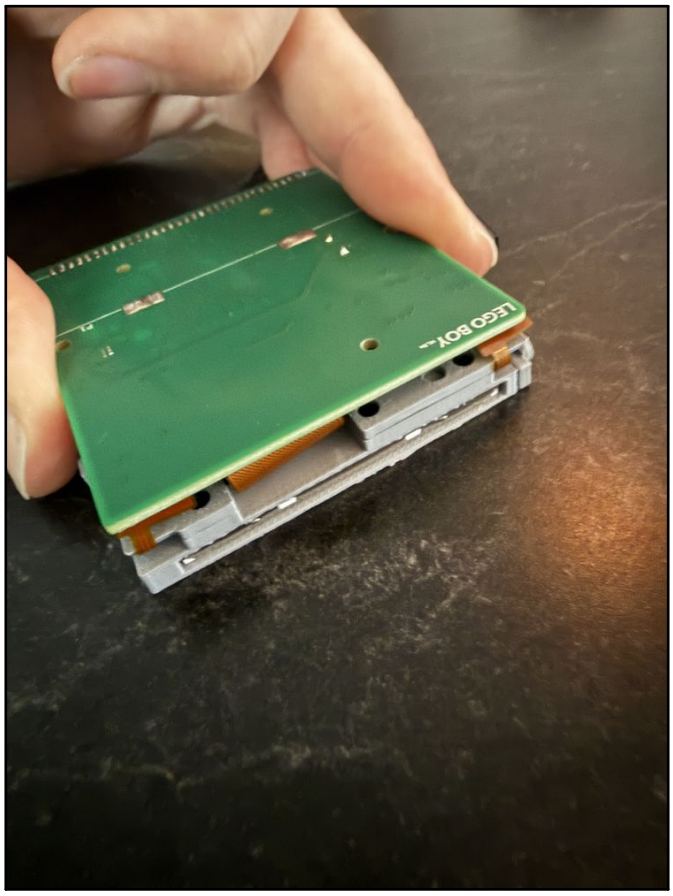


Photo 1 — LEGO MGB Motherboard folded down onto the screen housing standoff plate, ribbon cables folded inward and tucked between board and plate.

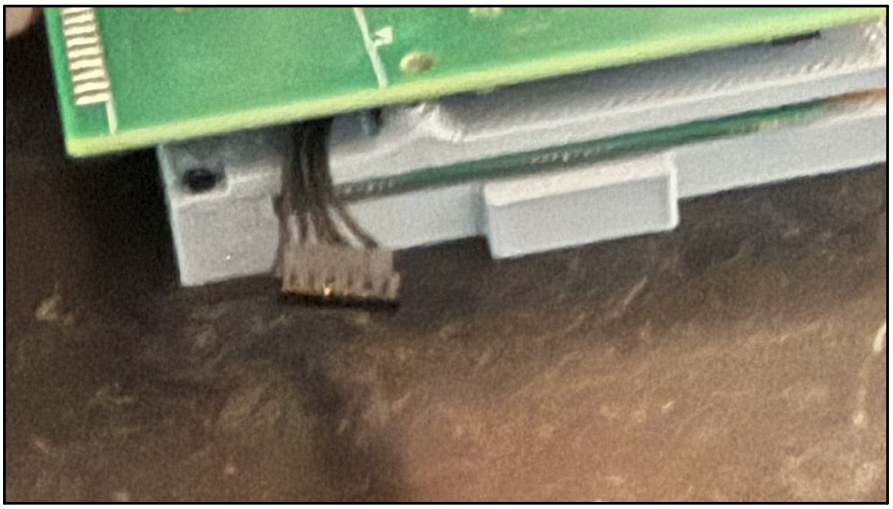


Photo 2 — Close-up of the USB Molex cable routed around the bottom-right standoff post, hanging clear without pinching.

Procedure

1. Fold the LEGO MGB Motherboard down onto the screen housing's standoff plate like closing a book.
2. As you fold, guide the two ribbon cables at the top so they tuck neatly between the motherboard and the standoff plate rather than getting pinched at the edge.

3 Route the USB Molex cable around the bottom-right standoff post, ensuring it isn't pinched between the board and the post or any other component.

