Concept 14.2

Field Recorder

R9 | Rapid Product Solutions | Supplier brief

WIDTH (mm)	HEIGHT (mm)	DEPTH (mm)
108	150	27.4

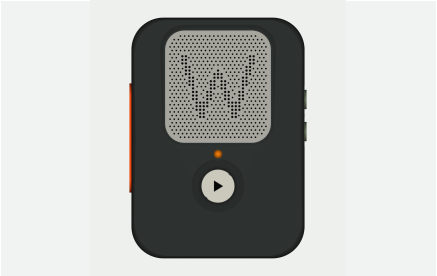
Substrate dimensions. Calculated finished depth: 27.945 mm. Maximum finished depth: 28 mm.

Inspiration photo

CAD assembly / R9

Appearance intent; CAD shows the current engineering proposal. Views are not to scale.

CAD front



CAD rear

CAD exploded

02 Quote and materials / 03 Build and inspect / 04 Inputs and delivery

Quote and materials

R9 | Rapid Product Solutions | Thin sculpted body with a stainless W grille, tactile coating and precision internal mechanisms.

Please review manufacturability and quote a staged enclosure prototype for Walkie One, a handheld push-to-talk voice device. We need to evaluate grip, button operation, speaker/microphone openings, status light, charging access and serviceability.

What to quote first

Rear and front boss coupons, precision mechanism/nest samples and F1 finish/grille samples, then one unpowered full fit set. Agree how to achieve the 28.00 mm finished maximum before a finished article.

Materials and processes

Structure and tactile surface	SLS PA12 with controlled secondary machining. F1 is a thin tactile coating, not a bonded rubber skin. Proposed total coating is 65-95 microns per coated face; Rapid can propose a compatible soft-touch system within that budget.
Metal grille	0.80 mm 304 stainless, exact 644-hole W pattern. Fine laser or compensated photoetch is proposed; Rapid must confirm direct or partner capability. Brushed/passivated finish is the base route.
Mechanisms and small parts	CNC POM-C guides/caps, aluminum play key, stainless drives/bushings and tapped crossbars; die-cut PET shims. Custom springs require an approved springmaker drawing/force curve.

Published capability is not acceptance of this specific geometry. Exact grades, fine tolerances, thin-section casting, specialty coatings/cutting and test services need Rapid confirmation. General website tolerances do not replace the finished drawing tolerances.

Build and inspect

Finished depth	108 x 150 x 27.4 mm substrate. Calculated finished budget 27.945 mm leaves only 0.055 mm to 28.00. Inspect the complete finished part; raw SLS tolerance is insufficient. Do not count the modeled artwork lift twice.
Crossbar fastening	Rear M1.6 x 4 and front PTT M2 x 4 fasten into separately tapped metal crossbars. No blind tapping toward cosmetic faces. Follow D1/D1b; qualify floors, retaining roofs and torque on actual coupons.
Precision and calibration	Finished guide diametral clearance 0.03-0.07 mm; guide pitch +/-0.005 mm needs explicit process acceptance. Rest gap 0.050 +/-0.020 mm. Select measured shims/bushing lengths after actual contact; +0.03 mm trial travel is not a switch rating.
Grille and finish	Keep 644 holes and minimum finished web target 0.70 mm. Perimeter-bond breathable backing, not opaque film. Mask all guide, stop, contact and acoustic surfaces.

Assembly order

1. Inspect and load metal crossbars before cradle/cell block access. Depth-control all bores. Assemble and calibrate cassettes in the supplied nest before PCB installation; see Release_and_Assembly.md and D1-D3.

2. Demonstrate PTT end/center and play center/quadrant presses, return and removal. Fit grille/backing, mic/optics and verified electronics with the approved harness; check the real recessed USB cable.

3. Apply approved F1/marking process and measure maximum finished depth without compressing surfaces. Return measured depth, finish thickness, torque and calibration records.

Keep separate

Alternative B is excluded: its 30.245 mm calculated finished depth exceeds the 28 mm requirement. It is an appearance study, not a substitute for R9.

Use the supplied artwork at its specified size and position. Approve physical color, texture and marking samples together; screen colors are visual intent. Keep finish and adhesive off guides, stops, acoustic openings, optical faces and service seams unless the drawing explicitly calls for them. Record any proposed substitution before using it.

Inputs and delivery

Rapid is asked to make, finish, inspect and optionally assemble agreed parts using Walkie One-supplied hardware. Walkie One owns electrical design, firmware, battery/charging, RF and acoustic validation. Rapid may quote specialist support separately; these services are not assumed from its website.

Before precision parts	Rapid	Confirm guide tolerances, crossbar/bushing and grille process; identify outsourced work and any requested drawing changes.
Before finished article	Rapid proposes; Walkie One design/mechanical approves	F1 chemistry and thickness control, strength/torque coupons and round volume-cap appearance proposal.
Before powered acceptance	Walkie One electrical/mechanical	Switch load approval, spring data, populated electronics/harness, actual battery and cable, acoustic/thermal/RF tests.

Quote and return

Quote each concept separately: one unpowered fit set and the priority samples on page 2, followed by one finished appearance article after sample approval. This is a comparison basis, not an order for all concepts. Show any minimum quantity; confirm the selected concept, quantity, delivery date and ship-to with Walkie One before work starts.

Please itemize parts, fixtures/coupons, tooling, finishing, assembly, inspection and shipping; state lead time from receipt of approved inputs. Identify partner-made work, exclusions and tolerances you cannot hold. Quote a feasible alternative with its effect on fit/appearance rather than silently changing the design.

Return identified parts/samples, the material and finish selections, measured critical dimensions, assembly photos and the completed applicable inspection record. List hand fitting, deviations and unresolved items. Leave unperformed tests blank or NOT TESTED. Walkie One approves samples and engineering changes before repeat finished units.

Use these files

This brief controls supplier scope and responsibilities. The current per-part STEP, BOM and finished-interface drawings retain the technical requirements. Stop and return a marked question if they disagree. Millimetres throughout. Assembly STEP is a reference, not a single part to print. Purchased hardware, foam, cloth and adhesive solids are not rigid-print instructions.

BOM: manufacturing/R9_BOM_All_Items.csv; manufacturing/R9_BOM_Custom_Parts.csv

Records: manufacturing/Physical_Test_Record.csv; docs/Rapid_Open_Items.csv.

Release_and_Assembly.md remains the detailed assembly/process reference; original detail pages 6-16 and drawings D0-D4 retain the technical requirements.

Supplier capabilities checked 06 Sep 2026. Source links and confirmation limits: docs/Rapid_Capabilities.md. https://www.rapid-products.com/

Build files: start here

Read the four-page supplier brief first. The remaining pages consolidate the required engineering detail and drawings; use the PDF bookmarks to jump to an appendix. Original engineering page numbers are retained inside those appendices.

The companion ZIP contains this same PDF. Parts_and_Process.csv maps every BOM entry to its exact delivered files. File_Manifest.csv maps original paths mentioned in retained drawings to their delivered locations.

01_Parts_to_Print: individual STEP and existing STL for the specified print process. 02_Other_Manufacturing: cast, machined, cut and artwork definitions. 03_Assembly_and_Drawings: assembly references and essential process / inspection records. 04_Required_Fit_Checks: staged coupon and fixture geometry.

