

Before You Start

ONE SYSTEM = 1 bass cabinet • 1 head • 1 subwoofer (build two of everything for stereo)

PARTS PER SYSTEM

Bass: BA-L, BA-R, BB-t, BB-b, BC-i, BC-b, BF ×3, BE Head: HA-L, HA-R, HB ×2, HC-i, HC-b, HE
Sub: J-L, J-R, K ×2, L, M, P ×2, N → identify every panel on page 2 (holes drawn as machined)
Hardware: Ø8×25 dowels ×12, sorbothane pads ×3, NL4 connectors ×2 + cable, inserts, gaskets, damping

TOOLS: PVA glue (Titebond II/III) • band clamps ×2 + bar clamps • cauls • glue brush • damp rag
• tape measure (diagonals) • router w/ R3 + 18mm roundover bits (later steps)

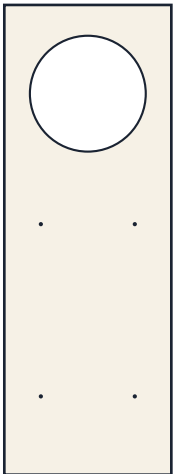
THE FOUR RULES

- 1 READ THE LABEL. Engraved ID readable in the LOWER-LEFT = correct face, correct orientation, correct hand. If it reads anywhere else – stop, you're holding it wrong.
- 2 DRY-FIT THE WHOLE BOX FIRST. Every tab drops into its pocket by gravity. Every fit in this booklet is computationally verified – if something needs force, it's the wrong panel or the wrong orientation, not a tight fit.
- 3 GLUE EVERY JOINT. These are sealed loudspeakers: the glue IS the air seal. Full bead in every dado, rabbet, and pocket. Wipe squeeze-out outside; leave interior squeeze-out as your fillet base.
- 4 NEVER FORCE. If a tab truly binds after checking orientation: one pass of 120-grit on the TAB. Plywood face veneers split quietly and leak loudly.

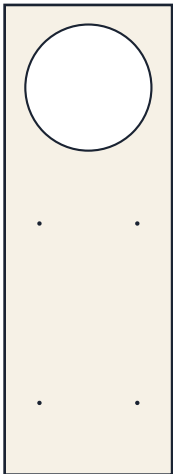
✓ = fit verified in assembled coordinates against the Rev G machining geometry.

Know Your Panels — holes as machined (matches fab package p.6-9)

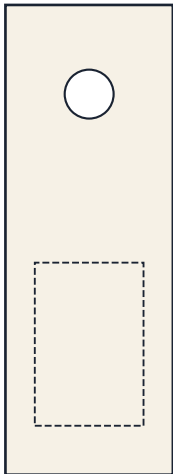
BASS



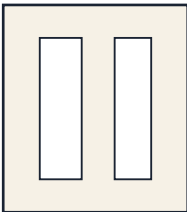
BE x1



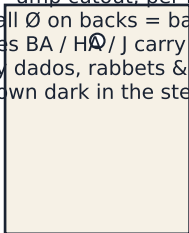
BC-i x1



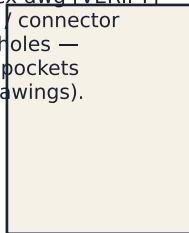
BC-b x1



BF x3



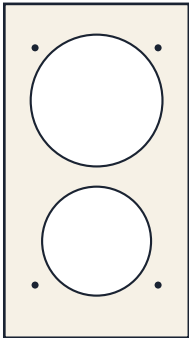
BB-t x1



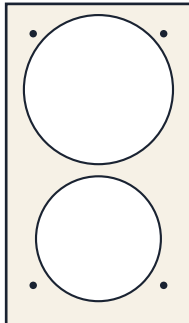
BB-b x1

● = Ø8 dowel pocket (lamination face)
--- = amp cutout, per Hypex dwg [VERIFY]
small Ø on backs = badge / connector
Sides BA / HA / J carry NO holes —
only dados, rabbets & tab pockets
(shown dark in the step drawings).

