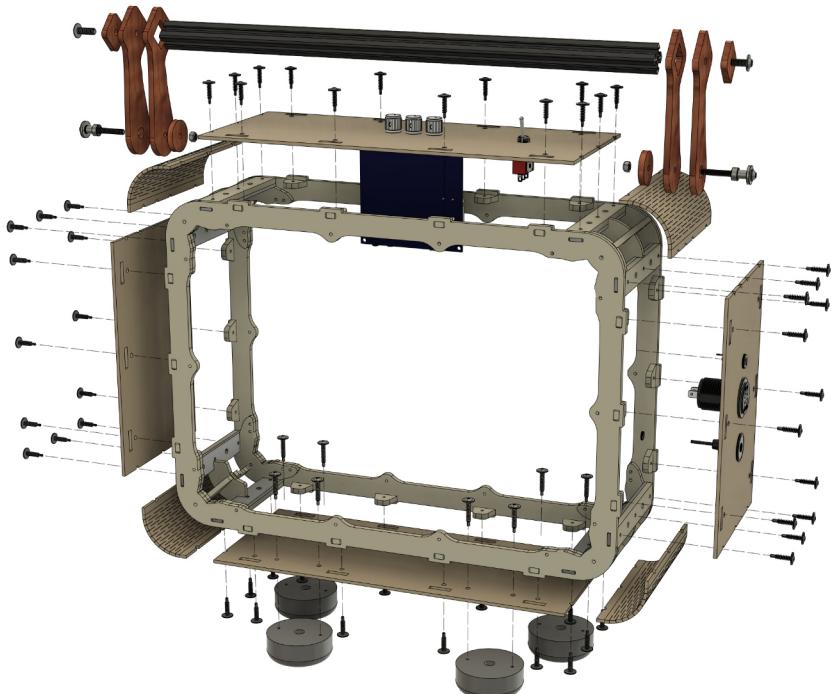


MOJOFESTO DIY Kit

Assembly Guide Part I of II

4/28/2024



Milestones:

- A. Chassis**
- B. Traction**
- C. Expansion**

[Print PDF](#)



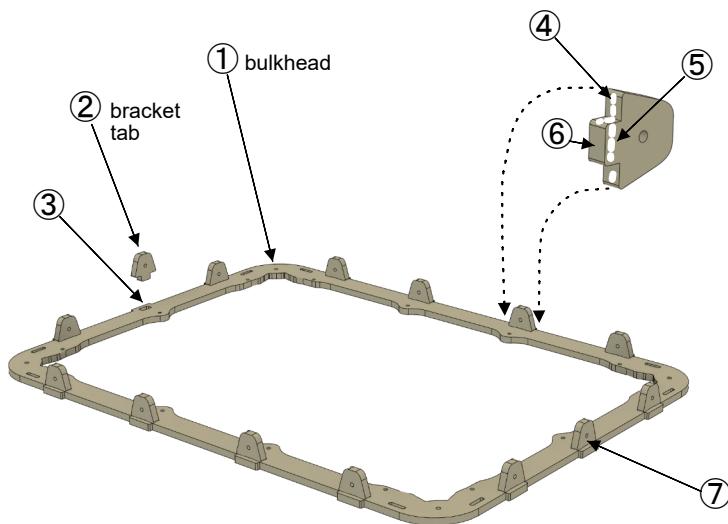
**STEP
A1**

Glue the Bracket Tabs to the Frame Bulkheads



For each of the two bulkheads ①, glue ten bracket tabs ② into the bulkhead grooves ③ as follows:

- ▶ Place bulkhead on a flat surface – either side down (Note: the bulkhead front and back are the same)
- ▶ One tab at a time, put glue on the tab shoulders ④ and the tab tongue sides ⑤ (not on tips ⑥)
- ▶ Firmly seat the tabs into bulkhead grooves
- ▶ Clean excess glue from the tab faces ⑦ and bulkhead (see Glue Pro Tips below)



Glue Pro Tips:

Do an assembly dry run before gluing to ensure that the pieces fit together correctly – without forcing it. Apply glue sparingly. Clean excess glue before it hardens. Scrape with a wooden stick or slot screwdriver to get into corners. Yellow glue starts to harden in 10-12 minutes depending on the type. Dried messy glue can block other parts of the boombox from fitting right.

Tools:

- Yellow glue with precise nozzle
- Glue cleanup: Wooden stick or small slot screwdriver
- Damp cleanup rag

Material Tip:

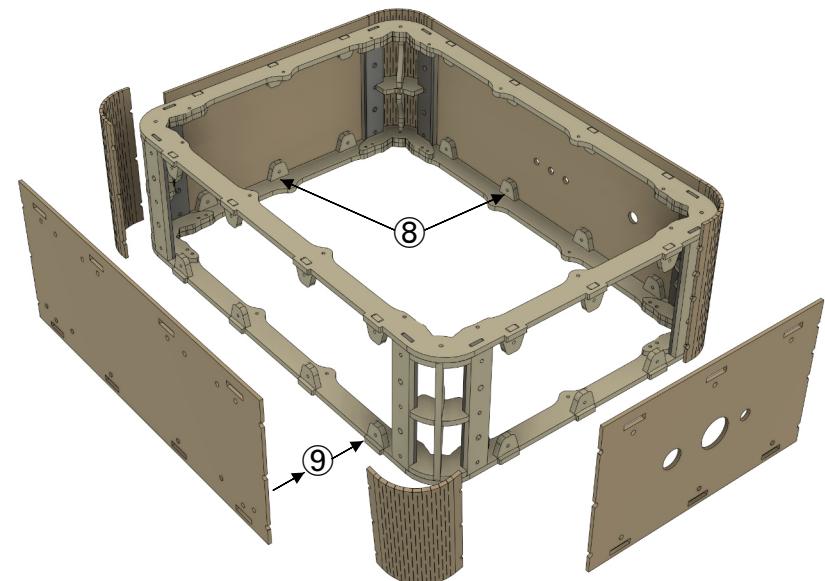
Glue Choice: Titebond III is the recommended yellow glue for best strength and open time.

Check:

- All bracket tabs are fully seated in the bulkhead with no gap between the tab shoulders and the bulkhead
- All glue squeeze-out is scraped or wiped off of the tab faces and bulkhead

Design Note:

The bracket tabs ⑧ strengthen the wall-to-bulkhead joints ⑨. This was inspired by luthierie (the craft of making stringed instruments like acoustic guitars, violins, etc.) where kerfed linings similarly reinforce the joint between the sides and the soundboard.



Online Guide:

<https://mkbx.info/festo-brackettabs>

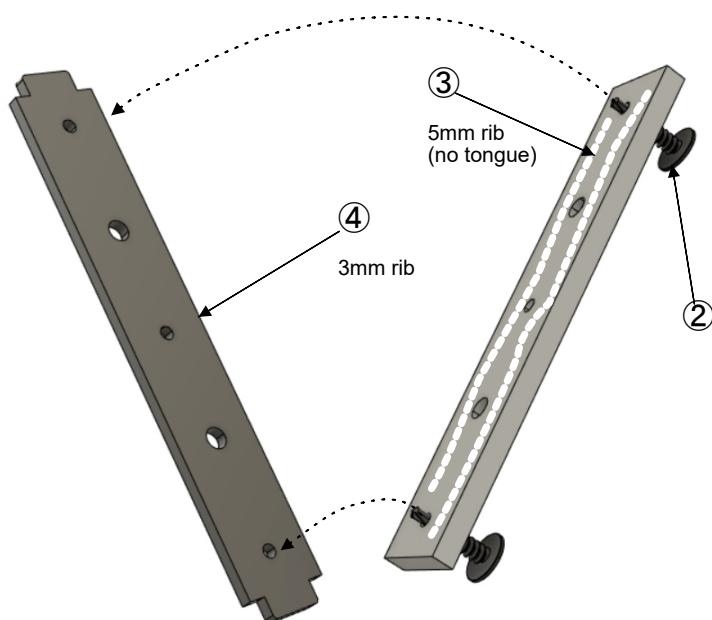


**STEP
A2**

Glue the Rib Assemblies Together

 Make eight double-layer rib assemblies ①, by gluing each as follows:

- ▶ Partially screw two 3/4" self-tapping screws ② into the 5mm-thick frame rib (no tongue) ③
 - ▶ Put glue on the inner side of ③ and mate ④ to the 3mm-thick frame rib ④ using the screw tips to align
 - ▶ Squeeze the layers together and clean excess glue from the rib tongues ⑤ and shoulders ⑥
 - ▶ Clamp the layers with two medium binder clips ⑦
-  Unscrew the $\frac{3}{4}$ " screws. Keep them for future steps.