4 Lower the motherboard fully flat onto the standoffs, confirming the mounting holes align.

5 Double-check that neither ribbon nor the USB cable is kinked, twisted, or trapped under a standoff post before pressing the board fully closed.

Tips / Gotchas

- Fold slowly and watch both ribbons simultaneously — it's easy to get one routed cleanly while the other gets caught at the hinge point.
- If the board doesn't sit flat, stop and check for a trapped ribbon or wire before applying pressure.

Step 12 — Item #4: Secure Motherboard with Flat Head Screws

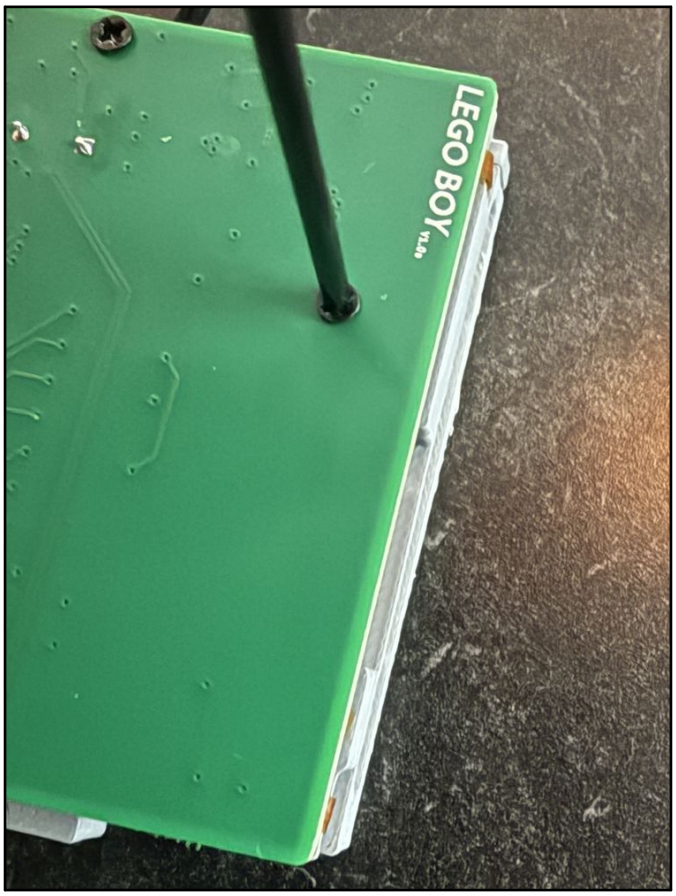


Photo — Screwdriver driving a flat head screw into the corner of the LEGO Boy motherboard, securing it to the standoff plate.

Procedure

1 Secure the motherboard to the standoff plate using 4× Item #4 (M1.7×4 flat head tapping screws).

2 Start each screw by hand to seat it straight in the printed plastic before driving with a screwdriver.

3 Tighten snug — flat head screws should sit flush with the board surface once fully seated.

Tips / Gotchas

- Don't overtighten into the printed housing; stop once the screw head sits flush and snug.

