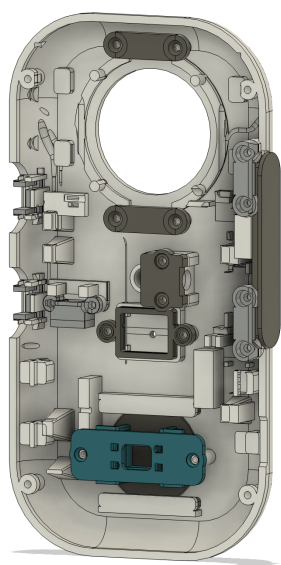


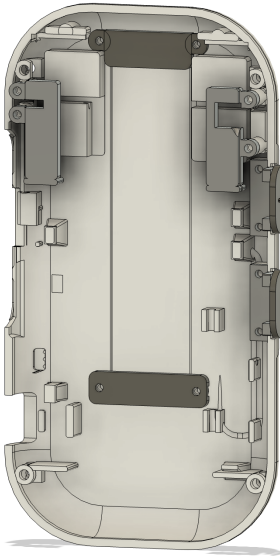
Same exterior. Stronger internals.

28.1 / R3.6 — holistic mechanical durability revision

Fixed constraint	Implementation
Bare case	78 × 150 × 24 mm; original R3.4 geometry is the baseline.
Exterior	Original bumper, caps/protrusions, openings, grille and seam retained.
Battery	62 × 38.5 × 8.5 mm maximum body plus documented directional clearance.
Scope	All 25 original printed components reviewed; 28 default product parts, with 133 feature-level risk entries, plus hardware, soft stock and wiring.
Build status	Native Fusion, STEP and STL geometry verified for a first-article build. Physical fit, force, durability and functional qualification remain open.



Front shell / internal mechanisms



Rear shell / internal mechanisms

This review separates geometric evidence from physical qualification. The final pages list measurements and tests that still have to be performed on real parts.

What changed and why

Battery installation

The maximum body fits in a 62.60 × 39.10 mm bare cradle. Low rounded locators and removable bridges replace forced insertion past tall fences. Local receiver and keeper reliefs preserve clearance to the controls and factory leads. The pouch is not used as a structural clamp.

All four controls

The volume legs become broad captured sliders. PTT loses its long projecting printed rods and gains broad guidance, removable keepers and a central stop. Play gets larger capture bars and direct shell-supported stops. The visible cap shapes and protrusions stay fixed.

Fasteners and retainers

Speaker countersink ligaments grow from approximately 0.24 to 1.5 mm. Microphone and LED keepers gain broad pan-head seats. Blind-hole depths, head envelopes, thread engagement and available bearing stock are coordinated with neighbouring parts.

Board, antenna and wiring

Every original PCB support gets a broader root; three new support pads address the lower/right board edges. Compact antenna end clamps replace fragile frame details. A removable battery adapter retains the factory battery plug. Defined cable paths, insulation and strain retention keep wires out of moving mechanisms.