⌚ Timing:

The ribs can be used in the next step while the glue is still drying because they are clamped firmly with binder clips.

Tools:

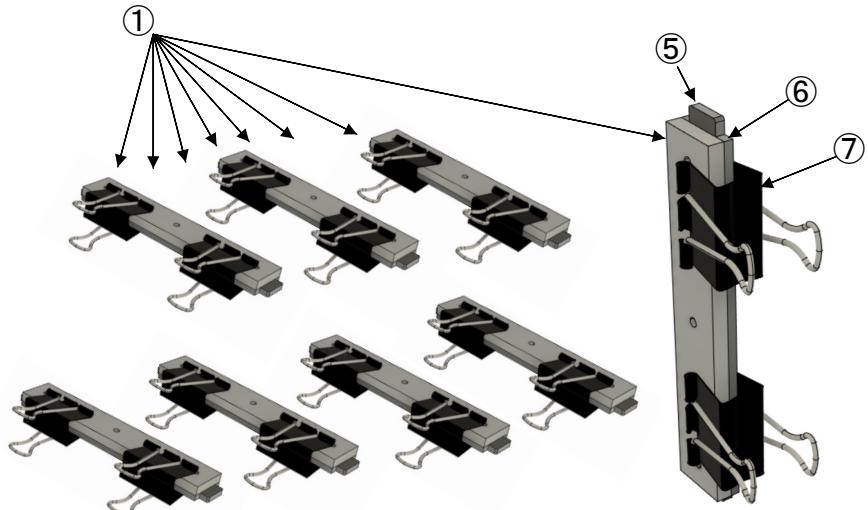
- Medium binder clips
- Yellow glue with precise nozzle
- Wooden stick or small slot screwdriver remove excess glue
- Damp cleanup rag

Tip: See previous "Glue Pro Tips" in Step A1.

Note: In this step, the screws are just used to temporarily register the exact position of the rib layers for gluing.

✓ Check:

- Ribs assemblies have their holes and edges precisely aligned
- All glue squeeze-out is completely scraped or wiped off the tongue sides and shoulders



💡 Design Note:

The chassis design maximizes joint strength with "tongue and groove" joinery, which increases leverage and gluing area at the interconnected surfaces.



Online Guide:

<https://mkbx.info/festo-ribs>



**STEP
A3**

Glue the Frame Bulkheads to the Ribs

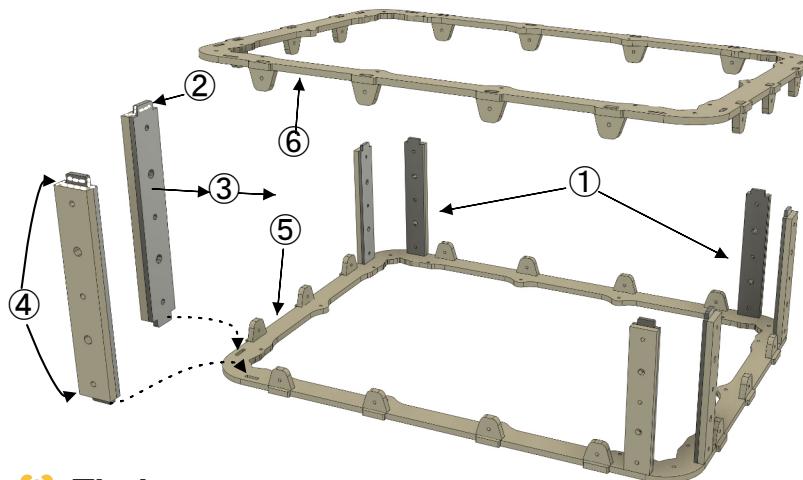
- ▶ Note: The ribs ① must be glued with their tongue ② sides facing inward ③. See  **Important.**

 For each of eight ribs, glue **both** ends ④ (shoulders and sides of the tongues but not the tips) and set them ⑤ in the first bulkhead ⑤ (flat on table with tabs facing up)

- ▶ Position the second bulkhead ⑥ (tabs facing down) on top of the ribs

 For each corner, finesse two ribs at-a-time into the second bulkhead grooves, press down firmly to fully seat the ribs into the bulkheads

- ▶ Remove excess glue from bulkheads & ribs
- ▶ Put some weights on top of the assembled frame to press downward evenly holding it in position to dry



⌚ Timing:

Glue all eight ribs to both bulkheads within 10-12 minutes of the first gluing to ensure full-frame alignment. Set aside to dry at least 1 hour.

Tools:

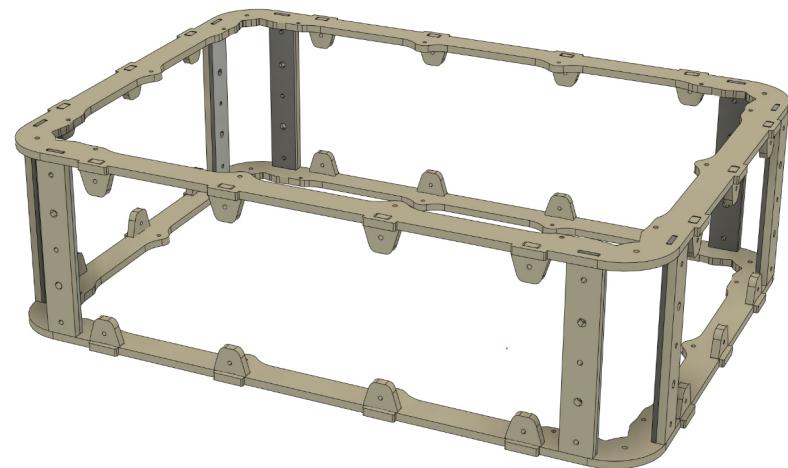
- Yellow glue with precise nozzle
- Wooden stick or small slot screwdriver to remove excess glue
- Damp cleanup rag

Tips: See previous “Glue Pro Tips.”

All the ribs must be fully seated when the glue dries to ensure the shell wall grooves will line up with the bulkhead tongues. A mis-glued frame is hard to fix once dried and may have to be discarded and replacement parts ordered.

✓ Check:

- The frame is squared up, the ribs meet the bulkheads at 90 degree angles
- Ribs are fully seated with no gaps anywhere between the rib shoulders and the bulkhead
- All glue squeeze-out is scraped or wiped off of the rib faces and bulkhead



⚠ Important:

Correct rib orientation is critical for the shell walls to mount properly in next steps. The ribs must be glued with their 3mm tongue layer facing inward and their 5mm non-tongue layer facing outward.