STEP is the nominal geometry. STL is a mesh alternative for the same part, not an additional part or quantity. Millimetres throughout; import at 1:1. Quote quantities come from the brief and part schedule. Assembly, hardware, artwork and compliant installed envelopes are not rigid print instructions.

Alternative B is excluded: its 30.245 mm calculated finished depth exceeds the 28 mm requirement. It is an appearance study, not a substitute for R9.

The original engineering package, source code and historical alternatives remain available under Supporting engineering and archive on the concept page. The supplier brief controls scope; technical values remain unchanged. Resolve any conflict before the affected operation.

Required stages: Rear and front boss coupons, precision mechanism/nest samples and F1 finish/grille samples, then one unpowered full fit set. Agree how to achieve the 28.00 mm finished maximum before a finished article.

For exact tolerances, assembly order and inspection criteria, use the technical appendix and the corresponding records in 03_Assembly_and_Drawings.

Parts and processes

Fabrication parts with individual files are listed below. Parts_and_Process.csv also contains every purchased item, reference, consumable and complete source note. Quantities describe the source assembly; the quote quantity is agreed separately.

Part / quantity	Material / process	Delivered filenames
LED_PACKAGE_RETAINER / 1	PA12 SLS substrate SLS; machine datum pads/bores, clean, seal and finish external faces	LED_PACKAGE_RETAINER.step LED_PACKAGE_RETAINER.stl
01_FRONT_TUB_CONNECTED / 1	PA12 SLS substrate SLS; machine datum pads/bores, clean, seal and finish external faces	01_FRONT_TUB_CONNECTED.step 01_FRONT_TUB_CONNECTED.stl
02_REAR_COVER_CONNECTED / 1	PA12 SLS substrate SLS; machine datum pads/bores, clean, seal and finish external faces	02_REAR_COVER_CONNECTED.step 02_REAR_COVER_CONNECTED.stl
03_GRILLE_304SS_0p8 / 1	304 stainless 0.80 +/-0.04 Fine laser or photochemical cut; bilateral deburr, brush and passivate	03_GRILLE_304SS_0p8.step
04_SPEAKER_REAR_CUP / 1	PA12 SLS substrate SLS; machine datum pads/bores, clean, seal and finish external faces	04_SPEAKER_REAR_CUP.step 04_SPEAKER_REAR_CUP.stl
SPEAKER_TAB_KEEPER_8.5 / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	SPEAKER_TAB_KEEPER_8.5.step
SPEAKER_TAB_KEEPER_55.5 / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	SPEAKER_TAB_KEEPER_55.5.step
PCB_EDGE_CLIP_1 / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	PCB_EDGE_CLIP_1.step
PCB_EDGE_CLIP_2 / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	PCB_EDGE_CLIP_2.step
PCB_EDGE_CLIP_3 / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	PCB_EDGE_CLIP_3.step
PCB_EDGE_CLIP_4 / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	PCB_EDGE_CLIP_4.step
06_PCB_EDGE_CARRIER / 1	PA12 SLS substrate SLS; machine datum pads/bores, clean, seal and finish external faces	06_PCB_EDGE_CARRIER.step 06_PCB_EDGE_CARRIER.stl
CAP_PTT_GUIDED / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	CAP_PTT_GUIDED.step
SWITCH_REACTION_SHIM_PTT / 1	PET shim stock 0.25 +/-0.015 Steel-rule die / knife cut; deburr and micrometer measure	SWITCH_REACTION_SHIM_PTT.step
SWITCH_CARRIER_FR4_PTT / 1	FR4 1.60 sheet CNC route, drill and slot; bare mechanical carrier	SWITCH_CARRIER_FR4_PTT.step
CASSETTE_PTT_CNC / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	CASSETTE_PTT_CNC.step
CAP_UP_GUIDED / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	CAP_UP_GUIDED.step
SWITCH_REACTION_SHIM_UP / 1	PET shim stock 0.25 +/-0.015 Steel-rule die / knife cut; deburr and micrometer measure	SWITCH_REACTION_SHIM_UP.step

Part / quantity	Material / process	Delivered filenames
SWITCH_CARRIER_FR4_UP / 1	FR4 1.60 sheet CNC route, drill and slot; bare mechanical carrier	SWITCH_CARRIER_FR4_UP.step
CAP_DOWN_GUIDED / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	CAP_DOWN_GUIDED.step
SWITCH_REACTION_SHIM_DOWN / 1	PET shim stock 0.25 +/-0.015 Steel-rule die / knife cut; deburr and micrometer measure	SWITCH_REACTION_SHIM_DOWN.step
SWITCH_CARRIER_FR4_DOWN / 1	FR4 1.60 sheet CNC route, drill and slot; bare mechanical carrier	SWITCH_CARRIER_FR4_DOWN.step
CASSETTE_VOLUME_DUAL_CNC / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	CASSETTE_VOLUME_DUAL_CNC.step
CAP_PLAY_CIRCULAR / 1	6061-T6 aluminum CNC including integral guides; brush visible face; infill glyph	CAP_PLAY_CIRCULAR.step
PLAY_SWITCH_FR4_CARRIER / 1	FR4 1.60 sheet CNC route, drill and slot; bare mechanical carrier	PLAY_SWITCH_FR4_CARRIER.step
PLAY_REAR_BRIDGE / 1	POM-C, stress-relieved machining stock CNC; finish-ream controlled bores in common setup	PLAY_REAR_BRIDGE.step
PLAY_CAP_TRAVEL_STOP_TUBE_-11 / 1	303 or304 stainless bar Swiss turn OD3.10 / ream ID2.60; grind matched lengths	PLAY_CAP_TRAVEL_STOP_TUBE_-11.step
PLAY_CAP_TRAVEL_STOP_TUBE_11 / 1	303 or304 stainless bar Swiss turn OD3.10 / ream ID2.60; grind matched lengths	PLAY_CAP_TRAVEL_STOP_TUBE_11.step
MIC_EDGE_CARRIER / 1	PA12 SLS substrate SLS; machine datum pads/bores, clean, seal and finish external faces	MIC_EDGE_CARRIER.step MIC_EDGE_CARRIER.stl
05_BATTERY_CRADLE / 1	PA12 SLS substrate SLS; machine datum pads/bores, clean, seal and finish external faces	05_BATTERY_CRADLE.step 05_BATTERY_CRADLE.stl
BATTERY_SPLIT_STRAIN_RELIEF_FRONT / 1	Molded silicone, proposed50A Two-part mold from CAD; validate lead grip on sample	BATTERY_SPLIT_STRAIN_RELIEF_FRONT.step
BATTERY_SPLIT_STRAIN_RELIEF_REAR / 1	Molded silicone, proposed50A Two-part mold from CAD; validate lead grip on sample	BATTERY_SPLIT_STRAIN_RELIEF_REAR.step
PTT_RIGID_DRIVE_BRIDGE / 1	304 stainless CNC from bar/plate; flatness0.03; radius contact edges0.15	PTT_RIGID_DRIVE_BRIDGE.step
PLAY_RIGID_DRIVE_BRIDGE / 1	304 stainless CNC from bar/plate; flatness0.03; radius contact edges0.15	PLAY_RIGID_DRIVE_BRIDGE.step
STOP_CALIBRATION_PTT_0 / 1	PET 0.25 +0.05 +0.02 stock stack Die-cut 4 x3; paired total0.320 +/-0.010 after selection	STOP_CALIBRATION_PTT_0.step
STOP_CALIBRATION_PTT_1 / 1	PET 0.25 +0.05 +0.02 stock stack Die-cut 4 x3; paired total0.320 +/-0.010 after selection	STOP_CALIBRATION_PTT_1.step
STOP_CALIBRATION_UP_0 / 1	PET 0.25 +0.05 +0.02 stock stack Die-cut 4 x3; paired total0.320 +/-0.010 after selection	STOP_CALIBRATION_UP_0.step
STOP_CALIBRATION_UP_1 / 1	PET 0.25 +0.05 +0.02 stock stack Die-cut 4 x3; paired total0.320 +/-0.010 after selection	STOP_CALIBRATION_UP_1.step
STOP_CALIBRATION_DOWN_0 / 1	PET 0.25 +0.05 +0.02 stock stack Die-cut 4 x3; paired total0.320 +/-0.010 after selection	STOP_CALIBRATION_DOWN_0.step