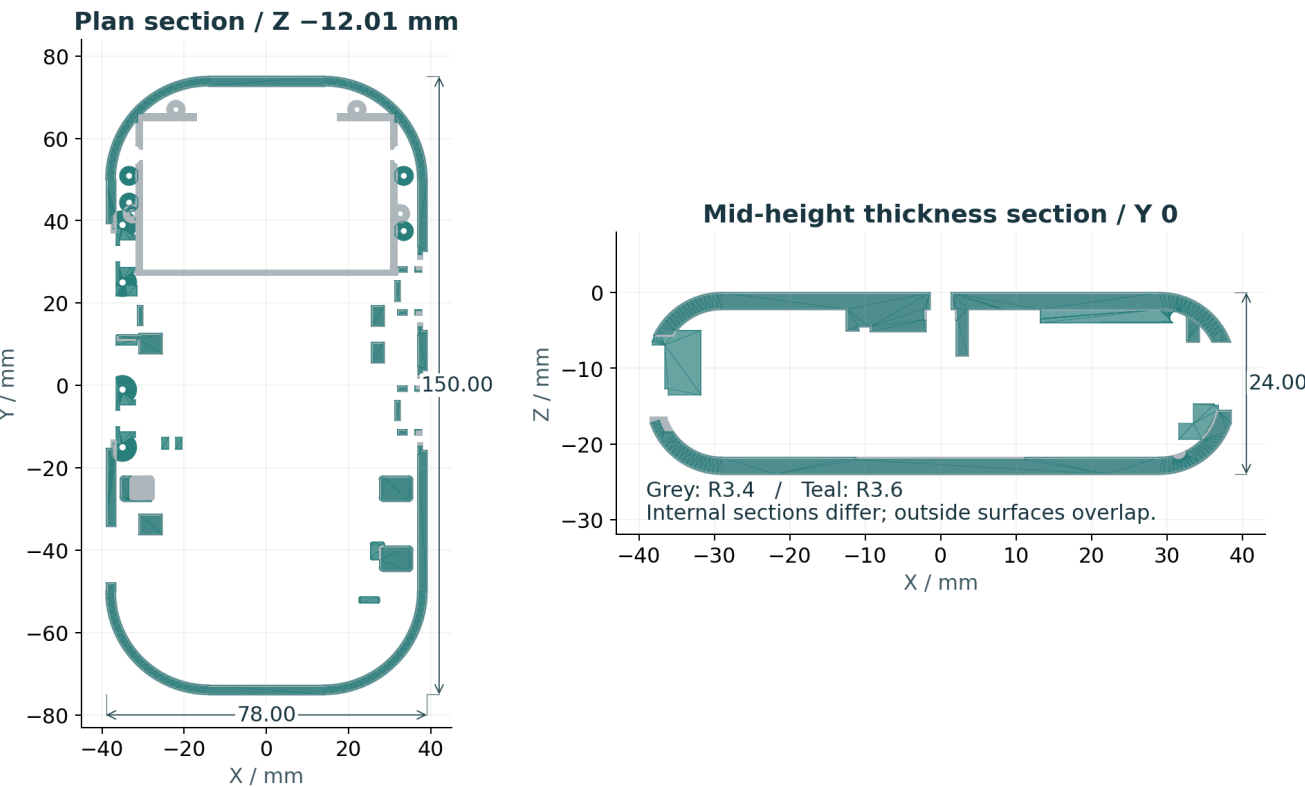
Retained parts

The original flexible rim, grip, grille and optical proxies remain because their outside geometry is fixed and their installed loads can be supported. Each has a specific handling, fit, material, bond or functional test. Unchanged does not mean unreviewed.

Every original printed component has a recorded disposition. New retainers, support details, hardware, soft stock and cable paths are included in the feature-level risk register supplied alongside this review.