**Online
Guide:**

<https://mkbx.info/festo-framebulkheads>

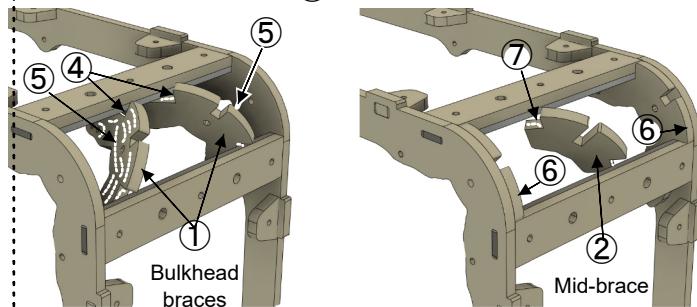


**STEP
A4**

Glue the Bracings to the Frame Corners

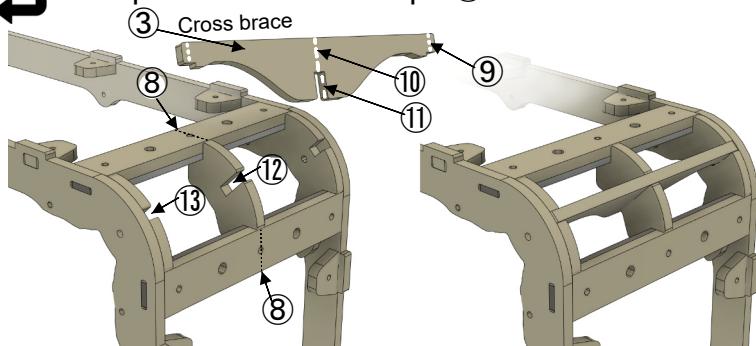
For each of four frame corners, glue the bracing pieces (two bulkhead braces ①, one mid-brace ② and one cross-brace ③).

For each bulkhead brace, glue the shoulders ④ and the bulkhead side ⑤. Angle in the bulkhead brace to lock its shoulders to the ribs. Push flat to the bulkhead ⑥.



- ▶ Glue the mid-brace shoulders ⑦. Angle in the mid-brace to lock its shoulders to the ribs midpoint ⑧.
- ▶ Glue the cross-brace tips ⑨, the mid-line (on both sides) ⑩ and in the groove ⑪. Seat the cross-brace groove fully into the mid-brace groove ⑫, and press cross-brace tips into the bulkhead braces' grooves ⑬.

Clamp medium binder clips ⑭ to bulkhead corners.

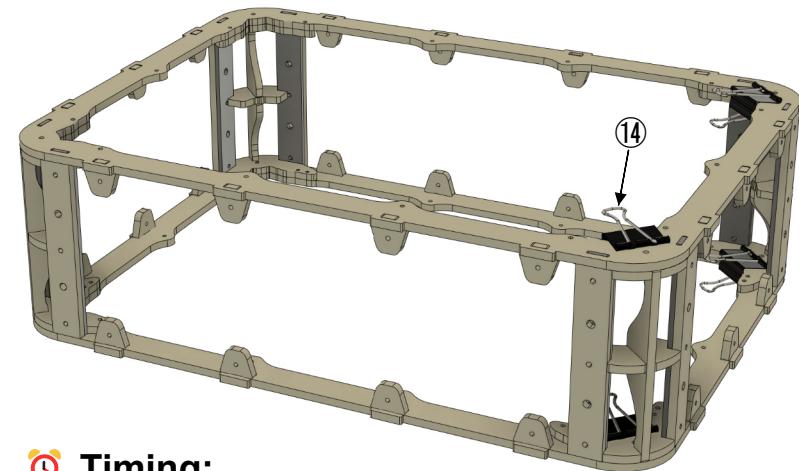
**Tools:**

- Yellow glue with precise nozzle
- Wooden stick or small slot screwdriver to remove excess glue
- Damp cleanup rag

Tips: See previous “Glue Pro Tips.” Do a dry run before gluing to practice. All the bracings must be fully seated when the glue dries to ensure the corner walls seat fully to the frame. Mis-glued bracings are hard to fix once dried.

✓ Check: for each corner

- The cross-brace is fully seated and flush to the bulkhead braces and mid-brace at the grooves
- The mid-brace is perpendicular to the ribs and the mid-brace outer curve meets the ribs smoothly
- The bulkhead braces are seated to the bulkhead with no gaps
- All glue squeeze-out is scraped or wiped off of bracings, rib faces and bulkhead



⌚ Timing:

For each corner, glue all five bracings within a window of 10-12 minutes to ensure correct alignment before the glue sets. After the last corner is glued up, set aside to dry at least 1 hour.



Online Guide:

<https://mkbx.info/festo-bracings>



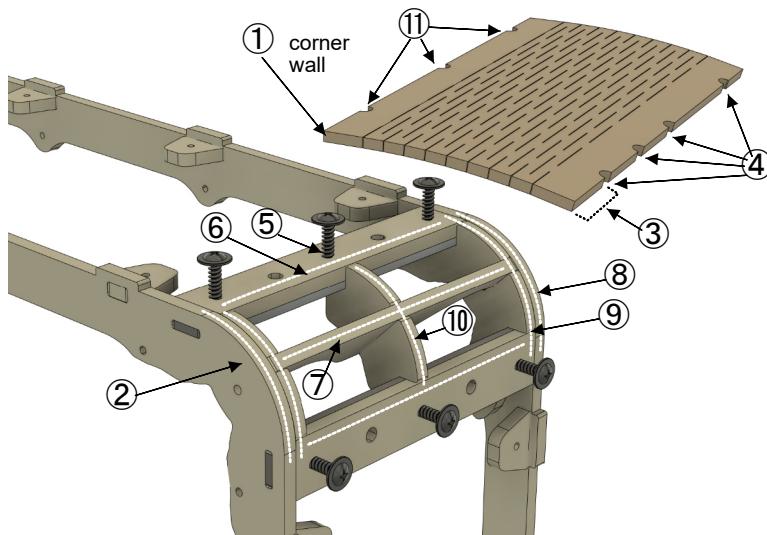
STEP
A5

Glue the Corner Walls to the Frame Curves

 For each of the four corner walls ①, glue and screw to the frame curves ② as follows:

- ⚠ **IMPORTANT:** Do a dry run. The longer overhang of the walls ③ must all point the same way. AND the top left / top right corner walls must have their 4-notches edge facing down ④ (towards the frame short side)
- ▶ Screw in halfway six 3/4" self-tapping screws through shell mounting holes ⑤
- ▶ Put glue on half of each side ribs ⑥, the edge of the cross brace ⑦, the curved edges of the bulkhead ⑧ and bulkhead braces ⑨ and the mid-brace ⑩
- ▶ Position corner wall 3-notch edge ⑪ to the screws on the frame's long side ⑫ and screw to finger tight

 Smooth down the corner curve tight to the frame, aligning notches to the other three screws on the frame's short side ⑬ and screw to finger tight

**Tools:**

- Phillips head screwdriver
- Yellow glue with precise nozzle
- Wooden stick or slot screwdriver to remove excess glue
- Damp cleanup rag

Screws Pro Tips:

Don't over-tighten the screws which could strip out pilot holes. Finish driving in the screws to "finger tight" — this means torquing the screwdriver with finger tips, not with clenched fist.

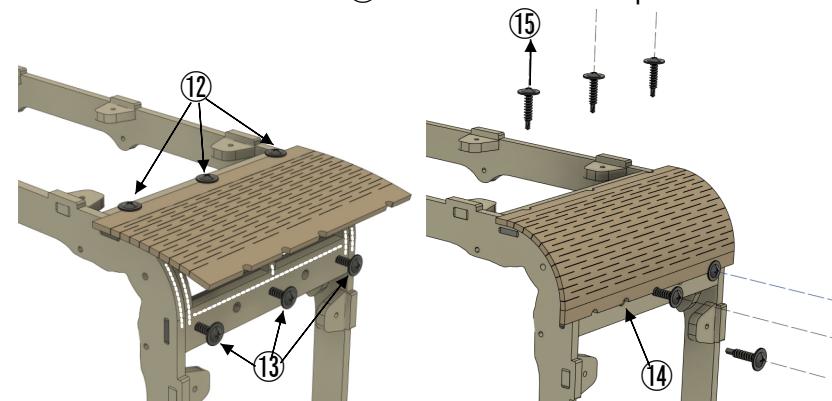
See previous "Glue Pro Tips."

