

Concept 27 / R1

Chalk and powder with orange press-to-talk. Prototype handoff for Rapid Product Solutions. 9 September 2026.



Selected design

Chalk-white rigid polymer case, warm-grey removable soft rim, brushed pewter control faces and an orange ribbed PTT grip. The microphone port and its internal mounting patch are centered below the status lens.

The CAD was authored through Adam MCP using Concept 26 v12.3 NoStack as the source. The images in this guide are renders of the actual R1 meshes.

Prototype review release. Resolve the inherited enclosed clamp pilot cavities before fabrication. Hardware fit, motion, bonding and elastomer performance remain unqualified.

Dimensions and changes

Millimetres. STEP is the dimensional authority. Images are reference views, not a 1:1 manufacturing drawing.

Rigid body W x H x D	Complete assembly including rim / controls
78 x 150 x 24 mm	83.35 x 152.70 x 24.739 mm



Source frame: X right, Y up, front +Z. The rigid front face is Z=0 and the back is Z=-24. Overall bounds: X -41.90 to +41.45; Y -76.35 to +76.35; Z -24.189 to +0.550.

Feature	R1 design definition
Microphone	Move X=14 to X=0 at Y=-14 with the source pocket, gasket interface and retention patch. Fill the original port.
Rim	1.20 mm nominal normal wall; 0.15 mm cavity clearance. 68 x 140 mm front/rear window with R20 corners.
PTT	23 modeled ribs at 2.10 mm pitch; 0.45 mm rib height. Four flexible retention studs plus a bond layer.
Grille	121 original holes: 32 x dia 1.4; 48 x dia 1.8; 41 x dia 2.2. Centers and radii preserved.

Parts and materials

One of each listed component per device. IDs correspond to the STEP and STL filenames.

ID	Component	Material / process intent
01	Front shell	Chalk rigid polymer
02	Back shell	Chalk rigid polymer
03	Front action carrier	Rigid PA12
04	Status lens	Frosted translucent polymer
05	Front-switch clamp	Rigid PA12
06	PTT carrier	Rigid PA12
07	Volume up carrier	Rigid PA12
08	Volume down carrier	Rigid PA12
09	Soft perimeter rim	Warm-grey TPU 85A target
10	Front action metal face	Brushed / anodized 6061
11	Front action bond film	0.10 mm adhesive reference
12	Volume up metal face	Brushed / anodized 6061
13	Volume up bond film	0.10 mm adhesive reference
14	Volume down metal face	Brushed / anodized 6061
15	Volume down bond film	0.10 mm adhesive reference
16	Orange ribbed PTT grip	Orange TPU 85A target
17	PTT bond film	0.10 mm adhesive reference

17 CAD solids = 13 physical components plus four bond-layer references. The three pewter faces are intended metal parts. Ten polymer components have geometry-only 3MF derivatives; no slicer profile or print orientation is prescribed.

TPU 85A, rigid PA12 and brushed/anodized 6061 are prototype targets. Approve samples, process capability and exact grades. A PC-ABS or molded elastomer production route needs separate tooling engineering. STLs for metal faces and bond films are reference geometry, not ordinary print jobs.

Hardware references

Baseline component geometry is preserved from Concept 26. This is a reference schedule, not a procurement-ready BOM or verified placed electronics assembly.

Item	Qty	Reference / definition
PCB	1	SIM7670G AI Voice Terminal
Battery	1	Adafruit 2011; supplied 100 mm lead reference
Microphone	1	Adafruit 3421; relocated to X=0, Y=-14
Side switches	3	OMRON B3F-3150; orientations / travel to verify
Front switch	1	OMRON B3F-4000; clamp screw access unresolved
Speaker	1	Samesky CMS-40504N-L152
RGB LED	1	Kingbright WP154A4SUREQBFZGW
LTE antenna	1	Taoglas FXUB63
Enclosure screws	4	Confirm exact type, length, engagement and torque
Clamp screws	2	M2 locations; resolve enclosed pilot cavities
Pads / seals / harness	TBD	Select and qualify against actual hardware

Source files

Original vendor CAD is in inputs/Walkie_Talkie_NoStack_v12_3/Internal_Component_CAD_Originals/. Hardware_Reference_BOM.csv gives each exact filename.

The delivered assembly STEP contains the 17 enclosure components. It does not certify placement of the PCB, battery, antenna, speaker or switches. Use the actual switch plunger and carrier drive nub when checking actuation; a whole-mesh minimum distance is insufficient.

The microphone module must follow the relocated central pocket. Confirm its wiring, acoustic seal and lead clearance against the actual module before closing the housing.

Assembly structure

Exploded reference view. Offsets show component relationships and are not an insertion or motion simulation.