Exterior preservation

ORIGINAL EXTERIOR / section overlays from STEP geometry

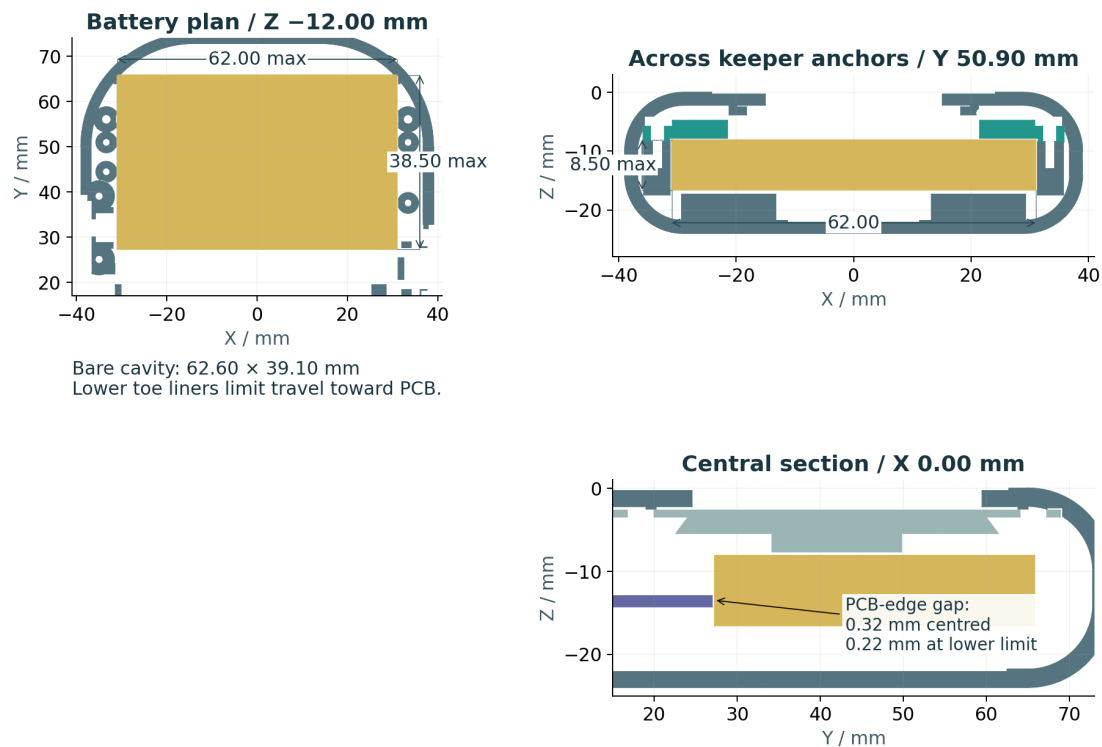


Check	Recorded result
Nominal bare case	78 × 150 × 24 mm; baseline R3.4.
Shell surfaces and opening rims	Original analytic surface occupation retained; exact boundary/curve evidence recorded.
Visible controls	Caps and contact nubs preserved; valid solid differences or documented face/curve fallback used.
Rim, grip, grille and optics	F01/F02/M04/L01/L02 original STEP inputs retained byte-for-byte; native archive retains original bodies.
Native round trip	28 product parts reopen with matched bounds and volumes.

Nominal outside dimensions and underlying exterior surfaces are retained. The native export refines one original B-spline trim by at most 0.000976 mm, within its original 0.001035 mm stored tolerance; native edge coordinates are not bit-identical. Valid face comparisons and the identical analytic cylinder resolve the raw area discrepancy. Internal receivers and passage walls change, so the entire 0.8 mm skin band is intentionally unequal.

Battery: clearance and supported capture

BATTERY / maximum body, clear installation, removable capture



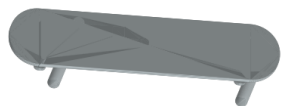
Interface	Dimension / treatment
Maximum body	62 x 38.5 x 8.5 mm, per the agreed supplier maximum.
Directional nominal clearance	0.30 mm at sides/ends; 0.15 mm rear; 0.25 mm front. Installed layers are tracked separately.
Closest board edge	0.32 mm centred; 0.22 mm nominal at the lower movement limit. Actual print/pack measurements must confirm positive clearance.
Bridge structure	3.0 mm main plate, 2.6 mm outboard ear necks, broad roots; four M2x6 pan screws.
Critical local skin	Approximately 0.953 mm at a small curved battery corner; 1.098 mm around the limiting front head relief. Qualify those local regions in the actual process.

Check the actual wrapped pouch, taped tab and factory lead separately. The maximum-body gauge is not permission to squeeze a larger battery. Nominal-only thicker pads replace the thin films; never stack them.