Check:

- Top left/right corner walls have their 4-notch edges facing the short (left/right) sides of the frame
- Corner walls are fully seated to the frame with no gaps
- All the shell wall mounting screws are fully driven to finger tight
- All glue squeeze-out is removed from the bulkhead and the ribs so there won't be any dry glue in the way of seating the top and side walls, the soundboard and backboard in future steps

NOTE: Wall orientation is critical. The walls' longer overhang faces the boombox front, the shorter overhang faces back. The fourth notch in the top left/right corner walls goes where the handle axles pass ⑯

⌚ Compete gluing each corner within 10-12 minutes of first glue. Set aside to dry at least 1 hour. When the glue is dry, remove the screws ⑯ and save for later step



 **Online Guide:**

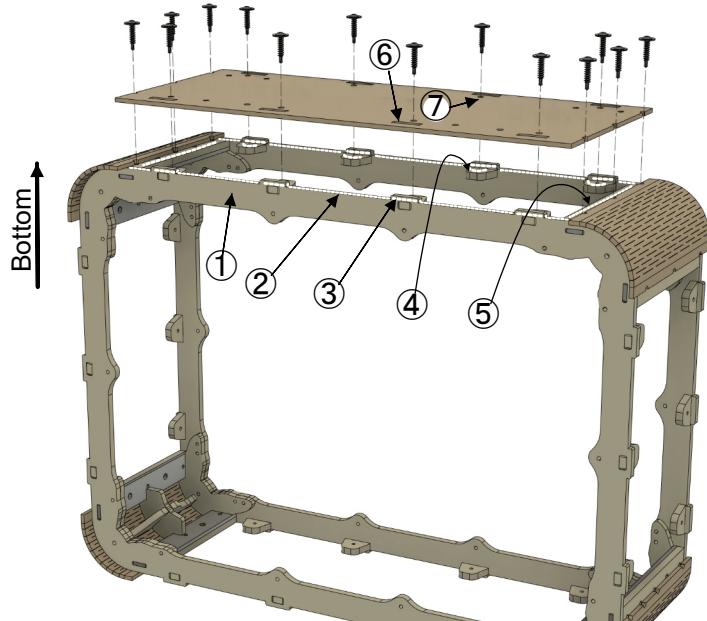
<https://mkbx.info/festo-cornerwalls>



STEP
A6**Glue the Bottom Wall
to the Frame**

Do a dry run to ensure the bottom wall grooves seat fully over the bulkhead tongues without forcing.

- ▶ On a long side of the frame ① (see note), put glue on the edges of the bulkhead ②, the sides of the bulkhead tongues ③, the faces of the frame bracket tabs ④ and the inner half of the side rib faces ⑤
- ▶ With the bottom wall front aligned the same way as corner walls, position the grooves ⑥ over the bulkhead tongues and seat the fully to the bulkhead
- ▶ Screw fourteen 3/4" self-tapping screws through wall mounting holes ⑦
- ▶ Clean excess glue from the walls and bulkheads
- ▶ Clamp the long edges of the bottom wall to the bulkhead with four extra large binder clips ⑧

**Tools:**

- Medium binder clips
- Phillips head screwdriver
- Yellow glue with precise nozzle
- Wooden stick or slot screwdriver to remove excess glue
- Damp cleanup rag

Pro Tips:

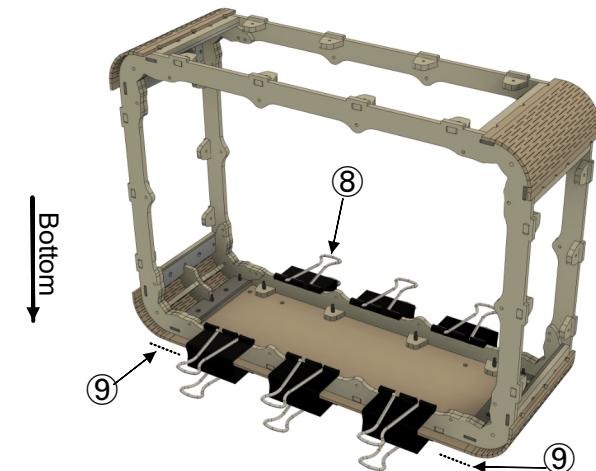
Screws: See previous “Screws Pro Tips.” Don’t overtighten the screws.

Glue: See previous “Glue Pro Tips.” Do dry run. Wipe clean.

NOTE: The frame is symmetrical – the frame top and bottom are the same. Glue the bottom wall to either one of the two long sides of the frame – there is no difference.

Check:

- The wall overhangs point the same way (edges are aligned ⑨)
- The bottom wall mounting screws are fully driven to finger tight
- Bottom wall is seated with no gaps between it and the bulkhead
- All glue squeeze-out is removed from the frame-to-wall seams



Set aside to dry at least 1 hour. Remove binder clips when dry

**Online
Guide:**

<https://mkbx.info/festo-bottomwall>

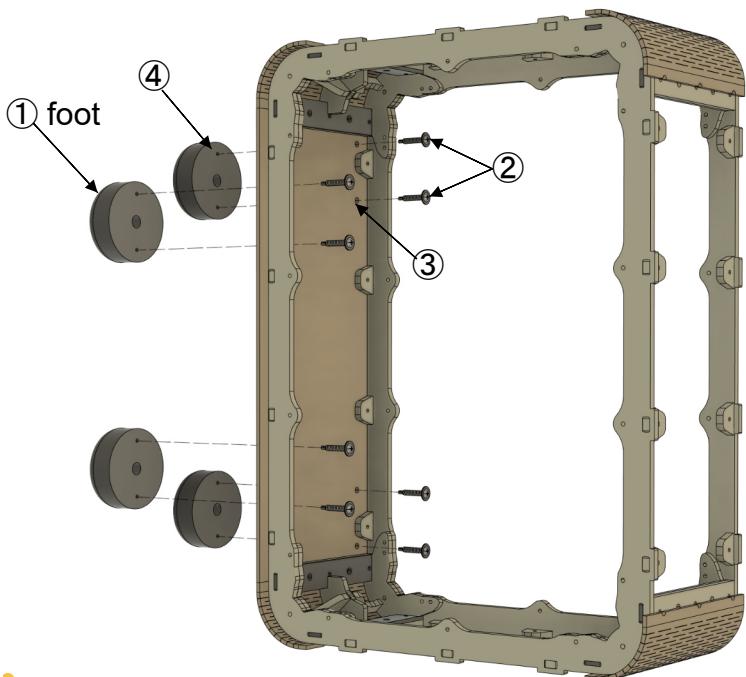


STEP
B1

Screw the Feet to the Chassis Bottom

 For each of the four feet ①, fasten them to the chassis as follows:

- ▶ Insert two of the feet mounting screws (1" self-tapping) ② through feet screw holes ③
- ▶ Push the screw tips into foot pilot holes ④
-  Pressing the foot to the screws, tighten the screws to finger tight



⌚ Timing:

If your kit has unpainted / unfinished walls, this is the easiest point in the project to paint/finish walls (**before** attaching feet). If you continue assembly unpainted now, you can always disassemble the boombox for custom painting later. See the Operation & Customization Guide: "Optional Custom Painting" for ideas and resources.

Tools:

- Phillips head screwdriver, or power drill with #2 Phillips head bit set to lowest possible torque setting.

Tips:

This step is easier to do with the chassis turned on its side.

Remember "Screws Pro Tips" on driving screws to "finger-tight." Don't over-tighten the feet screws which could strip out the pilot holes in the feet.