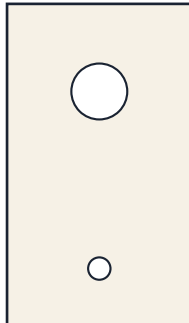
HEAD



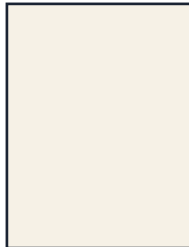
HE x1



HC-i x1

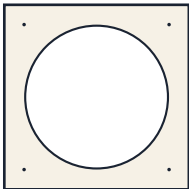


HC-b x1

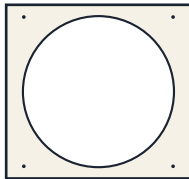


HB x2

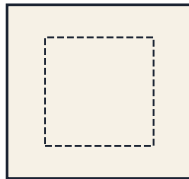
SUB



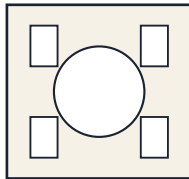
N x1



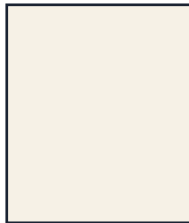
L x1



M x1

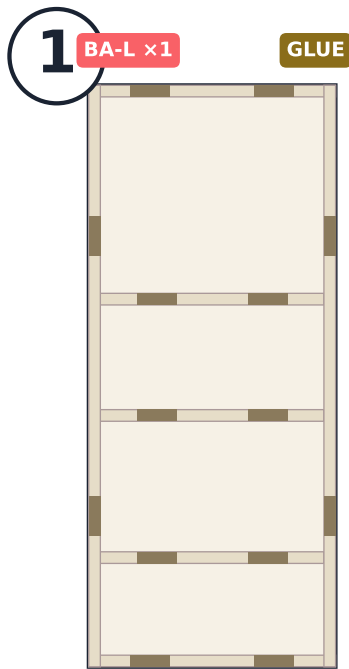


P x2

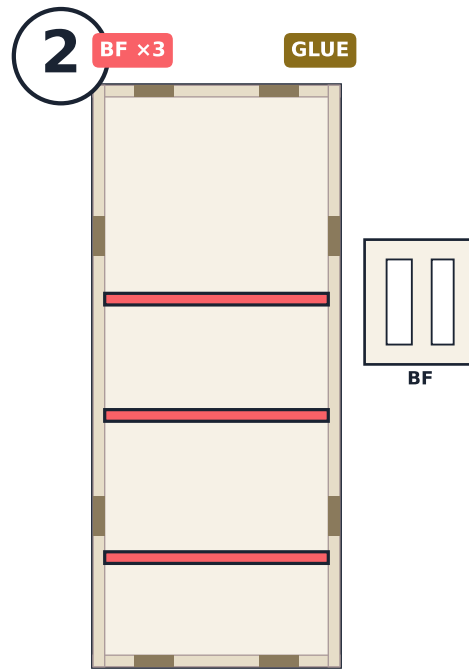


K x2

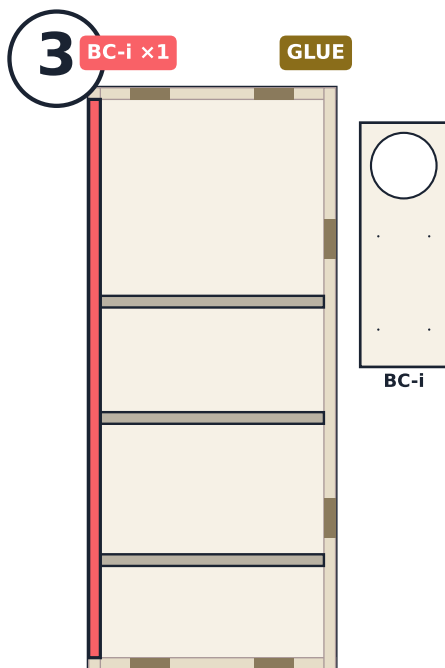
Bass Cabinet — Steps 1-4



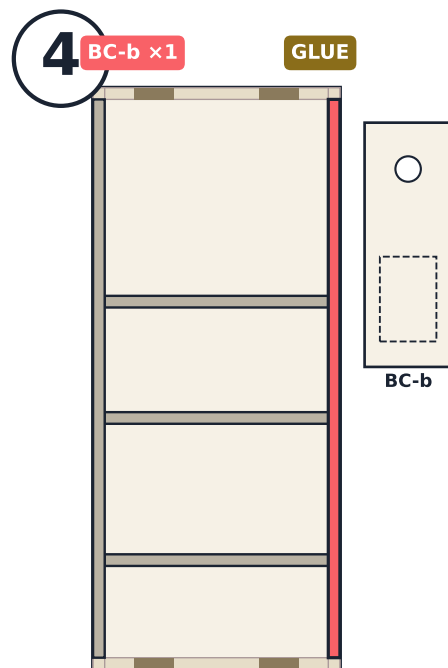
Lay BA-L pockets UP (dark = tab pockets; label lower-left).
Brush glue into ALL dados, rabbets, and pockets.