Part / quantity	Material / process	Delivered filenames
STOP_CALIBRATION_DOWN_1 / 1	PET 0.25 +0.05 +0.02 stock stack Die-cut 4 x3; paired total0.320 +/-0.010 after selection	STOP_CALIBRATION_DOWN_1.step
REAR_THREADED_CROSSBAR_-27_20 / 1	316L stainless CNC5x5x1.50 +/-0.03; through-tap M1.6x0.35-6H; deburr	REAR_THREADED_CROSSBAR_-27_20.step
REAR_THREADED_CROSSBAR_-36_65 / 1	316L stainless CNC5x5x1.50 +/-0.03; through-tap M1.6x0.35-6H; deburr	REAR_THREADED_CROSSBAR_-36_65.step
REAR_THREADED_CROSSBAR_27_20 / 1	316L stainless CNC5x5x1.50 +/-0.03; through-tap M1.6x0.35-6H; deburr	REAR_THREADED_CROSSBAR_27_20.step
REAR_THREADED_CROSSBAR_36_65 / 1	316L stainless CNC5x5x1.50 +/-0.03; through-tap M1.6x0.35-6H; deburr	REAR_THREADED_CROSSBAR_36_65.step
PTT_MOUNT_CROSSBAR_-31 / 1	316L stainless CNC4x4x1.20; through-tapM2x0.4-6H; deburr	PTT_MOUNT_CROSSBAR_-31.step
PTT_MOUNT_CROSSBAR_31 / 1	316L stainless CNC4x4x1.20; through-tapM2x0.4-6H; deburr	PTT_MOUNT_CROSSBAR_31.step

Walkie One 14.2
Sculpted thin revision / R9

6 September 2026 | Isolated revision from R7 | Dimensions in millimetres

28.00 mm finished maximum

A concrete constrained exterior and buildable calibration proposal. R7, other concepts, the shared website and the Git branch are preserved. Start with the supplied coupons. This package is not a production qualification.

First-build priority	Controlling action
Thin fastening	Rear: captured metal crossbars, inward bosses and M1.6x 4 screws. Front PTT: raised mounting ears and M2x 4 crossbars. No blind plastic tapping toward cosmetic faces. D1/D1b control depth and engagement.
Precision mechanism	CNC guides, rigid drives and measured stop stacks replace fragile foil/disc/loose-pusher assemblies. Calibrate each actual switch before PCB installation; nominal .33/.38 travel does not qualify every unit.
Tactile finish F1	Named 2K polyurethane topcoat candidate on sealed PA12; total dry buildup 65-95 microns per coated exterior face. Approve actual PA12 adhesion, sheen, grain, feel and wear coupons.
Appearance decision	Keep W grille, orange PTT, metal play key and rear text. D12 round/textured volume faces are an explicit proposal at unchanged approved centres. Alternative B is outside 28 mm.
Required evidence	Spring force, off-centre actuation, acoustic response, torque/pullout, tactile finish and durability: UNPERFORMED. Electrical/RF, harness and battery qualification remain open.

Roles: design owner approves form/feel; mechanical supplier makes and measures coupons; mechanical owner closes calibration/fastening; electrical/acoustic owners confirm electronics and sound. No supplier order or communication is part of this package.

Release limits and process locks

Dimension / item	R9 controlling definition
Exterior envelope	108 x 150 x 27.4 substrate body. Uncoated/source-art extreme 27.655. Delivered appearance STEP27.730 because rear ink sits on nominal 0.075 coating.
Conservative finished budget	27.655 +0.190 coating allowance +0.100 combined positive profile/assembly allowance =27.945. Reserve 0.055 to the 28.00 maximum. Do not add the 0.075 modeled artwork lift twice.
Rear crossbars	Floor 1.595 nominal /1.445 calculated minimum. Tip clearance 2.005 nominal /1.755 calculated minimum. Four full-sizeM1.6x 4 screws.
Front PTT mounts	Mounting ears move 1.5 inward; control/guide axes do not. M2x 4 tipY-21.80; clearance endsY-22.30. Inspect actual curved floor>=1.5 and qualify 0.75 retaining roof.
Guides, uncoated	PTT4.00/4.05; volume/play 2.50/2.55, each +/-0.01. Diametral clearance 0.03..0.07. Common-setup pitch/axis inspection is mandatory.
Thin parts	Reaction shims: die-cutPET0.25. Stop stacks: measuredPET0.25+0.05+0.02 nominal. Drive bridges: machined 304 stainless. No SLS assignment for thin shims.
Play stop and return	Machined OD3.10/ID2.60 bushings, nominalL7.22, matched within 0.01. Replacement by-drawing 302SS springs OD3.80/wire 0.25; force curve and retention unqualified.
Finish masking	Keep coating/adhesive off guides, stop faces, switch contacts, mating lands and acoustic field. Source engraving/print remain decoration, not structural solids.

Thickness is an allocation and final inspection limit. A raw SLS general tolerance does not satisfy the combined 0.100 mm positive allowance; scan, machine/select or reject accordingly. No actual finished dimension has been measured.

Matched before / after

Same orthographic cameras, scale, materials and lighting. Geometry comes from actual BRep tessellations.

R9 removes material to create a shallow spherical crown and a more generous perimeter roll, then blends a local grille shoulder into it. The play halo is a curved surface, while the key itself retains its approved location. The W cut pattern is unchanged.

Front and oblique comparison: R7 on the left of each pair, R9 on the right. Flat CAD shading intentionally shows the tessellated surfaces; color and render highlights are not the evidence of curvature. Sections D0/D2 are controlling.

Inspiration and constrained form

Original inspiration (left) / R9 actual CAD (right). Reference perspective is not calibrated and cannot supply dimensions.

The original has a deeper sunken key and a fuller body. Restoring that depth without moving the current hardware would push the front crown beyond 28 mm. R9 therefore keeps a shallow dish and the broad 108 x 150 footprint. Round volume faces are proposed; their centres remain 30 mm below R6.

Rear wording decision recovered: preserve “Design in Los Angeles.” The exact instruction appears in the archived working-state record, line 86; R7 repeats it in the artwork specification. Vector and X/Z registration remain unchanged.