Controls: guidance, capture and stops

CONTROLS / unchanged outside, broader internal load paths

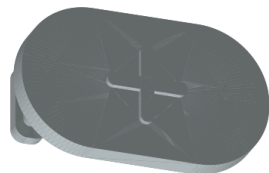
R3.4 / PTT carrier



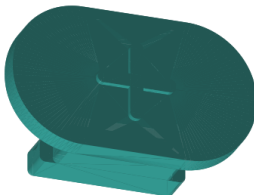
R3.6 / PTT carrier



R3.4 / Volume-up cap and slider



R3.6 / Volume-up cap and slider

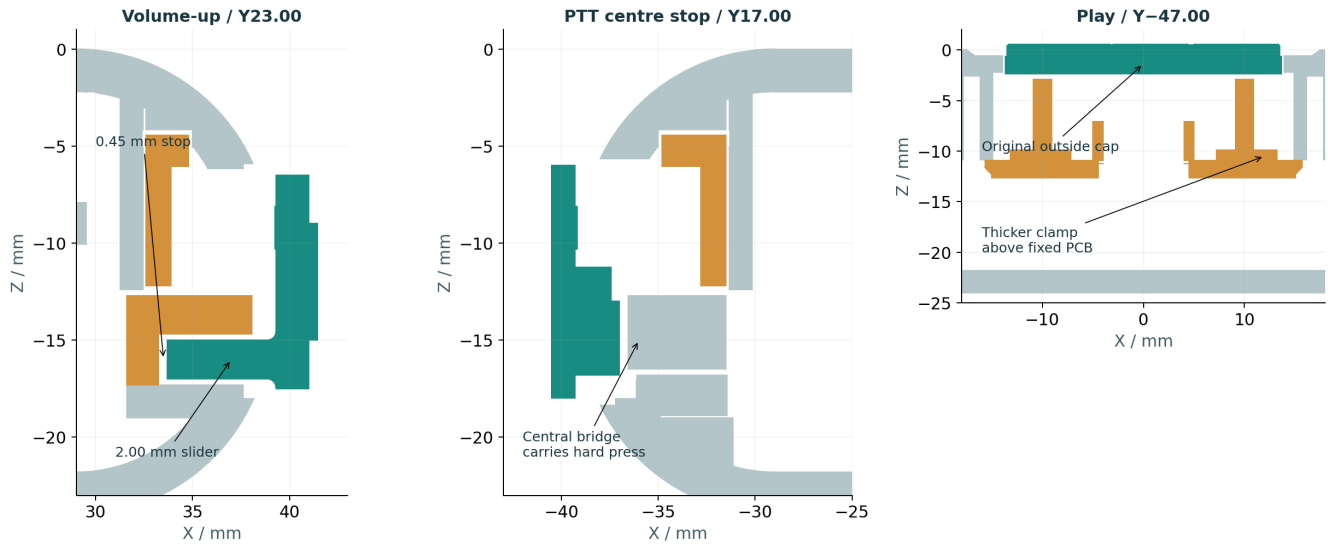


Control	Mechanism and test
Volume up/down	9.2 ×2.0 mm stems; 11.2 mm capture flanges; 2.0 mm keeper roofs. Independent removable keepers with broad 0.45 mm default stops.
PTT	Broad captured heads replace long rods. End guidance and central stop shorten hard-press spans; matching default 0.45 mm P01/P17/P18 set.
Play	29 ×3.2 ×1.8 mm capture bars; direct 0.50 mm shell stops. Original 0.10 mm outward capture clearance retained.
Cradles	1.0→1.6 mm roofs with matching internal relief. Actual switch insertion, wire exits and return require measurement.

Stop selection depends on the actual switch. Verify electrical click before the mechanical stop and full release afterward. Test off-centre presses with the case tightened and wiring installed.

Internal mechanism sections

CONTROL SECTIONS / grey shell, teal moving part, amber support



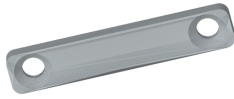
Sections use the original assembly coordinates. The separate keepers make straight insertion possible. The stop lands are part of supported structure. Nominal travel still needs validation with the actual switches, pad stack and printed stiffness.

Speaker, microphone and LED retainers

PASSIVE RETAINERS

Original R3.4 geometry and the internal durability revision

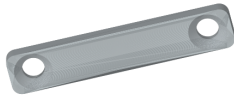
R3.4 | P11



1.4 mm beam / narrow countersink sides

LOWER SPEAKER KEEPER

R3.4 | P12



Approximately 0.24 mm side ligaments

UPPER SPEAKER KEEPER

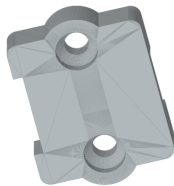
R3.4 | P13



1.85 mm frame; countersunk screw seats

MICROPHONE KEEPER

R3.4 | P14

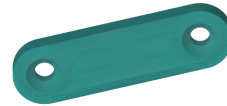


Small countersunk bearing regions

LED KEEPER

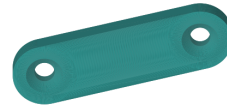
CAD geometry shown. Screens do not establish printed strength; see the joint and beam coupon tests.

R3.6 | P11



2.2 mm beam / 1.5 mm side ligaments

R3.6 | P12



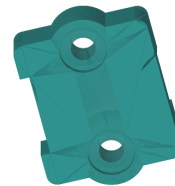
Rear face -7.15 mm preserves battery space