Drop the three braces BF — solid edge toward the FRONT
rabbet, windows to the rear. Tabs into dark pockets. ✓

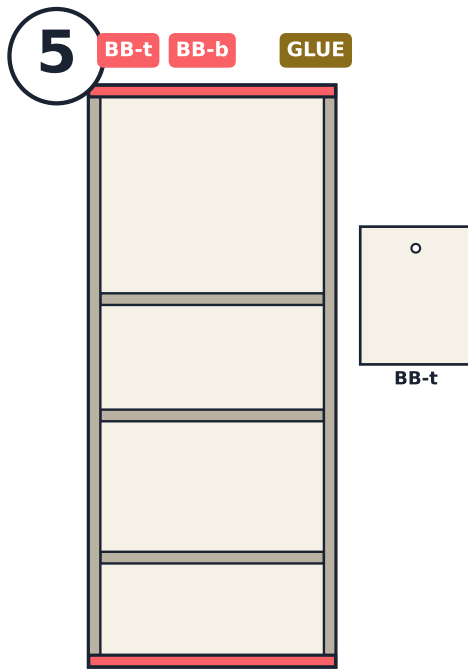


Drop inner baffle BC-i into the FRONT rabbet.
Dowel pockets + big bore face front (up). ✓

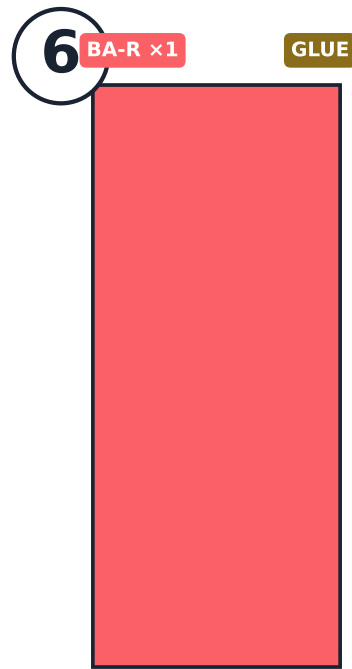


Drop back BC-b into the REAR rabbet. Amp cutout low;
badge faces outward. ✓

Bass Cabinet — Steps 5-8



Drop bottom BB-b and top BB-t into the end rabbets.
BB-t = Ø24 hole; hole to the REAR, at the woofer end. ✓



Glue BA-R's joinery, flip pockets-DOWN, cap the box.
Every tab drops home — no sliding possible. ✓

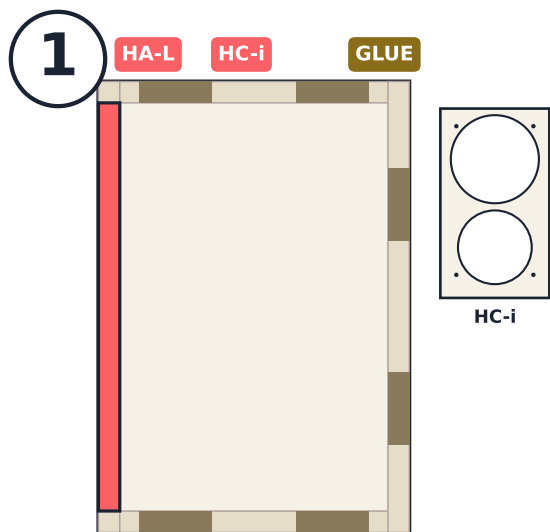
7 CLAMP + CHECK

- Two band clamps around the box; light bar-clamp pressure over each brace.
- Diagonals on the open front face match within 1mm — the tabs squared the box.
If not: a panel isn't seated. Release, re-seat, re-clamp.
- Wipe external squeeze-out NOW.