Alternative B / outside 28 mm

Separate form study only. Do not mix this shell with the R9 manufacturing build.

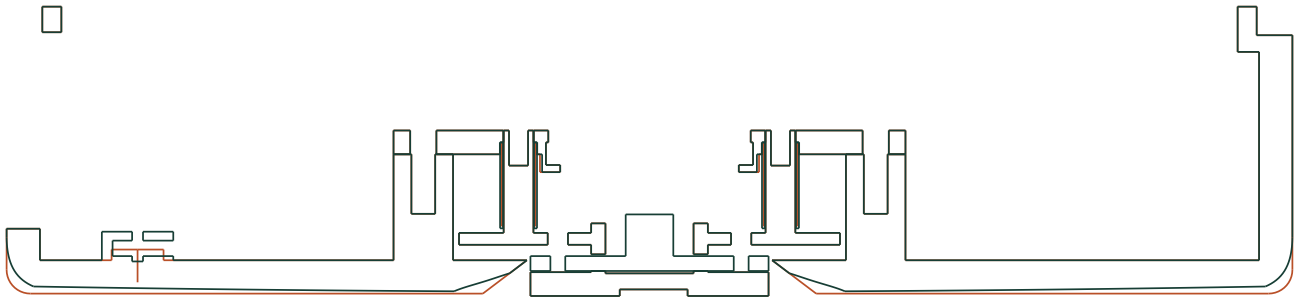
Nominal alternative depth: 29.955 mm before the F1/assembly allowance; conservative total 30.245 mm. This trades additional depth for a key that sits about 2.3 mm behind the front crown. Hardware is not rescaled.

The recessed LED and grille require new optical/acoustic-well validation. Alternative B is an appearance proposal, not a collision-qualified substitute or permission to relax the 28 mm requirement.

D0 / Actual cross-sections

Orange = R7; green = R9. All profiles are cut from the BRep, not traced from renders.

Horizontal section through play centre Z-30

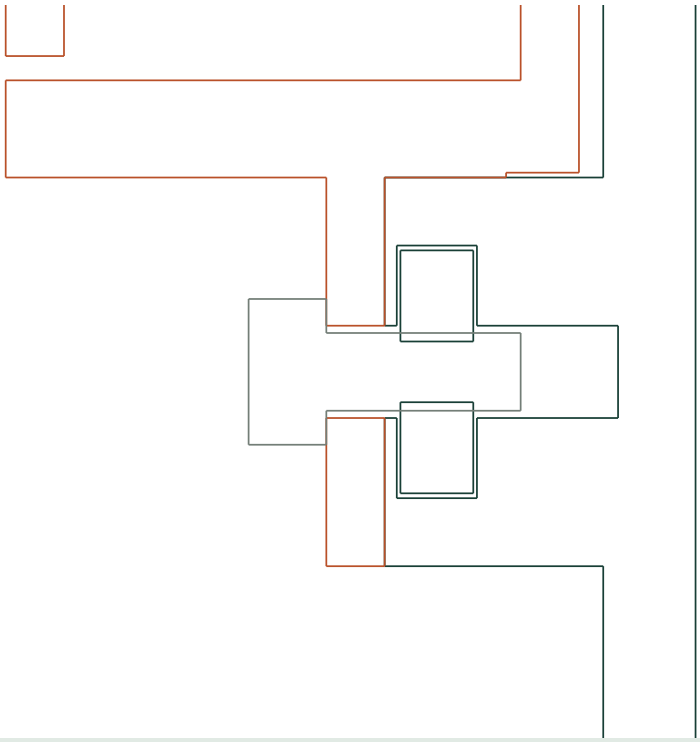


Vertical centre section X0

Full substrate front/rear limits stayY-25 /Y+2.4. Broad-front material samples in the listed grid have a minimum about 1.877 mm alongY; this is not a global normal-wall minimum. Apertures, small bosses and local pockets are controlled separately.

D1 / Rear fastening section

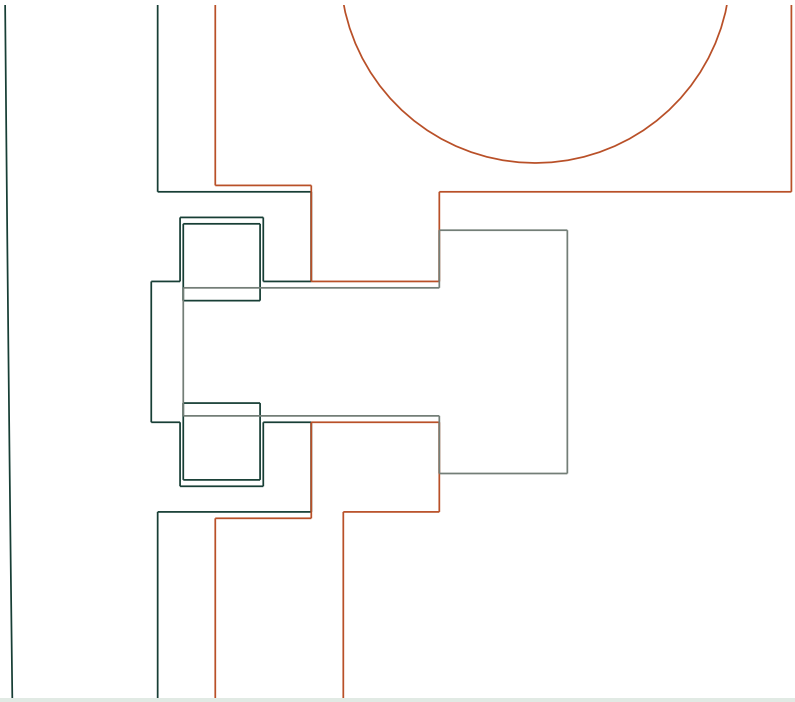
Actual section X-27 at the lower mount; orange cradle, green cover/crossbar, gray screw. Upper mount centres move toX+/-36/Z65.



Feature	Depth-controlled definition
Bearing / screw	UnderheadY-5.20; lug 1.20; M1.6x 4 tipY-1.20. HeadD3x 1.6; hex 1.5.
Metal thread	5x 5x 1.50 crossbar atY-3.675..-2.175. Through-tapM1.6x 0.35-6H off-part; nominal 1.50 engagement.
Blind clearance / floor	Flat-endD1.90 fromY-4.00 toY+0.805, depth 4.805+/-0.10. Floor 1.595 nominal; minimum 1.445 with listed tolerances.
Tip reserve	2.005 nominal; calculated minimum 1.755. Inspect full screw length, not nominal label only.
Coupon / access	Boss_Coupon_* STEP/STL reproduce the lower section. Side-load crossbars before cradle; driver access before cell insertion. Establish torque by coupon.