✓ Check:

- All feet are mounted in their correct position, completely seated with no gap between the feet and chassis
- All screws are completely driven in with no gap between the screw heads and bottom wall interior
- Twist the feet by hand to a moderate degree of force to check that the feet are firmly attached
- The boombox sits evenly on a flat surface without much wobble



🔍 Design Note:

Big rubber feet hold the box steady and vibration free, raised high and dry off the ground. This also adds to the bass response.



Online Guide:

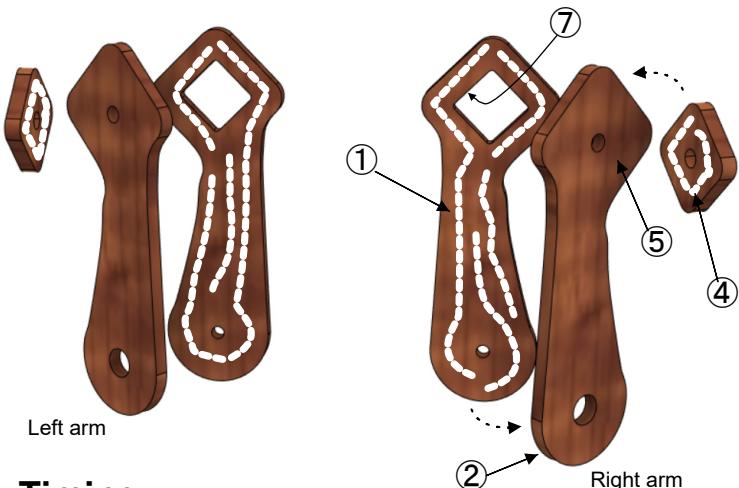
<https://mkbx.info/festo-feet>



**STEP
B2**

Glue the Handle Arms Together

- ▶ Spread out the handle parts as pictured in ensure proper orientation of their layers
- ◀ For each of the two handle arms, glue their layers together as follows:
 - ▶ Put glue on the inside face of the handle arm inner layer ① and mate precisely to the handle arm outer layer ②. Clamp with medium binder clips ③
 - ▶ Put glue on the inside face of the handle arm cap ④ and stick it to the outside face of the handle arm outer layer ⑤ aligning the center holes
 - ▶ Clamp the handle cap with an extra-large binder clip ⑥
 - ◀ Remove excess glue from the handle bar pocket ⑦, the handle bar edges ⑧, the ball bearing pocket ⑨, the handle cap edges ⑩, and the set screw hole ⑪

**⌚ Timing:**

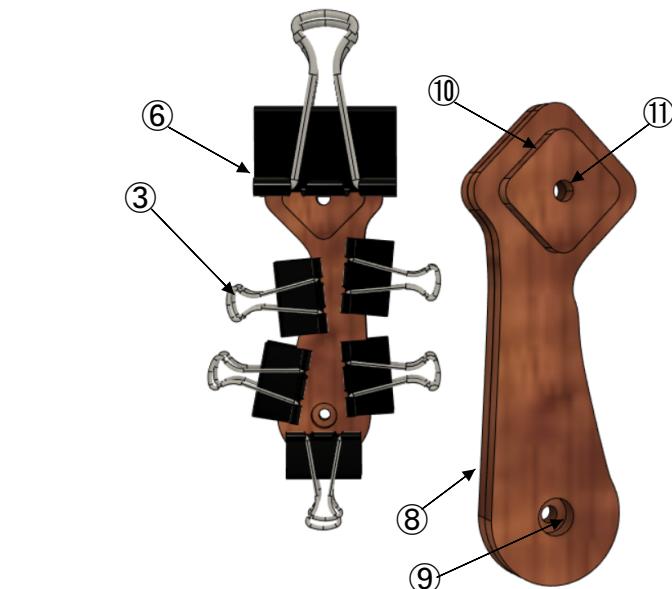
Allow at least 30 minutes for the glue to set before unclipping handle arms and mounting them in the next step.

Tools:

- Yellow glue with precise nozzle
- Five medium and one extra-large binder clips (double the number to assemble both handle arms at a time)
- Wooden stick or small slot screwdriver to remove excess glue
- Damp cleanup rag

✓ Check:

- All glue squeeze-out is scraped or wiped off the handle arms
- The edges of the handle arm inner and outer layers are well-aligned. The set screw holes in the cap and outer layer are well-aligned

**Online Guide:**

<https://mkbx.info/festo-handlearms>

Note:

The correct alignment of the handle arm caps is etched on the handle arm outside layer.



**STEP
B3****Bolt in the Handle Bar
to the Handle Arms**

For each of the two handle arms ①:

- ▶ Seat one end of the handle bar ② into the handle pocket ③
- ▶ Insert an M6 x 15mm button head bolt ④ into the handle bar mounting hole and screw in the handle mounting bolt by hand as far as possible
- ▶ Tighten the handle bolt the rest of the way down to finger tight using a 4mm Allen wrench or hex driver
- ▶ Insert the M5 x 30mm handle axle bolt ⑤ through the handle bearing pocket. ⑥
- ▶ Pass the axle bolt through the handle shoulder (shoulder is on the inner side of the handle)



Partially screw the M5 lock nut ⑦ to the handle axle bolt just a few turns to keep the parts together



Set aside the handle assembly for use in later steps.

Tools:

- Adjustable wrench or fixed size wrench: 8mm or 5/16"
- Allen wrenches or power drill with hex drivers: 3mm AND 4mm

✓ Check:

- Handle bar mounting bolts are finger tight, firmly holding the arms to the bar
- Handle axle assembly parts are attached for later use

**⚙ Options:**

Handles can be DIY painted, decorated, etc., or replaced with custom-made or after-market options available at makeboomboxes.com

**Online
Guide:**

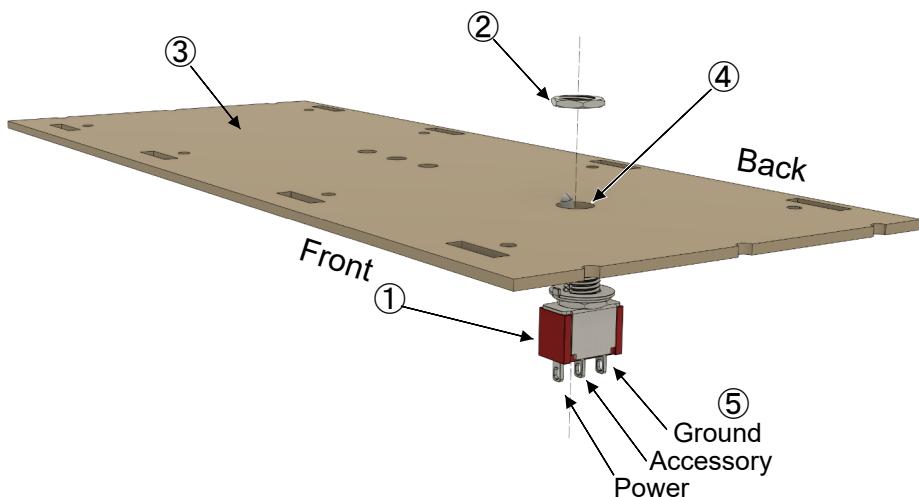
<https://mkbx.info/festo-handlebar>



**STEP
C1**

Mount the Kill Switch to the Top Wall

- ▶ Remove the kill switch ① nut ② (set aside safely)
- ▶ Seat the kill switch in the top wall ③ mounting hole ④ with switch terminals ⑤ oriented as shown (with the terminal labeled 'ground' facing the back edge)
- ▶ Thread and tighten the nut
- ▶ The kill switch nut can be tightened by hand to finger tight. Gently use a pliers with toothed jaw for tightest result. Do not over-tighten which can crack the nut or strip the threads.