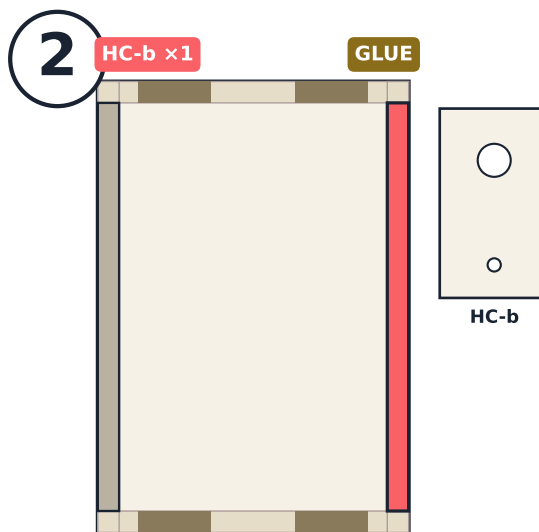
8 SEAL + CURE

- Through the woofer bore and amp cutout: finger-fillet of glue along every reachable interior seam — this fillet is the air seal.
- Clamped 2h minimum; full cure 24h before lamination.

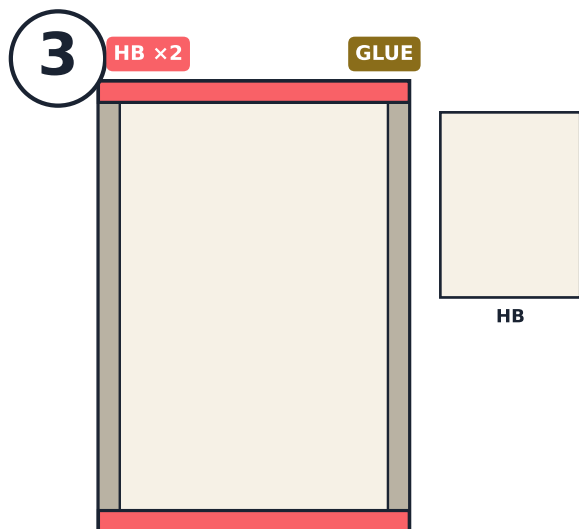
Head Unit — Steps 1-4



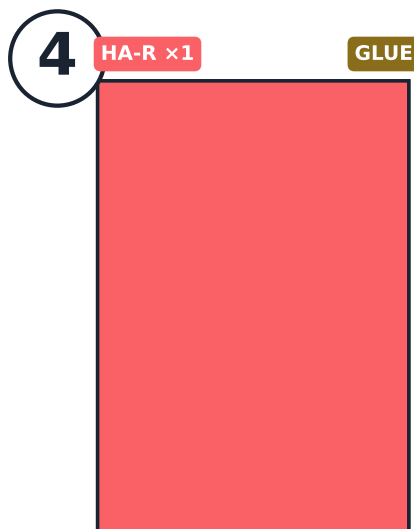
Lay HA-L pockets up; glue all joinery. Drop HC-i into the FRONT rabbet — dowels + bores face front. ✓



Drop HC-b into the REAR rabbet. Ø24 NL4 hole toward the BOTTOM; badge outward. ✓

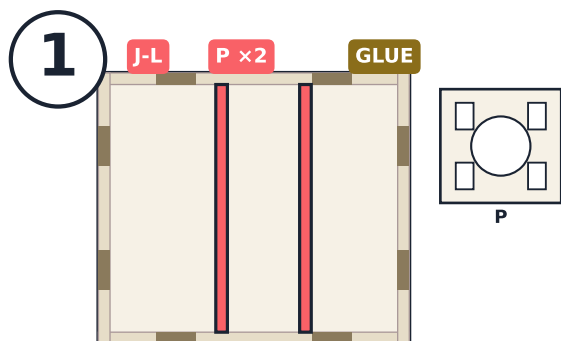


Drop both HB into the end rabbets (identical). ✓

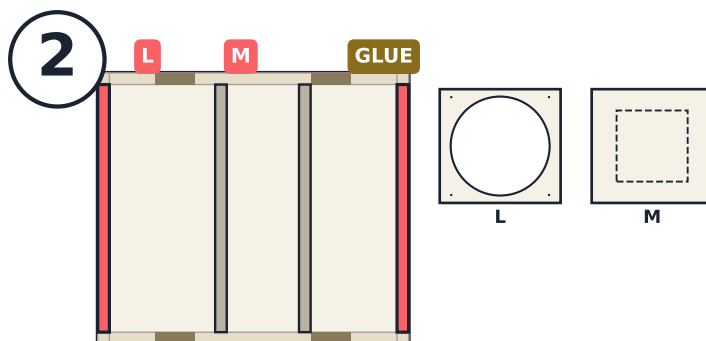


Glue + cap HA-R. One band clamp. Diagonals. Glue-block all 8 corners through the bores. Cure 24h.