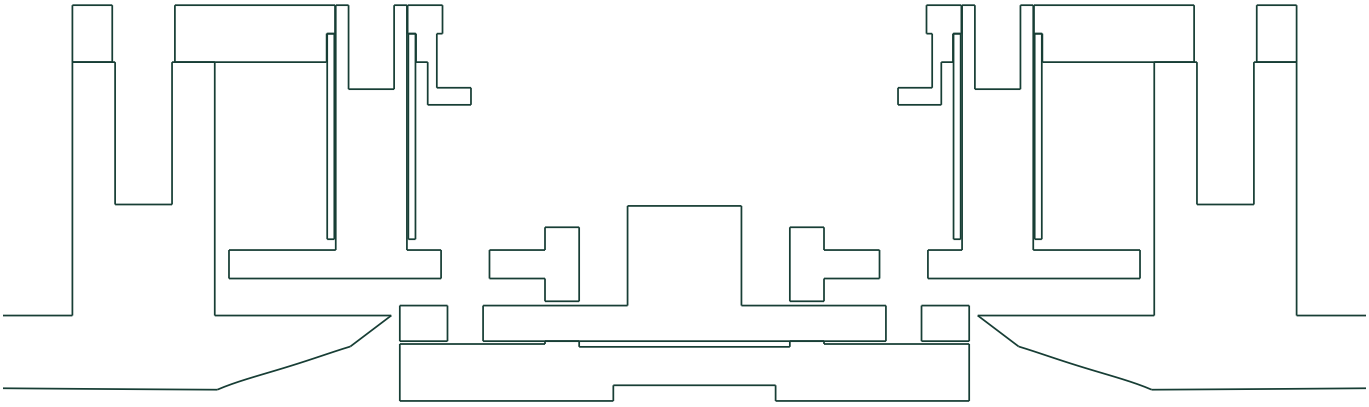
D1b / Front PTT pilot replacement

Actual section X-43 at Z-31. The guide and control centres remain fixed; only the mounting ears move inward.



Feature	Definition
Mount ear	FrontY-19.80 / rearY-17.80. Raised 1.5 relative toR7; attached to the original cassette rail.
Screw / crossbar	M2x 4 DIN912, underheadY-17.80, tipY-21.80. Nut 4x 4x 1.20 atY-21.80..-20.60; tap off-part.
Depth / support	D2.20 clearance endsY-22.30; tip reserve 0.50 nominal,0.25 worst-case allocation. Slot rearY-20.55; retaining roof 0.75.
Acceptance	Inspect actual residual curved outer floor>=1.5. Section the Front_Boss_Substrate coupon and qualify roof strength/torque; no physical result claimed.

D2 / Precision guides and stops



Finished interface	Tolerance / inspection
PTT pin / bore	D4.00+/-0.01 /D4.05+/-0.01. Pitch 50 alongZ atY-16.3.
Volume pin / bore	D2.50+/-0.01 /D2.55+/-0.01. Pitch 8 alongZ atY-3.1.
Play pin / bore	D2.50+/-0.01 /D2.55+/-0.01. Pitch 22 alongX atZ-30.
Datum scheme	A: mounted cassette pads. B: primary bore axis. C: plane through both axes. Pitch+/-0.005; perpendicularity 0.005 over bearing length; assembled axis mismatch<=0.010.
Stop bushing	OD3.10+0/-0.01 /ID2.60+0.02/0 /nominalL7.22+/-0.01; pair difference<=0.01. SeatD3.14; front spring reliefD3.96.
Stock / masking	CNC POM guides; stainless bridges/bushings; die-cut PET shims. No paint or adhesive on bores/stop faces. Qualify bushing outer-seat retention.

D3 / Calibration and force evidence

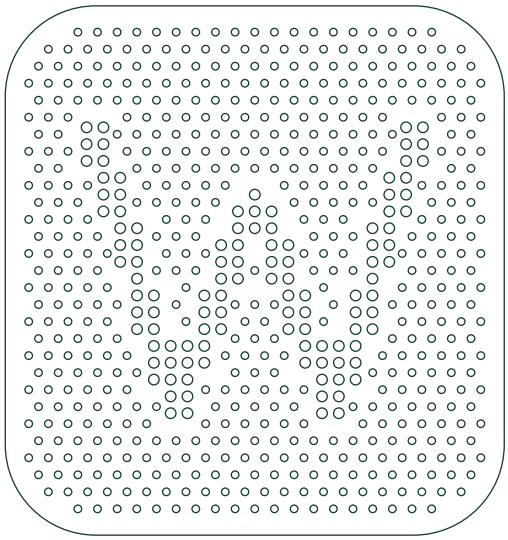
Quantity	Side / play
Verified switch force range	0.69..1.27N /0.78..1.76N [S1]
Verified switch pretravel	0.15..0.45mm /0.20..0.50mm [S1]
R7 travel deficit	0.20mm at each worst-case pretravel, before extra series compliance.
R9 freeplay target	0.050+/-0.020mm, measured at each actual switch.
Nominal cap stop	0.33mm side /0.38mm play. Sample-specific adjustment required.
Side setting	S=0.65-(measured contact +approved margin); nominal PET stack 0.32; selected range 0.05..0.42.
Play setting	L=7.60-(measured contact +approved margin); nominal bushing 7.22; selected range 6.98..7.40.
Calculated return rates	0.174N/mm side /0.0941N/mm play. Proposed wire geometry and nominal modulus [S2]; unmeasured.
Predicted contact force	About 1.26N side /1.43N play nominal, before friction. High-switch-force estimates 1.63N /1.97N. No measured tactile result.

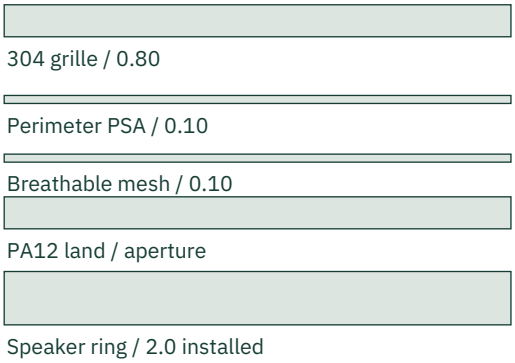
Use a coaxial 0.001 mm indicator, low-range force gauge and continuity tester. Measure rest, first contact, stop and return; test PTT ends/centre and play centre/quadrants. The proposed 0.03 mm post-contact trial allowance is NOT manufacturer-approved overtravel. Establish it before accepting a calibrated unit.

Record: part/lot, gap, first-contact travel, stop travel, shim total or bushing pair lengths, force curve, return, anchor torque, coating sample ID and operator/date. Physical_Test_Record.csv starts with every physical test marked UNPERFORMED.

D4 / Grille and acoustic assembly

D4 / Exact W plate at 1:1 (print actual size)





Stack schematic enlarged; not a solid membrane.

Feature	Preserved geometry / proposed process
W pattern	644 holes:111 xD1.4 W core and 533 xD1.0 background. Plate 66x 70/R12 x 0.8.
Web / finish	Minimum nominal web 0.8234. Proposed finished minimum 0.70; flatness 0.15; burr<=0.03; brush and passivate both faces.
Cutting	Qualify fine laser or compensated photoetch; inspect through-throat and taper. Hole count is unchanged.
Backing / bond	BlackPET breathable mesh 62x 66/R10, installed 0.10 maximum, within perimeter PSA0.10. No glue or opaque film over acoustic field.
Seal	Retain speaker ringOD41/ID37,2.0 installed. HT-8002.39 sheet is a candidate requiring measured compression selection; no seal or acoustic rating claimed.

The hole schedule and vector masters are byte-preserved fromR7. Proposed dimensions and process limits require supplier first-article acceptance; do not change perforation count based only on 13.11% overall open area.