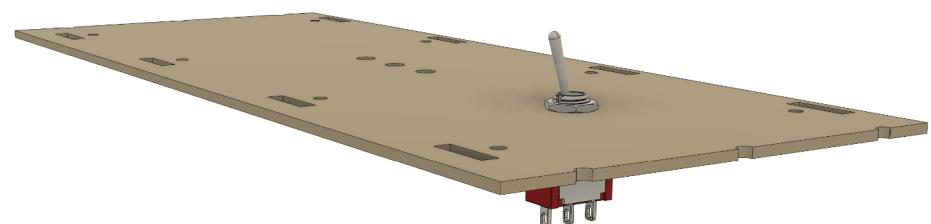
Note: The switch comes already connected to a wire harness which is not illustrated here

Tools:

- Optional pliers with toothed jaw if hand-tightening is not tight enough

✓ Check:

- The kill switch is oriented the correct way — with the switch on the right, the terminal labeled 'power' is closest to front and the 'ground' terminal is furthest toward the back
- The nut is tightened so that the kill switch can't be turned in its mounting hole when moderately torqued by hand

**⚙ Options:**

The top wall is modular / replaceable to allow for DIY upgrades /and experimentation. For example, another toggle switch could be installed to turn user-added powered accessories on or off. Go ahead and drill holes, add hardware without fear. Laser-cut replacement walls are available at makeboomboxes.com



**Online
Guide:**

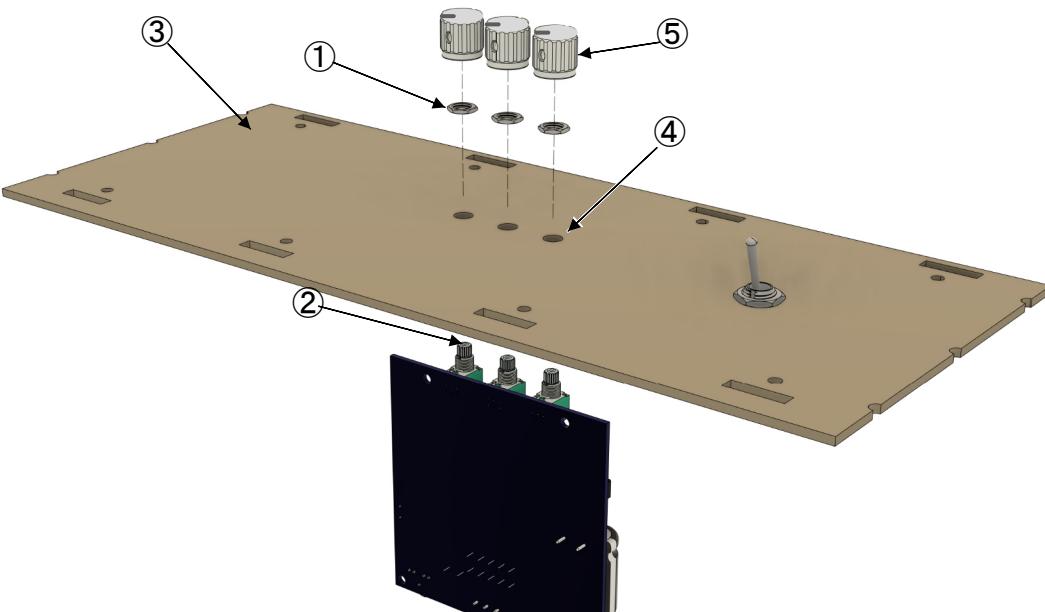
<https://mkbx.info/festo-killswitch>



STEP
C2

Mount the Amp Board to the Top Wall

- ▶ Un-thread the three amp board nuts ① from the pots ② (set aside safely). No washers are used
- ▶ Insert amp board pots into the top wall ③ mounting holes ④ — with the board oriented as pictured
- ▶ Place three nuts over pot shafts
- ▶ Tighten nuts with wrench or socket driver to finger tight
- ▶ Turn pots' shafts all the way to the off position (counter-clockwise)
- ▶ Push down knobs ⑤ over pot shafts all "zeroed" towards the 7 o-clock position



Note: The amp comes already connected to speaker wires which are not illustrated here

Tools:

- Adjustable wrench, or socket driver: 10mm, or 3/8"

Tips: Under-tightened amp board nuts can wiggle loose from box vibration. Over-tightening can risk stripping the pot threads and/or damaging the nut.

Check:

- The amp board is installed tightly to the top wall
- The nuts are flat to the panel and threaded tightly on the potentiometers
- The amp board does not wiggle in its mounting holes when gently flexed by hand
- Amp board control knobs are all zeroed at the same angle and seated fully on the potentiometer shafts
- Amp board knobs turn freely

**Options:**

Friction holds the amplifier control knobs to the pots' knurled shafts with friction. Some replacement knobs may use a set screw on the sides of the knobs to secure them even more firmly to the pot shafts. The control knobs can be replaced any time with a style of your choice. If custom knobs were purchased with the kit, set aside the stock knobs and attach the custom knobs instead.



**Online
Guide:**

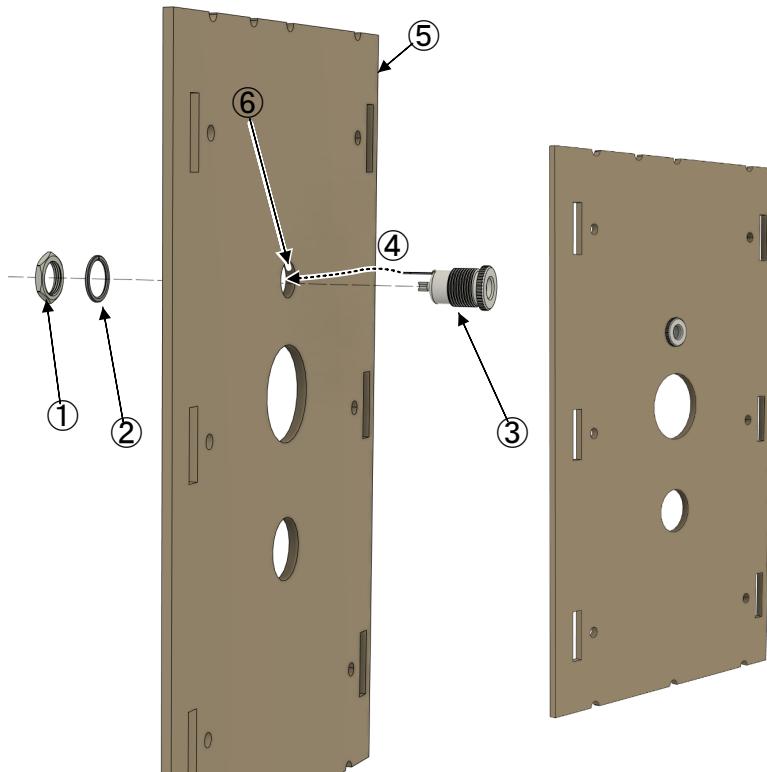
<https://mkbx.info/festo-ampboard>



STEP
C3

Mount the Charging Jack to the Right Wall

- ▶ Remove nut ① and washer ② from charging jack ③
- ▶ Pass the wire terminals ④ through the right wall ⑤ charging jack mounting hole ⑥ one wire at a time. (Wire harness not shown.)
- ▶ Seat the jack in mounting hole
- ▶ Pass the wire terminals, one at a time, through the washer, then the nut
- ▶ Thread and tighten the nut with an adjustable wrench or toothed pliers

**Tools:**

- Adjustable wrench or toothed pliers

Tip: With the included kit battery, the charging jack can be a DC power input to charge the battery OR a battery DC output to power 12V accessories.