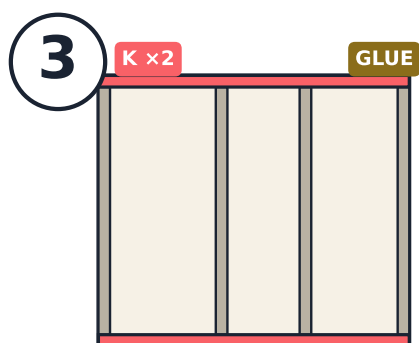
Subwoofer — Steps 1-4



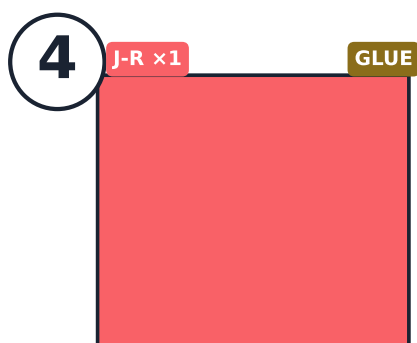
Lay J-L pockets up; glue all joinery. Drop both braces P into the vertical dados — Ø200 holes on the axis. ✓



Drop inner baffle L into the FRONT rabbet (dowels front) and back M into the REAR rabbet (text out). ✓



Drop both K into the end rabbets (identical). ✓



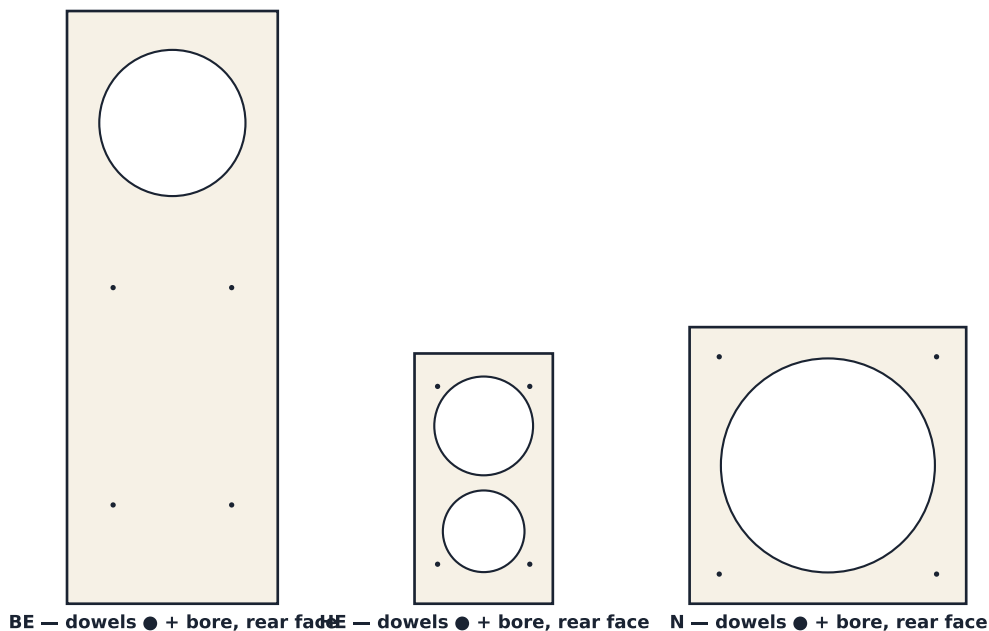
Glue + cap J-R. Band clamps, diagonals, interior fillet through the Ø324 bore + amp cutout. Cure 24h.

Outer Baffle Lamination — all three boxes

The dowels carry ALIGNMENT; your clamps only supply BOND pressure.

FOR EACH PAIR (BE→bass • HE→head • N→sub):

- 1 DRY-FIT: tap Ø8×25 dowels into the carcass's inner-baffle pockets; hang the outer baffle on them. It self-locates. ✓ (all 12 dowel pairs + all bores verified concentric)
- 2 A vertically-flipped baffle will NOT line up — bores visibly misalign. Flip it back.
- 3 Remove; roller a full even coat of glue on BOTH faces (100% coverage, no dry spots).
- 4 Dowels in, baffle on: stout cauls + every clamp, or cauls + 40kg. Perimeter squeeze-out everywhere = correct. Keep glue OUT of the driver rebates (mask or wipe immediately).
- 5 Wipe, cure 24h before roundovers. Do all three baffles of a system in one session.