Detailed manufacturing instructions

Controlling notes, assembly sequence, proposed finish recipe and unperformed qualification work.

Exterior and finish F1

Coordinate system is unchanged: X across width, Z up; front toward negative Y. Body maximum nominal dimensions remain 108 x 150 x 27.4. The front crown uses a real radius 3000 spherical surface, intersected with a lofted perimeter roll. At the crown centre Y=-25; the reference sphere recedes about 0.267 at X40/Z0 and 0.817 at X0/Z70 before local grille/LED lands. Edge stations and recess contours are editable in source/revise.py and visible in actual sections. The original cavity, W plate and component positions are retained. Grille shoulder widens into the crown rather than adding a metal trim ring. The play halo is a smooth loft with radii 17,16.4,14.6,12.4,10.35; the metal key remains frontmost atY-25.20. This is a shallow dish, not the inspiration's deeply sunken key.

Volume centres stay X54/Y-13.6/Z24 andZ4 (30 mm down from R6, pitch 20). The explicitly proposed appearance changes are D12 circular faces with machined recessed texture and +/- cues. The PTT face stays orange 16x 68 atY-11.3/Z0. Metal play key staysD20 and its rear guides stay fixed. Rear branding remains 44.8 mm wide atZ-51.9, with exact text Design in Los Angeles atZ-61, nominal 2.8 mm. Explicit prior user decision recovered in evidence/Original_WORKING_STATE.md, line 86 and the R7 artwork specification. No alternate wording is necessary unless that decision is reopened.

F1 is a thin tactile coating proposal, NOT a rubber skin: cleaned and controlled-finished PA12, compatible adhesion/sealing layer, charcoal color and waterborne two-component polyurethane tactile clear. AkzoNobel 622-CJS-10158 (waterborne 2K PU silky smooth clear) is the named topcoat candidate; its PA12 primer, mix/cure recipe and adhesion are subject to supplier technical approval. Public product identification does not qualify this exact substrate or layer stack.

Proposed dry-film stack normal to each exterior surface: penetrative sealer/primer 10-15 microns, charcoal compatible base 10-20 microns, tactile clear 45-60 microns. Total 65-95 microns; nominal 75. The 95-micron ceiling includes texture peaks, not just average film. Artwork's existing 55-micron clearance/envelope is already included in 27.655 mm; no additional unbudgeted ink or protective overcoat is allowed. No bonded silicone/PU skin fits the remaining budget without removing core material or increasing depth; F1 is the selected thin route. Do not market a colored raw SLS print as rubberized.

Depowder; wash using the supplier's PA12-compatible process; dry to constant mass. Finish the outer surface only with controlled media/abrasion and inspect against CAD before sealing; no uncontrolled solvent smoothing that erases the roll. Proposed final fine grain: Ra 3-6 microns, no isolated peaks above the layer budget; sheen 5-10 GU at 60 degrees. These are design targets to be correlated to a physical master, not vendor performance promises. Use curved edge, grille-shoulder and rear-lettering coupons plus flat witness strips. Record layer thickness by cross-section/witness step, optical texture profile, gloss and color master. Use supplier-compatible ink after full cure, with the existing off-black #3A3C3C as visual intent only.

Sample plan: at least 3 F1 coupons per preparation/primer recipe; dry and damp hand assessment by design owner, crosshatch/tape adhesion before and after moisture exposure, 500 dry and 500 damp rub cycles, cleaning-agent spot exposure using the intended cleaning list, and accelerated abrasion trial. These are proposed comparison tests; physical acceptance criteria: no exposed substrate, peeling, sticky residue, legibility loss or perceptible edge ridge, and design-owner retained sample approval. Record actual methods, loads and results; do not infer wear life from the cycle count. All results currently UNPERFORMED.

Rear fastening / drawing D1

R7's four M1.6x 3 candidates entered blind plastic pilots leaving 0.4 mm exterior floor and 0.2 mm nominal tip clearance. R9 eliminates those plastic threads and restores the old pilot cavities. New crossbar centres: (-27,20), (+27,20), (-36,65), (+36,65). Upper centres move outward so the unmodified cell, cushion and insulation stay clear. This is an internal attachment change; rear exterior and artwork do not move.

Each PA12 boss projects inward toY-4.00, with a side-loading anti-rotation slot for a 5x 5x 1.50 mm 316L crossbar. Tap M1.6x 0.35-6H THROUGH the loose crossbar, never toward the rear surface. Nuts are loaded before the cradle; the cradle rail closes access and locates the assembly. Inspect seating before insertion of the cell. Screws are AccuSSCF-M1.6-4-A4-R360 (DIN912/ISO4762), full-sizeM1.6x 4, headD3x 1.6, hex 1.5. This is a specified replacement, not a shortened/rescaled source component. Verify supplied under-head length 4.00+/-0.10 at incoming inspection; reject substitutes without a stack check.

Underhead bearing planeY-5.20; lug 1.20; nominal tipY-1.20. Crossbar isY-3.675..-2.175. Full nominal threaded engagement 1.50 (4.29 pitches); after 0.10 mm deburr each face, count 1.30 mm effective (3.71 pitches). Clearance boreD1.90 ends atY+0.805: nominal floor 1.595 torearY2.40 and tip clearance 2.005. With bearing/profile +/-0.05, screwlength+0.10 and borebottom-0.10, minimum tip clearance 1.755 mm. With rear profile-0.05 and borebottom+0.10, minimum floor 1.445 mm. Boss coupon must establish strength and absence of cosmetic witness marks; these are tolerance calculations, not pullout or deformation tests.

Depth control: seat a stop-collared flat-end D1.90 cutter on the machined boss front datumY-4.00. Total cut 4.805+/-0.10 to the deepest point. Verify depth with a depth pin/dial indicator BEFORE assembly and use a sacrificial sectioned coupon. No twist-drill point beyond this total-depth limit; no blind tapping in PA12; no heat installation at these locations. Through-tap the crossbar separately, gauge and clean it. Seat cradle against all four boss faces with no draw-down gap; use a controlled low-range torque driver. Determine torque on coupons by a stepped torque/pullout trial and cosmetic rear scan; do not use an invented release torque. Stop tightening at full seating until that limit is established. The final release record must include screw lot, measured length, crossbar gauge result, applied torque and before/after rear flatness/photo.

Upper cradle rails have a local outer relief, retaining about 1.225 mm nominal rail width at the rear in the relieved zone. Front portions of the rail and the cell envelope remain intact. Validate loads on the actual coupon, rather than adding unexplained exterior thickness.

Precision mechanisms / drawing D2

CNC machine cassette guides and caps from stress-relievedPOM-C; machine play key from 6061-T6 and bridges from 304 stainless. The decorative face finish is outside the guide zone. Reaction shims are knife/die-cutPET0.25+/-0.015. Stop shims are measured stacks from 0.25/0.05/0.02 mm stock; nominal 0.320+/-0.010, matched pair difference<=0.01. Do not laser melt PET edges into the working stack. Flatness<=0.03 on bridges and stop seating pads; contact noses deburredR0.15, polished free of tool burrs. The play bridge has a through-tapped 1.25 mm anchor plate replacing the former separate nuts; screws engage approximately 0.93-1.05 mm depending seating. Demonstrate retention at the low button loads; no rated thread strength is asserted.