R3.6 | P13



2.65 mm frame; broad flat screw seats

R3.6 | P14

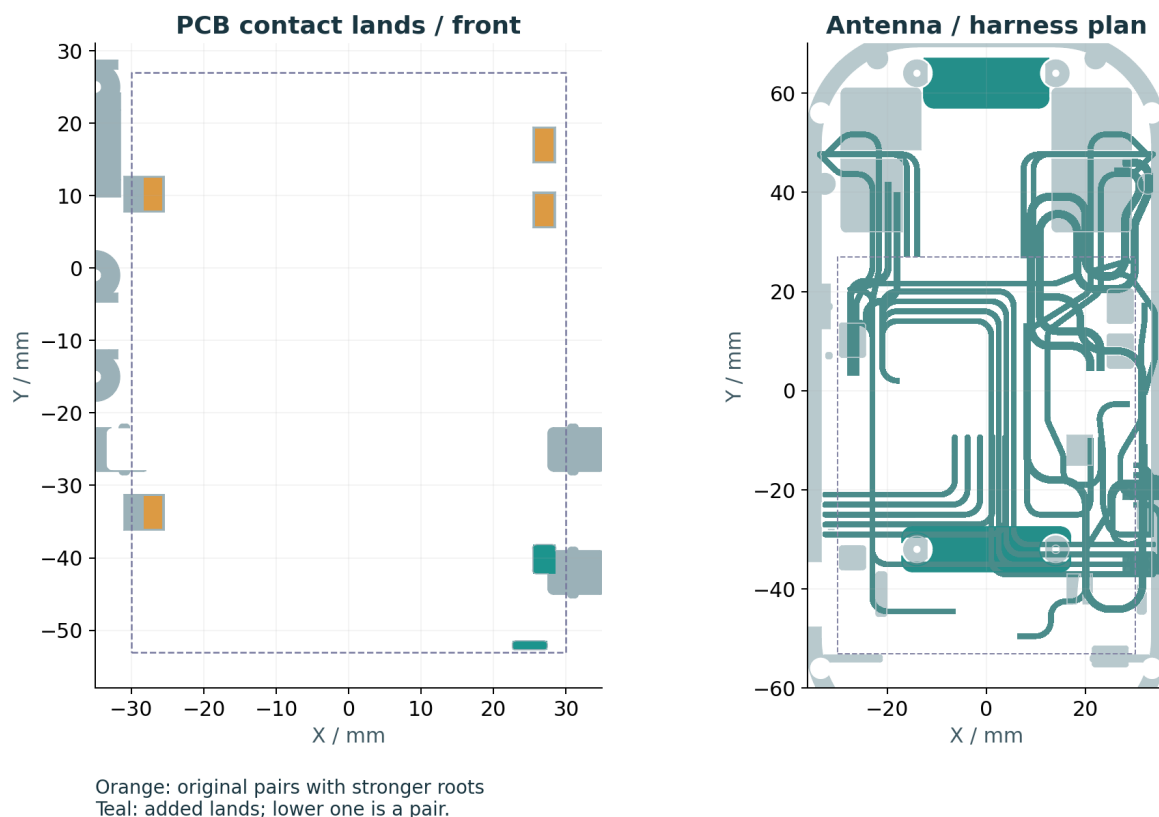


Broad flat ears; retained lamp/lead reliefs

Broad seats and deeper sections reduce bending and countersink splitting. Actual screws, installed pads and printed-material coupon tests remain part of qualification.

PCB, antenna and cable support

PCB, ANTENNA AND HARNESS / supported assembly paths



PCB support

Eight original support roots are backed. The original contact datums stay fixed; one added front land and one lower front/rear pair give eleven installed support pads. The lower pair lies within the nominal board edge. Simple load screens do not establish PCB strain limits.

Antenna

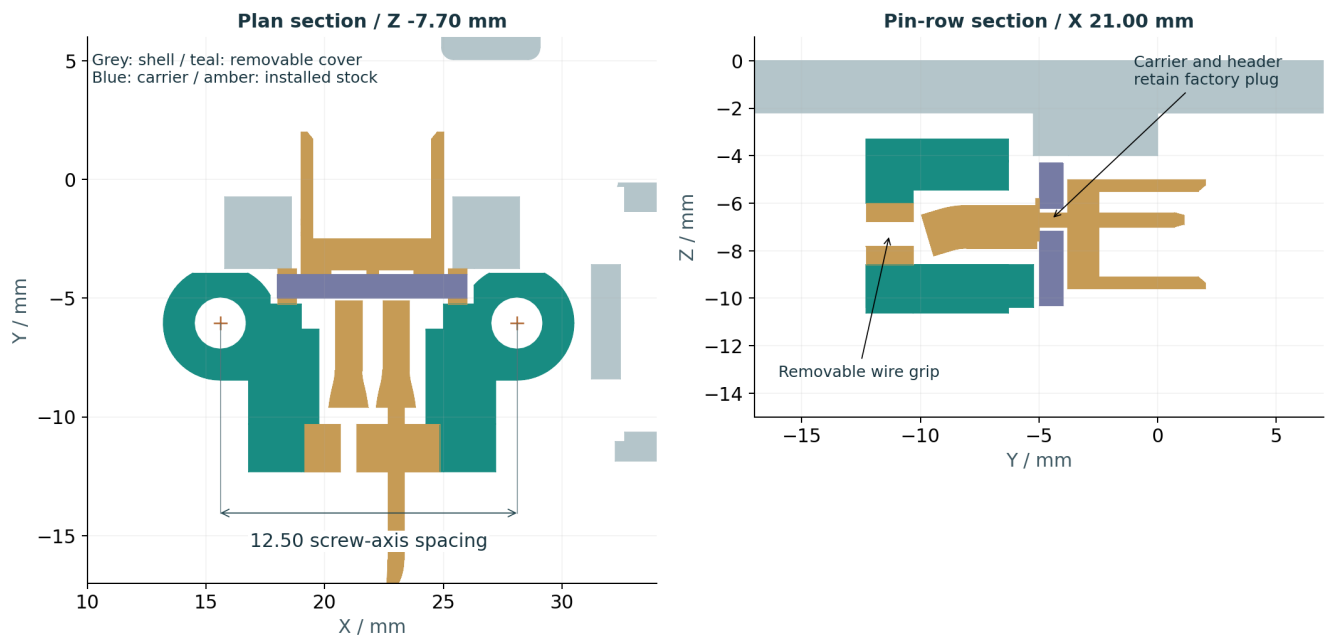
The compact clamps use the original nylon screw axes and a 0.10 mm PET/0.05 mm adhesive stack. A 1.90 mm rear bed and 1.25 mm local pilot-floor skin remain. Radio performance is a physical gate because the fixed enclosure cannot establish the supplier's preferred metal clearance.