Edges & Finish

- 1 R3 ROUNDOVER — every external edge of every box: rear verticals, top/bottom perimeters, the sub all around. Climb-cut the last 20mm at corners to prevent tear-out.
- 2 BAFFLE ROUNDOVER — 18-20mm bit on the front VERTICAL edges of bass cabinet and head (acoustic: kills edge diffraction). Sub baffle: R3 or the big bit — aesthetic below 80 Hz.
- 3 SAND 150 → 220. Machined engraving edges stay crisp.
- 4 FINISH — 2-3 coats wiping poly or hardwax oil. Mask driver rebates and amp seating lands. Badge groove paint-fill AFTER topcoat (acrylic in the groove, wipe the surface).
- 5 Cure fully before gasket tape.

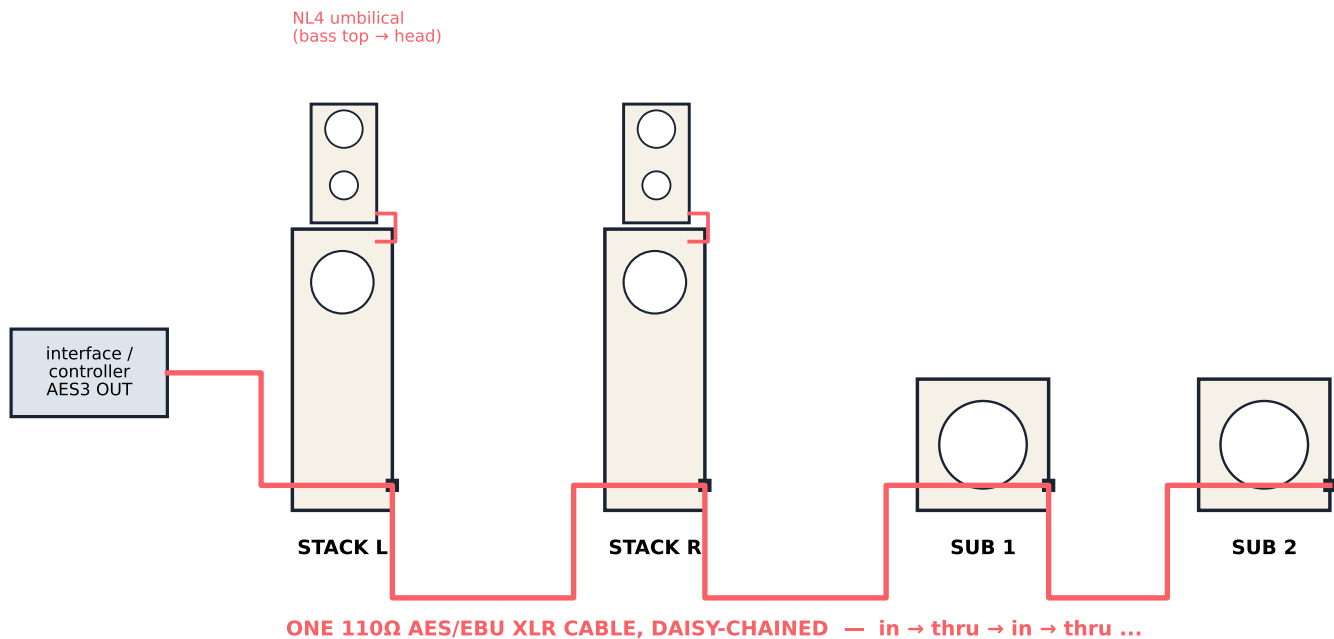
Fit-Out — Inserts, Damping, Wiring

- 1 THREADED INSERTS — driver centered in rebate, transfer-punch, drill, epoxy-set brass M4/M5 inserts. 8 sub, 8 woofer, 4 mid; tweeter per its adapter.
- 2 DAMPING
Bass: 25mm OC703 on walls (not behind woofer, not over amp); polyfill 40-50%, clear of vent.
Head: felt or 12mm OC703 all walls + light polyfill. Sub: 25mm OC703 walls only.
- 3 UMBILICAL + HEAD WIRING — fleet-wide pinout, write it inside the amp hatch:
NL4 1+ / 1- = MIDRANGE = FA123 ch2 NL4 2+ / 2- = TWEETER = FA123 ch3
Head: NL4 in HC-b, leads to mid (1) / tweeter (2), 16AWG crimped spades.
Bass top: NL4 in BB-t Ø24 hole — gasket + silicone bead UNDER the flange.
✓ hole verified behind the head footprint.
Inside bass cab: ch2/ch3 to top-plate NL4; ch1 to woofer.
- 4 GASKET TAPE on every rebate land + both amp flanges. Continuous, overlapped corners.