Step 13 — Route EXT VOLUME Molex Cable

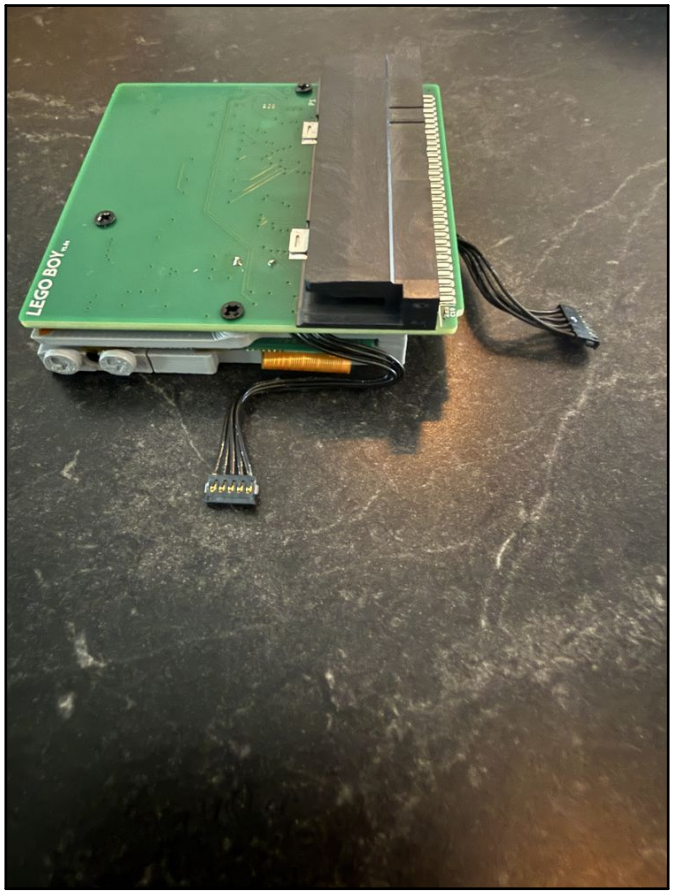


Photo 1 — Angled view showing the 5-pin volume cable formed into a loop and routed out through the notch on the left side of the housing.

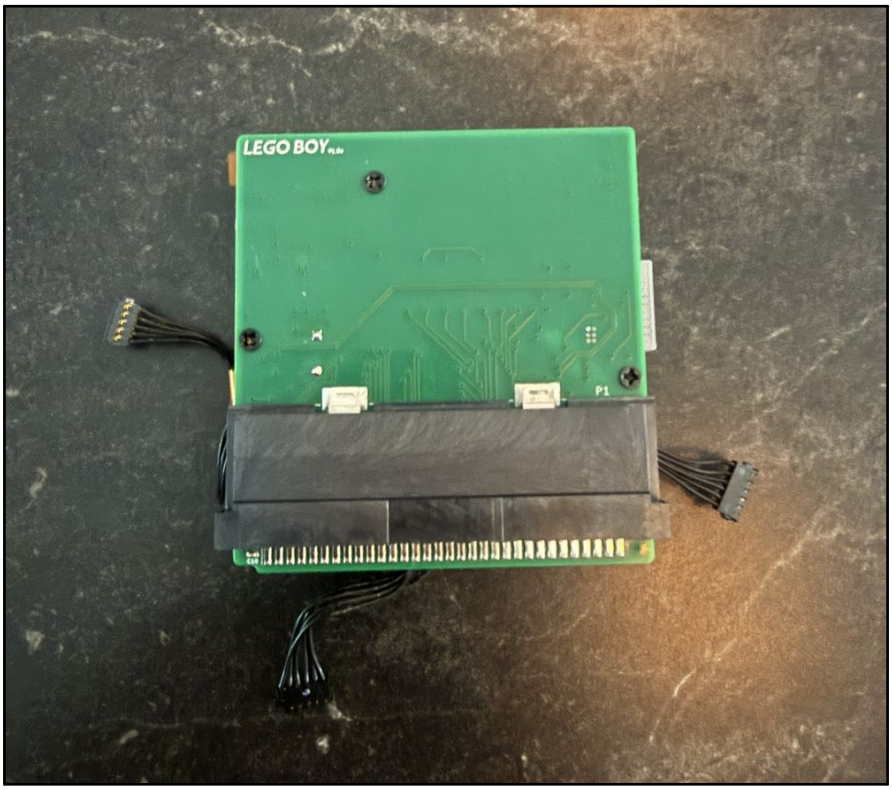


Photo 2 — Top-down view of the fully assembled Screen Housing Module, volume cable exiting cleanly to the left.

Procedure

1. Locate the notch on the left side of the housing/standoff assembly.
2. Form the EXT VOLUME 5-pin Molex cable into a gentle loop, routing it through the notch.
3. Guide the cable so it exits out to the left side of the module, clear of any pinch points.
4. Confirm the cable moves freely without strain and doesn't interfere with the housing closing or the cartridge slot area.

Tips / Gotchas

- Form the loop with a smooth bend rather than a sharp fold to avoid stressing the wires at the connector.
- Double-check the cable sits fully within the notch rather than getting trapped under the housing edge.