Harness and adapter

Original PCB headers remain. Compatible cable-side sockets, a passive removable battery adapter, controlled wire routes and replaceable strain stock address connector forces and pinching. Catalog socket gauges reserve their exterior but omit mating cavities; identified mating overlaps are intentional. The adapter uses rear-access screws and a drilled 8×6×1 mm carrier, with its holes aligned to the actual header tails. Its limiting pilot ligaments are 0.95/0.9616 mm; controlled tapping and QF01B are required. Its 4.0 mm material engagement reserves 1.0 mm for tip/runout, leaving a 3.0 mm design full-thread allowance.

Removable battery adapter

INTERNAL BATTERY ADAPTER / removable capture and rear tool access



The factory battery plug and lead remain intact. A small passive carrier mounts the mating header, and the removable cover captures the insulated outgoing wires. Separate carrier fabrication and harness notes identify the drill pattern, insulation and continuity checks.

The adapter screws are reached from the open rear before the PCB is installed. Supported screw seats and grommet webs replace the obstructed horizontal fastening arrangement. Refer to the final hardware schedule for engagement, tip margin and head envelope.

Component-by-component disposition

ID	Original component	Revision / justification
P01	Front shell	Revised: Broader closure and PCB roots, direct play/PTT stops, control clearances, battery head reliefs, speaker tab relief and adapter support. External skin, openings and seam are fixed.
P02	Rear shell	Revised: Low open battery cradle, supported volume guides, paired PCB support roots, closure bearing stock, antenna bed and bounded cable channels. Original outer contour retained.
P03	Play button	Revised: Capture bars increase to 29×3.2×1.8 mm; visible cap and nub stay fixed. Direct front-shell stops carry hard presses.
P04	Play switch clamp	Revised: 1.75 mm plate, 2.75 mm arms, Ø6.8 mm ear backing; original countersunk seat retained to avoid PCB interference. Keep solder access open.
P05	PTT carrier	Revised: Long fragile printed rods removed. Broad captured sliders, deeper internal backing and central stop shorten bending spans. Visible carrier and nub retained.
P06	Volume-up button	Revised: Original visible cap joined to 9.2×2 mm slider and 11.2 mm capture flange; removable K01 admits installation without flexing a leg.
P07	Volume-down button	Revised: Same broad capture mechanism as P06 with independent K02 guide and stop; original visible cap retained.
P08	PTT switch cradle	Revised: Roof thickened 1.0→1.6 mm with matching shell relief. Original switch seat and terminal datum retained; confirm insertion and installed pad compression.
P09	Volume-up switch cradle	Revised: Roof thickened 1.0→1.6 mm. Guide, roof and wire passages checked with the complete mechanism.
P10	Volume-down switch cradle	Revised: Roof thickened 1.0→1.6 mm. Original switch datum fixed; qualify no-force insertion and release.
P11	Lower speaker keeper	Revised: 7.2 mm broad section, 2.2 mm thickness and 1.5 mm countersink side ligament replace the narrow split-prone seat. Controlled M2×5 hardware.
P12	Upper speaker keeper	Revised: Same supported countersink and section treatment as P11; upper tab clearance checked separately in P01.
P13	Microphone keeper	Revised: Frame thickened to 2.65 mm; broad 1.85 mm pan-head seats support two M2×5 screws. Preserve acoustic seal and solder access.
P14	LED keeper	Revised: Flat Ø6 mm pan-head seats and controlled blind-hole depth replace fragile countersink loading. Original optical/saddle interface retained.
P15	Lower antenna retainer	Replaced: Compact removable end clamp replaces the thin frame/cable bridge. Supports the insulated antenna carrier without fastener load through the antenna.
P16	Upper antenna retainer	Replaced: Matching compact end clamp; original nylon screw axes retained. Coax route and RF clearance require physical verification.