Electronics & Leak Tests

- 1 AMPS IN — FA123 (bass), FA501 (sub). Gasket under flange, screws in cross pattern.
- 2 DRIVERS IN — leads FIRST (marked terminal = +), seat in rebate, screws to inserts, cross pattern, two passes, snug. Beryllium tweeter: grille stays on until power-up.
- 3 LEAK TESTS (every box)
 - Press woofer/sub cone gently, release: eases back over ~1 second.
Snaps back = leak (amp gasket, NL4 flange, or a starved fillet).
 - Head: press the mid — same slow return.
 - Hunt leaks with a listening tube around every seam while pressing.
- 4 CHANNEL VERIFY — before any real signal: -40dB pink noise per channel; confirm ch1→woofer, ch2→mid, ch3→tweeter ON EVERY UNIT. Full-range into the tweeter is the one mistake this project cannot undo.

Signal Distribution — one AES3 cable per room



AES3 = two audio channels (L+R) as DIGITAL on a standard XLR — copper, not fiber. Use 110Ω digital-rated cable (Mogami 3080 / Canare DA206 / Belden 1800F) and label it distinctly from analog stock: the connectors are identical, the cable is not.

EACH BOX SELECTS ITS OWN CHANNEL (set once in HFD — page 12):

STACK L FA123 : AES input, channel = LEFT STACK R FA123 : channel = RIGHT

SUB 1 & 2 FA501: channel = L+R SUM (MONO) — both subs radiate the same mono bass
(if your HFD/firmware lacks an input-sum option, feed the subs an analog mono sum from the controller instead — same result, one more cable)

ANALOG ALTERNATIVE: XLR analog works identically via the same loop-thrus — controller L → stack L → sub 1, controller R → stack R → sub 2. If you go analog: BYPASS any bass management in the controller — that job lives in the speakers now; doing it twice stacks filters.

DSP Configuration — Hypex Filter Design (HFD)

THE AMPS SHIP SILENT: a FusionAmp produces NO output until a filter set is uploaded – that's driver protection, and it enforces our channel-verify discipline.

WORKFLOW (laptop + USB, one amp at a time)

- 1 Install HFD (free, hypex.nl). USB to the amp's config port. Power on.
- 2 PROTOTYPE SYSTEM ONLY: run the measurement session from the build plans; design the filter sets in HFD against measured responses. Freeze them.
- 3 EVERY OTHER UNIT: load the frozen file, adjust nothing. Units 2-9 are manufacturing.

WHAT EACH AMP RECEIVES

FA123 (every bass cab):

input: AES, channel L or R (per its side)

ch1 woofer: HP 80 LR4 / LP 250 LR4

ch2 mid: HP 250 / LP 2k LR4

ch3 tweeter: HP 2k LR4, -7..-9 dB

delays per prototype measurement • limiters ON

3 presets on the plate button:

P1 four-way (reference, with subs)

P2 standalone full-range (LT on, no sub)

P3 near-wall variant

FA501 (every sub):