Check:

- The charging jack nut is completely threaded tightly down without obstruction to the inside of the panel
- The charging jack can't be turned in its mounting hole when moderately torqued by hand

What if I lose it?:

If the charging adapter gets lost, substitute another one that meets the specification below or order a new replacement here:

<https://mkbx.info/12.6v>

Substitute Charger Specification:

Barrel Plug: 5.5mm x 2.1mm
Plug Polarity: +inner, -outer
Voltage Out: 12.6V
Wattage Out: .5A to 2A



**Online
Guide:**

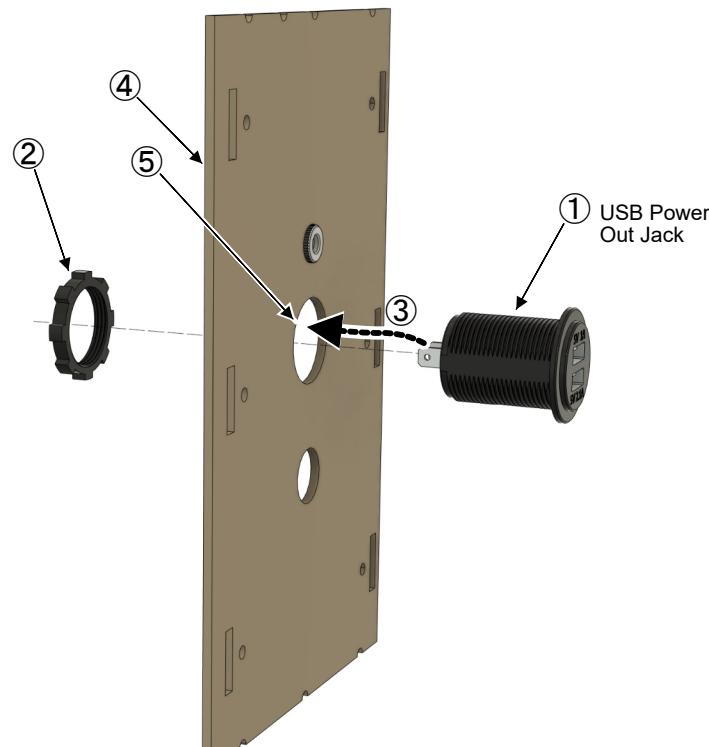
<https://mkbx.info/festo-chargingjack>



**STEP
C4**

Mount Optional USB Power Out Jack to Right Wall

- If the optional USB Power Out jack ① was chosen with the kit, then follow this step:
- Remove USB Out jack's nut ②
 - Pass the wire terminals ③ (wire harness not shown) through the right side wall ④ USB Out jack mounting hole ⑤.
 - Seat the USB Out jack in mounting hole
 - Pass the wire terminals through the nut
 - Thread and tighten the nut by hand and tighten fully with a toothed pliers

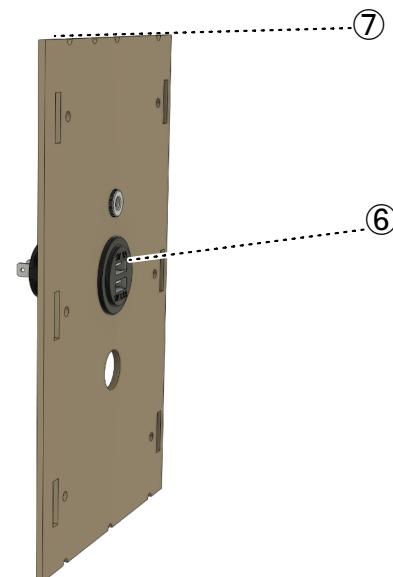
**Tools:**

- Toothed needle-nosed pliers or channel pliers

Tips: If under-tightened, the nut can wiggle loose from box vibration. Over-tightening can risk stripping the threads and/or damaging the nut.

Check:

- The USB Out jack is rotated so the port is parallel ⑥ to the panel top edge ⑦
- The USB Out jack nut is tightly threaded down without obstruction to the inside of the panel
- The USB Out jack can't be turned by hand in its mounting hole

Zoom Out:

**Online
Guide:**

<https://mkbx.info/festo-optionalusbout>

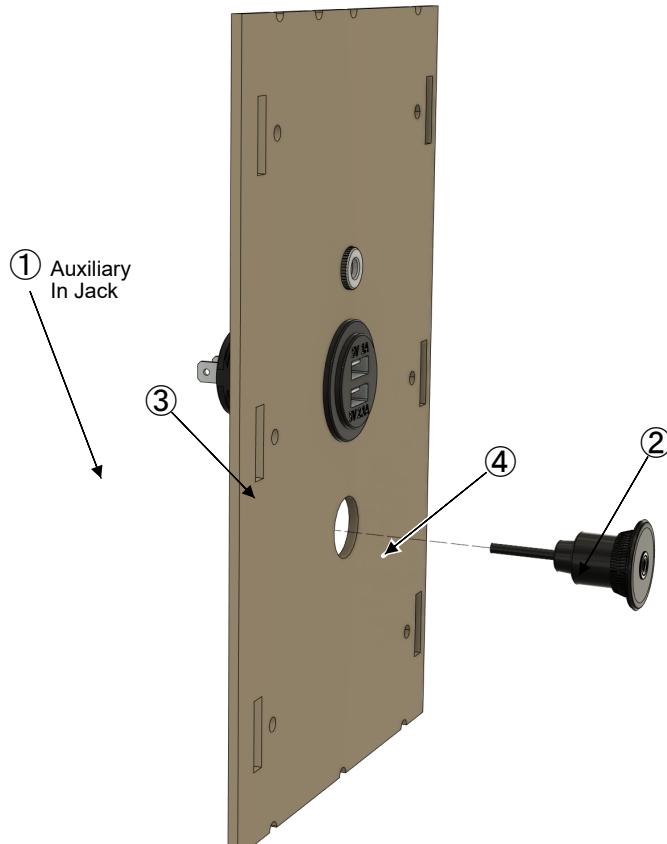


**STEP
C5**

Mount the Optional Aux In Jack to the Right Wall

► If the optional Aux In jack ① was chosen with the kit then follow this step:

- Remove the Aux In jack's nut ②
- Seat the jack from the inner side of the right panel ③ mounting hole ④
- Thread and tighten the nut by hand and tighten fully with a toothed pliers

**Tools:**

- Toothed needle-nosed pliers or channel pliers.

Note: Wire harness not shown

Check:

- The Aux In jack nut is tightly threaded down to the outside of the panel without obstruction
- The Aux In jack can't be turned in its mounting hole when moderately torqued by hand.

Zoom Out:

The completed right panel with optional USB Power Out and Aux In jacks.



**Online
Guide:**

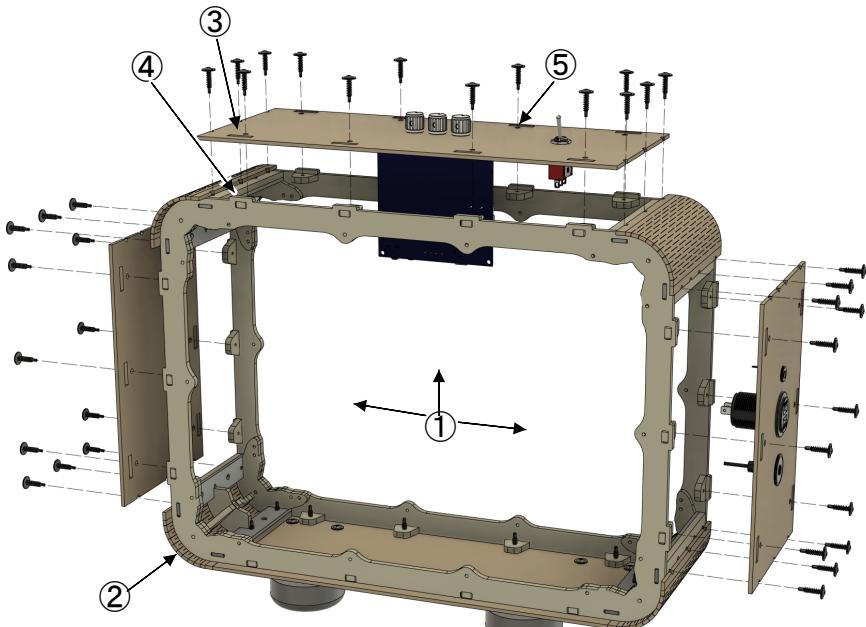
<https://mkbx.info/festo-optionalauxin>



**STEP
C6****Screw the Top and Side Walls to the Frame**

 For each of the three walls ①, mount to the chassis frame ② as follows:

- ▶ Position the wall grooves ③ over the bulkhead tongues ④ and seat the wall fully to the frame (ensuring the wall is oriented so the front and back edges align correctly with the corner wall edges)
- ▶ Screw the 3/4" self-tapping screws through shell mounting holes ⑤
- ▶  Screw in all the mounting screws to finger tight to draw the wall flush to the frame



Note: The pre-wired connectors are not pictured here.