ID	Original component	Revision / justification
P17	Lower PTT guide	Replaced: Removable hard-seated capture keeper for the broad PTT slider; two pan screws. Default 0.45 mm stop matches P01 and P18.
P18	Upper PTT guide	Replaced: Second supported capture keeper; no long projecting rod or flex-to-install catch. Combined alignment tested in the full shell.
P19	Left battery keeper	Revised: Broad 3 mm bridge with supported 2.6 mm ear necks, round roots and removable M2×6 fastening. Clearance film and no pouch preload.
P20	Right battery keeper	Revised: Matching bridge, coordinated with switch, factory lead route and screw heads; local reliefs retain the main load-bearing section.
F01	Flexible rim / bumper	Unchanged: Exact original geometry retained for the fixed exterior. Its thin spans require a qualified flexible material, supported installation and ten removal cycles; rigid material is unsuitable.
F02	Flexible PTT grip	Unchanged: Exact contour retained. A flexible grip on a broad supported carrier is reasonable when its single bond film passes peel/service and button-return tests.
M04	Grille bezel	Unchanged: Exact outer grille and 1.2 mm locating lip retained. Installed perimeter support carries the lip; use the handling tray, no force fit, and qualify adhesive/support removal.
L01	Lens fit proxy	Unchanged: Exact outer lens retained; hidden shell flange pocket enlarged. Tight 0.05 mm nominal radial neck fit requires coupon/actual optic measurement and hand seating.
L02	Light-guide fit proxy	Unchanged: Original supported optical geometry retained. Verify clear material, coupling film, LED alignment and removal without loading the narrow optic.
K01	Volume-up capture	Added: Removable 2 mm roof guide with hard screw seats, broad stops and qualified sliding fit.
K02	Volume-down capture	Added: Independent matching guide and stop; tightening must not distort the moving channel.
K03	Battery adapter cover	Added: Supported removable cover captures passive FR4 carrier and split silicone strain grommet. Two M2×6 pan screws seat on hard structure.

The accompanying feature register records location, failure mechanism, load case, evidence, treatment and verification for each concern. An unchanged exterior component is retained because of its supported installed use and a documented fit/material gate.

Hardware and soft stock

Joint / item	Quantity and specification	Assembly control
Closure	4 × M2.5×14 countersunk	5.35 mm potential material engagement; qualify actual head seating.
Play clamp	2 × M2×8 countersunk	6.61 mm potential material engagement /1.64 mm tip margin.
Speaker	4 × M2×5 countersunk	2.80 mm potential material engagement /0.65 mm tip margin.
Microphone / LED	2 +2 × M2×5 pan	3.15/2.40 mm potential material engagement; 0.65/0.70 mm tip margin.
Antenna	4 × M2×3 nylon	1.80 mm potential material engagement /0.62 mm tip margin.
Volume / PTT	4 +4 × M2×6 pan	4.00 mm potential material engagement; 0.40/0.50 mm tip margin.
Battery bridges	4 × M2×6 pan	3.40 mm potential material engagement /1.20 mm tip margin.
Adapter cover	2 × M2×6 pan	4.00 mm potential material engagement /0.60 mm tip margin; rear-access screws.

Soft stock is an installed stack

The detailed stock ledger records installed envelopes and all legacy removals. There are eleven PCB support pieces. Default battery stock uses two 0.70 mm rear pads, two 0.20 mm toe liners and four 0.10 mm keeper films. Optional thicker nominal-battery pads replace films. The adapter, antenna, cable straps and original acoustic/optical stacks each have defined single layers. Free-stock thickness and compression must be qualified.

The detailed schedules include each layer and each alternative. Remove superseded stock and old screws. Match actual head diameter, height, angle, length and blind-hole depth to the schedule; do not substitute a longer screw.

Assembly and service

1 / Inspect and qualify

Print process-matched coupons. Keep the bumper off during fastening. Inspect loose parts, clean guides and holes, and establish the actual screw/thread method.

2 / Build front mechanisms

Seat optics and acoustic components, fit their keepers to hard seats, then install controls through the open paths and fit removable captures.

3 / Wire and support

Prethread and solder the removable adapter module, then rear-fasten it before fitting the main PCB. Fasten volume captures before dressing the adjacent J9 common wire and closing its junction loop. Follow the harness schedule. Support connector housings and the PCB during mating; verify net map, continuity and polarity before connecting the battery.

4 / Fit antenna and battery

Fasten antenna clamps before fitting the battery. Install the controlled stock layers. Check the inert maximum battery and real dressed pack with keepers removed; then secure the bridges without pouch preload before dressing factory lead 2.