Guide dimensions FINISHED and uncoated: PTT pinD4.00+/-0.01 / boreD4.05+/-0.01; volume and play pinsD2.50+/-0.01 / boresD2.55+/-0.01. Diametral range 0.03..0.07. At each pair, set datumA from the mounted cassette seating pads, B from the primary guide axis, C from the plane through both guide axes. Coordinate-bore both guides in one setup; inspect corresponding cap pins in the same datum scheme. Guide pitches: PTT50 alongZ atY-16.3; volume 8 alongZ atY-3.1; play 22 alongX atZ-30. Specify pitch+/-0.005 and perpendicularity 0.005 over the bearing length. Assemble matched pairs with measured maximum axis mismatch 0.010, not an assumed printer capability. Minimum nominal radial clearance after 0.010 offset is 0.005 at the tight size limits. This is a room-temperature prototype fit; thermal/humidity free-return checks are still needed.

Use calibrated pin/ring gauges, micrometer, optical/CMM centre measurement and a low-force sliding test in the nest. Incoming dry parts and assembly inspection at 23+/-2 C. A binding pair is reworked or rejected; never paint, glue, polish blindly or force it to fit. For production thermal range, consider a relieved secondary guide as a future tolerance variant only after testing; it is not silently applied in R9.

Play stop bushings are turned from stainless bar, OD3.10+0/-0.01, ID2.60+0.02/0, nominal length 7.22+/-0.01, pair mismatch<=0.01. Rear seatsD3.14 and bearing mouth reliefD3.96 protect the new OD3.80 return springs. The original 0.1 mm-wall tube is superseded. Bushing face flatness 0.02, perpendicularity 0.02; ream before part-off, support with a mandrel, deburr both ends; inspect with a pin gauge and optical edge check. Retain with a metered small amount of supplier-qualified retaining compound on the OUTER seat only; mask the ID and both stop/shoulder faces. POM adhesion must be coupon-qualified; if adequate retention cannot be established, a mechanical keeper is required before service release. No hidden claim of qualified bond retention.

Side rigid drive replaces loose 0.20 pushers, two-disc stacks and PTT foil. Play rigid bridge replaces foil, spacers and independent pusher. Each switch now drives directly from the cap through a stiff bridge/integral boss; the cap stop governs travel. Source switch bodies, terminals, cap centres and guide locations stay fixed. The PTT carrier has local clearance for the new bridge.

Calibration and actuation / drawing D3

Manufacturer data S1: B3F-3150 operates at 0.98+/-0.29N and pretravel 0.15..0.45mm; B3F-4000 at 1.27+/-0.49N and 0.20..0.50mm. R7 pusher travel minus 0.10 gap gives only 0.25/0.30 mm, 0.20 mm short of each worst-case pretravel. Its 0.05 mm play foil has optimistic fixed-end beam stiffness about 0.846N/mm, requiring about 2.08 mm deflection to transmit 1.76N; that cannot establish actuation within 0.55 mm cap travel. PTT foil similarly requires about 0.381 mm under 1.27N in the idealized model. These calculations reject the prior assumption, not the component itself.

R9 bridges use estimated linear beam stiffness 753N/mm PTT and 3304N/mm play; approximate deflections 0.00169/0.00053 mm atmaximum switch force. Models use unperforated beams and nominal material modulus, so local hole/anchor compliance and friction must be measured. Original side return spring candidate:302SSwire 0.35, meanD5.3,5 activecoils, free 6.0/installed 5.5. New play return spring is a purchased custom-wound part by drawing:302SSwire 0.25, meanD3.55,8 activecoils, free 7.1/installed 6.6, OD3.80; do not stretch or resize a bought stock spring. No stock SKU/approved force curve has been recovered. Supplier must confirm free length, total coils/end form and solid height before purchase release.

Using k=G*d^4/(8*D^3*n) with G68,948MPa gives 0.174N/mm side and 0.0941N/mm play. Two springs add to switch force; nominal predicted contact force before friction is about 1.26N side and 1.43N play. Conservative high-switch-force estimates before friction are 1.63N and 1.97N. These are calculations, not measured button feel. Installed minimum lengths at proposed maximum calibrated travel are 4.90mm side and 5.98mm play. Specify supplier solid heights<=2.8 and<=3.0 mm respectively; unmeasured coils are not automatically accepted because the helix model fits.

1. Assemble each cassette outside the enclosure, with retainers accessible and no PCB/cell obstructing screws. Insert cap from inside the front tub/nest, then engage the cassette guides; fit original washers and axial screws after insertion. Use the actual nest to prove removal as well as installation. Do not force a captive flange through the finished exterior aperture.

2. Use a 0.001 mm-resolution indicator aligned to the motion axis and a 0..10N force gauge. Wire a continuity tester to the actual switch pins after electrical-owner confirmation. Press the switch separately first to record its contact displacement and force; do not exceed the component-approved limit.

3. Set positive unloaded gap 0.050+/-0.020 by measured drive-face finishing or selected reaction shim. Nominal digital drives contact atX-46.05/PTT, X46.05/volume andY-18.35/play. A source mesh is not the actual switch's tolerance datum. Reject preloaded assemblies.

4. Record first contact at cap travel tc. Set stop to tc plus component-approved margin. The supplied 0.03 mm experimental margin is only a prototype trial setting pending approval. Side bare stop is 0.65 mm; shim S=0.65-(tc+margin), permitted measured stack 0.05..0.42. NominalS0.32 yields 0.33. If requestedS is outside this range, rework the driver within a documented fit allowance or reject; never preload the switch to compensate.

5. Play travel T=7.60-L for the measured bushing length/seat stack. NominalL7.22 givesT0.38. Select matched lengths 6.98..7.40, givingT0.20..0.62; set L=7.60-(tc+margin). Verify the formula by indicator because actual seat depth and pin retention influence it. Record each actual seat stack and matched pair length. Check the bushing remains retained.

6. Tighten retainers to coupon-qualified values; record rest gap, tc, stop and return. Verify centre and both ends on PTT, centre/four quadrants on play and each volume key. Record force/displacement curves before and after finishing. Fit the PCB only after access-dependent settings are locked. Physical spring, tactile and endurance results remain UNPERFORMED.

Grille and acoustic stack / drawing D4

Preserve the exact 0.80 mm 304 plate,66x 70/R12,644 holes:111 W holesD1.4 and 533 backgroundD1.0. Minimum nominal web 0.8234 and 13.11% overall open area are retained. Source vector/DXF and hole schedule are copied byte-for-byte; percentage alone has not justified changing the W.

Supplier proposal: photoetch with etch-compensated tooling OR qualified fine laser cutting; final CAD is finished hole size, not etch tooling. For etching, measure taper/minimum through-throat; do not merely inspect outer hole diameter. Proposed acceptance: thickness 0.80+/-0.04, hole diameters+/-0.05, positional error<=0.05, smallest finished ligament>=0.70, flatness<=0.15 overall, edge burr<=0.03 with safe handling/no snag on both faces. Retain 2mm perimeter land. Brush consistently then passivate; any colored PVD must be separately approved and bounded at<=0.005mm per face within the existing dimensional reserve. The default is brushed/passivated stainless, not sprayed paint plugging holes.