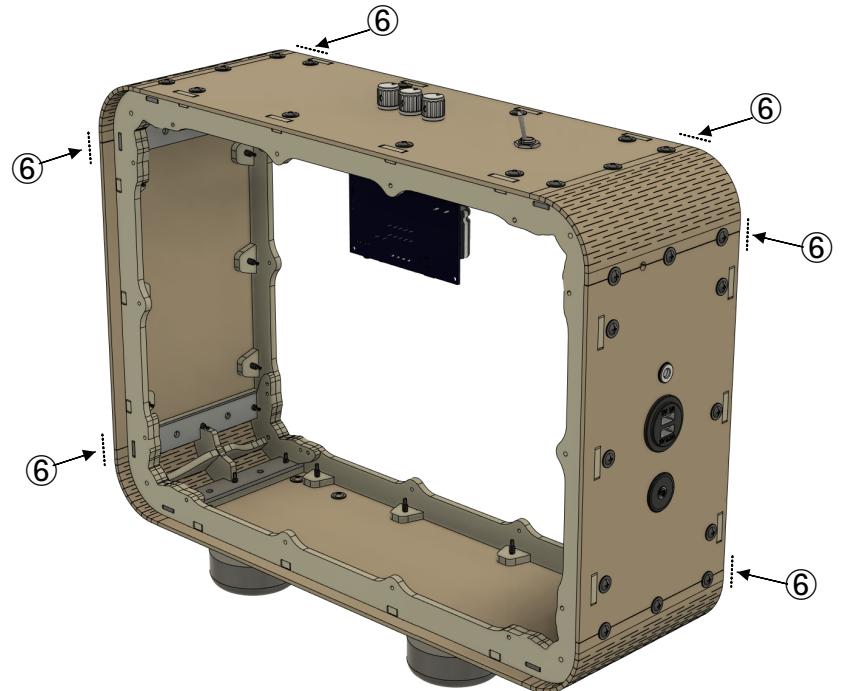
Tools:

- Phillips head screwdriver

Tips: Under-tightened screws could cause unwanted vibrations. Over-tightening the screws can strip out the panels' pilot holes.

 **Check:**

- All the wall mounting screws are fully driven to finger tight and not stripped.
- All three walls are tight and flush to the shell inner wall without obstructions or gaps
- The wall overhangs point the same way (edges are aligned ⑥)

 **Design Note:**

The modular / removable walls allow for maintenance, repair and customization.

**Online
Guide:**

<https://mkbx.info/festo-topsidewalls>



STEP
C7

Mount the Handle Assembly

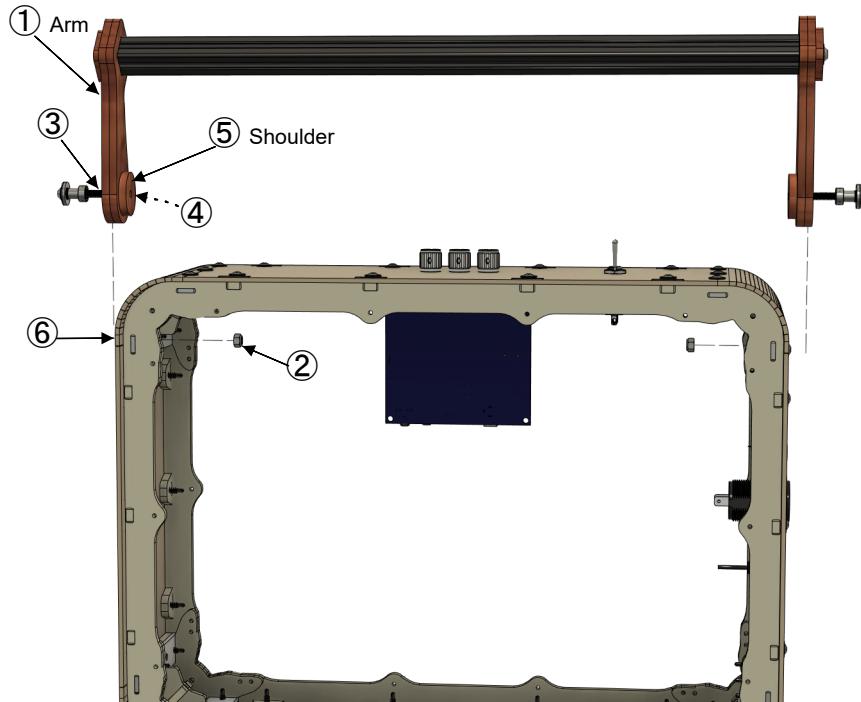


For each of the two handle arms ①, mount to the chassis follows:

- ▶ Unscrew the lock nut ② from the handle axle bolt ③
- ▶ Push the handle axle bolt through the axle hole ④ in the handle AND the handle shoulder ⑤
- ▶ Position the axle bolt over the axle hole in the chassis ⑥ and insert the axle bolt fully seating the bearing ⑦
- ▶ If dried glue obstructs the axle holes, use a 13/64" drill bit to clear the hole and try the above again



Tighten the lock nut by holding it stationary with a wrench while driving the axle bolt with hex driver ⑧ until the handle swivels with the desired drag

**Tools:**

- Adjustable wrench or fixed size wrench: 8mm or 5/16"
- Allen wrench or power drill with hex driver: 3mm

Options:

The choice of which handle goes on the left versus the right is a personal taste option. The standard orientation as pictured has the handle arm "wrist" breaking towards the rear of the boombox, but the handles will function just as well if reversed left to right.

Check:

- Axle lock nuts are completely threaded down — no gap between the lock nuts and chassis wall
- Handle shoulders are completely seated — no gap between the shoulders and chassis
- Handles swivel with the desired amount of drag

**Online Guide:**

<https://mkbx.info/festo-handleassembly>



Notes...

Notes...

Notes:

Fin

Copyright 2024 Noel Rabinowitz.

End user license agreement: This is a human-readable summary of (and not a substitute for) the license. The enclosed design and documentation material is available to the public under the Creative Commons open source license version: Attribution-ShareAlike 4.0 International (CC-BY-SA-4.0). By using the material, the user is agreeing to the terms in <https://creativecommons.org/licenses/by-sa/4.0/>. In short, users are free to: Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor Noel Rabinowitz cannot revoke these freedoms as long as you the user follow the license terms: Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. **Contact: noel@makeboomboxes.com, 510-463-4647**

Open Source Licenses

Hardware CERN-OHL-P-2.0

Software not applicable

Documentation CC-BY-4.0



Full open-source project with licensing details:
<https://mkbx.info/festo-opensource-license>

This project is certified
by Open Source
Hardware (OSHW)

US002628