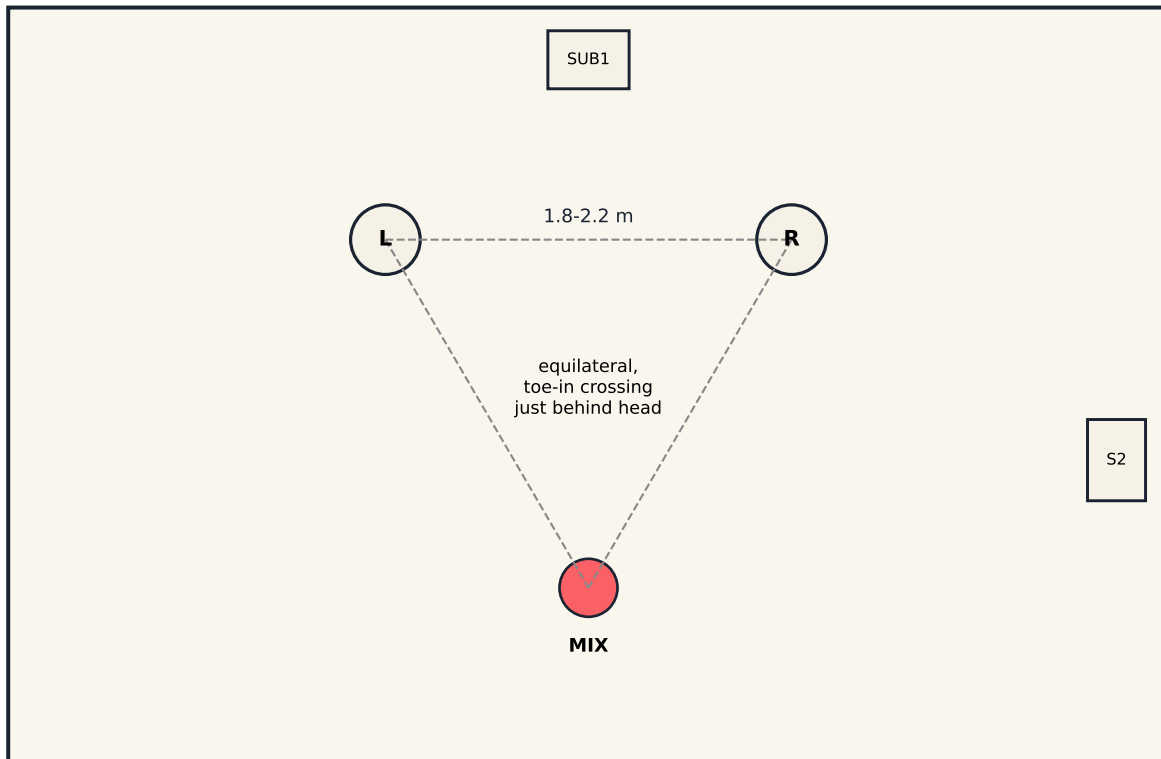
input: AES, channel = L+R sum (mono)

LP 80 LR4 • LT 29Hz/0.49 → 25Hz/0.577 • HP 15Hz BW2 • limiter @ 300 W

LABEL DISCIPLINE: write the loaded config name + date on a card inside each amp hatch, next to the NL4 pinout. Nine systems stay identical only if you can prove what's loaded.

Room Placement

front wall — ≥ 0.5 m clearance, or use near-wall preset



- Stacks: acoustic centers 1.8-2.2 m apart, equilateral to the mix position, toed in so the axes cross just behind your head. STRICT left/right symmetry to the side walls — asymmetry below 500 Hz cannot be fixed in DSP. Tweeters land at 1185 mm = seated ear height. ✓
- Front wall: ≥ 0.5 m out, or deliberately close with preset P3. Avoid the ambiguous 0.7-1.2 m middle zone (front-wall bounce notches the low mids).
- Subs: on the floor, positions ASYMMETRIC to the room's modes — front-center + a side-wall midpoint is the starting layout. Both radiate the same mono signal; their different positions excite different modes, flattening the seat-to-seat bass. Placement beats EQ below 80 Hz: move first, filter last.

First Power & Commissioning — per room

- 1 STACK — 3 pads on each bass top (two front, one rear-center), heads on, cleats engaged, NL4 umbilicals connected. ✓
- 2 CABLE — the AES daisy chain per page 11. Mains last.
- 3 VERIFY BEFORE SIGNAL (every unit, every time a box is opened):
 - ☐ leak test: press each cone — slow ~1s return
 - ☐ channel map: -40 dB pink per FA123 channel → ch1 woofer / ch2 mid / ch3 tweeter
 - ☐ correct preset selected (P1 four-way) and correct AES channel per box
- 4 SUB INTEGRATION (per room, mic at mix position):
 - level-match subs to mains at 80 Hz, then set sub delay/polarity by the invert-null method; store in each FA501.
 - moving-mic average around the seat; cuts-only PEQ on the worst room peaks BELOW 250 Hz. Do not chase dips; touch nothing above the transition region.
- 5 LISTEN — known material, moderate level, ten minutes. Buzzes on bass transients = a loose lead or starved gasket, and they announce themselves immediately.
- 6 SIGN-OFF

☐ diagonals matched	☐ leak tests pass	☐ channel map per unit
☐ configs labeled	☐ sub delay/level stored	☐ gated sweep within 1 dB
☐ room EQ cuts-only	☐ badge admired	

Deviation >1 dB from the reference curve = leak, gasket, or wiring — not the filters.
 The prototype system commissions the design; every other room is this checklist with music on.