The updated blackPET acoustic mesh envelope is 62x 66/R10,0.10 mm maximum installed, covering the hole field uniformly. SEFAR acousticPET is a candidate family; select a black breathable grade and measure transmission with the actual speaker. The CAD envelope denotes permeable textile, never an opaque film. A0.10 mm perimeter adhesive ring remains outside that field. Use die-cut adhesive with an inner setback and no squeeze-out; mechanical press fixture must bear only on the perimeter land.

Retain the existing speaker annular seal OD41/ID37 installed 2.0 mm, isolated from diaphragm and mesh. RogersHT-8002.39 mm sheet is a candidate free-thickness grade; its broad stock tolerance means each coupon must demonstrate positive compression at the actual 2.0 gap. Select/convert material, do not assume the nominal 16% reduction proves sealing. Test playback response and leakage with and without grille/backing, recording the speaker, volume setting and microphone position. Inspect dark appearance from front and oblique angles. No IP, acoustic output, sensitivity or frequency-response performance is claimed.

Validation boundaries and assembly access

Read reports/static_interference.json, motion_*.json, access_and_sections.json, export_verification.json and reference_preservation.json for the exact checks and exceptions. Static and sampled motion checks distinguish eight inherited insert interference fits and modeled screw-thread envelopes from unwanted overlap. The .25/.5/.75/1 motion checks are nominal CAD samples, not FEA or a continuous swept-volume proof. The rest assembly preserves supplied reference shapes; diagnostic actuator poses move only separate actuator solids. Springs need the independent dimensional/force checks above. See the final validation summary for any unresolved digital issues; do not manufacture past a failed geometric check.

Bottom USB remainsX25.139/Y-4.330,16x 11 opening, original 8.173 mm recess. Physical cable insertion and final wiring bend radii remain open. Demonstrate rear-cover removal without loading battery leads. Assemble crossbars and cradle screws before the cell to guarantee driver access, then prove cell loading/retention and service on the coupon/nest. No full harness routing is invented by these CAD files.

Release evidence belongs in Physical_Test_Record.csv; all current physical entries are UNPERFORMED. Return measured results and any hand-fit changes for a controlled revision before repeat manufacture.

Additional front pilot protection / D1b

The new sculpting prompted a second check of the inherited PTT cassette pilots. R9 also replaces those two blind plastic threads atX-43/Z+/-31 with 316L4x 4x 1.20 through-tappedM2 crossbars. Original pilot cavities are filled. Only the two cassette mounting ears move 1.5 mm inward; control centres, cap rest positions and guide axes stay fixed. Ears seat atY-19.80, rear atY-17.80. Full-size AccuSSCF-M2-4-A2 screws (M2x 4, headD3.8x 2) have underheadY-17.80 and tipY-21.80. No loose depth spacer is needed.

The new nut isY-21.80..-20.60 in a side-loaded slotY-21.85..-20.55. The PA12 retaining roof is 0.75 mm and the nominal threaded engagement 1.20 mm (3 pitches), effective 1.00 mm after edge breaks. D2.20 clearance endsY-22.30, giving 0.50 mm nominal tip reserve and a much thicker front cosmetic floor. With length+0.10, seating+/-0.05 and bottom+/-0.10, minimum tip clearance 0.25 mm. Use a flat-end depth-controlled cutter from boss rearY-19.80 to a maximum 2.50+/-0.10 depth; gauge loose crossbars before installation. Inspect residual outer

floor>=1.5 mm at both actual curved locations, and qualify the 0.75 mm retaining roof/torque on the front boss coupon. Do not transfer the rear-fastener torque without testing.

Artwork placement note: the delivered R9 rear ink solid is lifted 0.075 mm inY to lie on the proposed nominal coating, so the appearance assembly depth is 27.730 mm. Its vector, X/Z registration and lettering remain R7 exact. The conservative 27.945 mm limit allocation starts from 27.655 mm uncoated/source-art datum, adds 0.190 mm for both coated sides and 0.100 mm positive assembly allowance; do not add the modeled 0.075 mm a second time. With the play key uncoated, the tighter actual extreme stack is 25.20+2.40+0.095+0.055+0.100=27.850 mm; the more conservative 27.945 mm is retained as the build budget.

Maximum calibration travel and local PTT clearance

The maximum mechanical pose is 0.60 mm side / 0.62 mm play, checked separately from the nominal 0.33 / 0.38 mm sampled movement. Local PTT carrier and cassette reliefs end at X-46.70, leaving 0.20 mm nominal clearance to the moved flange at X-46.90. The PTT mounting-ear web retains 0.70 mm locally forward and widens to 1.20 mm behind the mounting seat. The rear reinforcement clears the front boss; qualify the short forward web on the supplied coupon. CNC the POM cassette relief; machine the PA12 carrier clearance from a located setup. Verify these surfaces before fitting the PCB. Do not move the control or guide centres.

The maximum-pose diagnostic excludes switches, springs and stop shims and shortens play bushings to 6.98 mm. It establishes clearance of the mechanical carriers at that pose only. It does not authorize that stroke for every switch, prove spring force/solid-height margin or replace the measured calibration and approved overtravel procedure. Qualify mount-web strength on the front boss coupon. All physical tests remain UNPERFORMED.

Source and package navigation

S1 / Omron B3F operating characteristics, page3

Switch OF/PT bounds; no allowed overtravel given

https://omronfs.omron.com/en_US/ecb/products/pdf/en-b3f.pdf

S2 / Lee Spring spring materials

Nominal 302/304wire E28e 6psi G10e 6psi; not a measured spring curve

https://www.leespring.it/en/spring-materials

S3 / Accu M1.6x4 DIN912 A4 R360

M1.6x 4 coarse 0.35, headD3x 1.6, hex 1.5

https://www.accu.co.uk/metric-cap-head-screws/250512-SSCF-M1-6-4-A4-R360

S4 / AkzoNobel622-CJS-10158

Waterborne 2K PU silky smooth product candidate; PA12 process and layer limits proposed, not manufacturer approved

https://consumerelectronics.akzonobel.com/en/products/622-cjs-10158

S5 / Sefar acoustic PET fabrics

Candidate acoustic fabric family; grade not selected

https://www.sefar.com/en/609/Product-Finder/Filter-Components/Acoustic/Fabric-solutions-for-Acoustic-devices-and-components.htm?Folder=7261728

S6 / Rogers BISCO HT-800 sheet

2.39 stock thickness tolerance broad; qualify/compression select to installed 2.0, no sealing claim

https://www.rogerscorp.com/-/media/project/rogerscorp/documents/elastomeric-material-solutions/bisco/english/data-sheets/180-070-ht-800---medium-cellular-silicone.pdf

Additional fastener source: AccuSSCF-M2-4-A2, https://www.accu.co.uk/metric-cap-head-screws/3790-SSCF-M2-4-A2

CAD: cad/Walkie_One_14_2_R9_Assembly.step; custom parts in cad/parts. Editable construction: source/revise.py plus immutable baseline and parameter values. DXF/SVG details: drawings and artwork. Coupons and nest: coupons. BOM and procedures: manufacturing. Verification records: reports. Alternative B: cad/alternative_B.

Source package is archived under baseline_R7 and is historical evidence, not a competing manufacturing instruction. Only R9 parts and this release sheet govern the proposed R9 build.