5 / Close by hand

Seat both halves fully before using screws. Screws cannot be used to pull an interference together. Tighten with the bumper off using the qualified seating method; retest every control, then fit the bumper.

6 / Service and inspect

Remove the bumper first. Support both halves and disconnect their crossing harness before separation. Remove keepers before lifting captured parts. Release the J9 junction loop before moving its common wire clear of volume screw paths. Replace damaged stock once; inspect after each cycle.

The full assembly and qualification instructions are supplied as a separate Markdown document. The reference assembly shows installed coordinates; individual print files are the authoritative product parts.

Digital verification

Digital verification	Evidence / limitation
Original exterior	84 protected face domains, reverse surface occupation, containment, four caps/nubs and five retained masters pass. Native trim refinement is at most 0.000976 mm, within the original stored tolerance.
Complete static assembly	10,094 product/hardware/reference pairs and 10,731 reference pairs screened. 22 thread and 39 mating contacts are explicitly classified. Final removal-only cover/stock changes each pass 206 local pairs.
Fasteners	All 32 modeled heads clear. Full screw-centre witnesses and nominal original thread-crest envelopes clear unintended targets. 22 engagements are confined to their specified pilot annuli.
Driver access	All 32 straight diameter 3 mm by 30 mm shaft paths clear at documented assembly stages. Bumper fits last; adjacent wires are dressed after the affected keepers are tightened. Real bit and handle access remain untested.
Operating controls	All four controls have positive continuous nominal translation bounds: PTT uses the final full-reference rerun; play and both volumes inherit verified unchanged-input/removal-only evidence. All 32 selected small-angle probes clear, and all six simultaneous pressed pairs were recomputed. Physical switch travel, elasticity and guide tolerances remain unqualified.
Native CAD and meshes	28 valid product solids and watertight, consistently wound single-part STL meshes. All 179 hardware/reference groups match native bounds, integrated solid volume and component quantities; open reference surfaces are accounted separately. Both Fusion archives reopen successfully.
Local structure	Critical roots, rails, keepers, bearings and pilot walls have dimensioned checks and documented load screens. Hypothetical effective material properties do not establish printed strength or fatigue life.
Coupons and coverage	32 checked STEP/STL coupon pairs; 133 feature risk entries cover all 25 original and all 3 added printed components, plus hardware, stock and wiring. Physical tests are unperformed.

Physical acceptance gates

Print and measure the representative fit and strength coupons in every intended material/process/orientation. Perform ten complete assembly/service cycles and 1,000 actuations of each control, with centre/edge presses and both PTT ends. Inspect every keeper, root, thread, rail, bond, lead and flexible part.

- Measure actual switch click/release/overtravel, printed guide fits and elastic travel beyond the stops. Default stops are qualification candidates.
- Measure actual dressed battery, free factory lead length, populated PCB/U6 height, stock compression and the tight battery-to-board gap.
- Qualify pilots, screw seating, local thin shell patches (including the 1.0 mm battery-wire region), keeper/root strength, adhesive grip and support removal for each material/process/orientation.
- Verify connector variants, pin pairs/net map, insulation, current/voltage drop, acoustics, optics, charging and RF performance.

A failed fit, crack, stripped joint, residual deformation, cable pinch, unintended activation or changed exterior keeps that manufacturing profile on hold. No physical test pass is claimed by this package.

How to use the package

Folder / file	Purpose
CAD / native archives	Editable direct-solid Fusion models and matched STEP assemblies.
Print_Parts / STEP and STL	Only the 28 default device components. Millimetres; orient each part for its qualified process.
Coupons	Enumerated fit and strength coupon pairs with protocols; reuse actual mating parts where indicated.
Documents	This review, annotated component review, feature register, hardware/stock schedules, assembly instructions and blank physical test log.
Verification / Engineering_Source	Final evidence, baseline provenance and construction scripts; diagnostics are identified separately.

Sources and assumptions

Battery and connector dimensions are traced to the primary sources below. Nominal switch models, actual populated-board height, dressed battery details and material properties are explicitly qualified by measurement. Analytical screens use stated effective stiffness/load assumptions and do not establish universal printed strength.

- Adafruit 2011 product and nominal dimensions
- Battery supplier maximum-dimension drawing
- JST CK cable-side socket catalog
- JST PH connector catalog
- Taoglas FXUB63 antenna data sheet
- Same Sky speaker data sheet
- Formlabs SLS design guide
- M2.5×14 DIN963 head envelope

The original files, SHA-256 provenance, construction scripts, inspection results and feature register remain with the package for review and revision.