Subassembly	Component IDs
Rigid enclosure and optics	01 front, 02 back, 04 lens, 05 switch clamp
Front action	03 carrier + 11 bond film + 10 pewter face
Left PTT	06 carrier + 17 bond film + 16 orange ribbed grip
Right volume	07 / 08 carriers + 13 / 15 bond films + 12 / 14 metal faces
Protective rim	09 flexible removable sleeve

Assembled and exploded STEP and GLB files are included. The browser Material Lab uses a uniformly scaled preview and illustrative part offsets; use the millimetre STEP files for engineering.

Prototype build sequence

Complete the affected open-item review before starting each stage. The source Concept 26 assembly guide is retained as baseline evidence.

1. Confirm fabrication and fastening

Resolve the sealed clamp pilot access and select enclosure/clamp fasteners. Review engagement, head access and wall thickness in CAD before changing or drilling parts.

2. Make fit samples

Trial the rim interface, PTT studs and cap/bond stack in the chosen processes. The original Concept 26 tolerance coupon is included but does not qualify the new soft interfaces.

3. Prepare controls

Fit the metal faces to their rigid carriers with the nominal 0.10 mm bond allowance. Fit the orange grip studs and bond layer. Keep adhesive away from guide and actuation surfaces.

4. Trial enclosure interfaces

Check the lens press fit and moving controls. Verify each actual switch orientation, rest clearance, actuation and hard stops. Check centered microphone seating and seal.

5. Install actual hardware

Check the remaining baseline hardware against the new assembly. Route real leads and coax, confirm USB cable seating and support the battery without pinching or abrasive contact.

6. Close and qualify

Close the rigid body, trial-fit the sleeve and recheck every control and opening. Measure return, retention, repeat cycles and finish. Revise geometry/process if the rim requires excessive installation strain.

Separate fabrication operations

Rigid polymer, flexible elastomer, translucent lens, metal faces and adhesive films need separate processes. Reorient parts in the slicer and inspect supports and small features. Do not print the assembled STEP or combine its solids into one fused object.

Verification and limits

Independent checks apply to this R1 CAD checkpoint and the files in this handoff. They do not establish production readiness.

Check	Measured result / scope
STEP solids	17 valid positive-volume solids in the assembled CAD.
STL topology	All 17 meshes watertight, consistently wound and positive-volume.
Rest intersections	Only inherited shell/lens press fit: 0.592018 mm3. Internal hardware is outside this check.
Grille / microphone	121 original hole centers/radii retained. New center port open; old offset port filled.
Preserved source surfaces	Sampled comparisons support preservation outside the mic patch. Exact-surface follow-up resolves front mesh outliers as triangulation differences.
Portable GLB preview	17 named components, correct materials and Y-up frame. Flat front normals preserved.
Source integrity	Adam geometry builder and parameters unchanged; original Concept 26 references retained with checksums.

Inherited clamp pilot cavities

Two closed cylindrical voids are present at $X=\pm 17$, $Y=-47$, $Z=-3.2$ to -2.6 mm. Each is dia 1.7 x 0.6 mm and is completely enclosed in the front shell. The original guide calls for two M2 clamp screws. An accessible pilot path is not established by these voids.

This geometry is preserved from 26, not silently corrected in 27. The mechanical engineer and fabricator must define a suitable access/fastening arrangement before final fabrication.

Read `validation/checkpoint_review_summary.json` and `VALIDATION_AND_PROVENANCE.md` for the numerical scope. Invalid coincident Boolean comparison results are inconclusive kernel diagnostics, not measured missing material. Surface sampling is not a global mathematical proof of BRep identity.

Open items and file map

Resolve these items with the responsible engineering and fabrication owners.

Stage	Owner / acceptance task
Before fabrication	Mechanical engineer + supplier: Resolve access and fastening at the two enclosed clamp pilot cavities, X=+/-17, Y=-47. Confirm screw direction, length and remaining wall thickness.
Before committing the process	Supplier + mechanical engineer: Trial the rim and grip with the chosen elastomer. Verify insertion strain, stud retention, clearance, shrinkage and minimum feature resolution.
Before final assembly	Mechanical + hardware team: Place the actual internal hardware and verify each switch plunger orientation, rest gap, actuation, return and hard-stop travel.
Before bonding	Supplier: Select the cap and TPU adhesives. Verify the 0.10 mm bond allowance, preparation, cure, squeeze-out control and durability.
First article	Mechanical + electrical team: Verify centered microphone seating and seal, speaker/LED fit, harness routing, USB cable seating and battery support without pinching.
Before functional sign-off	Electrical + acoustic team: Qualify acoustic output, microphone pickup, LED appearance, RF performance and battery integration.
Before release	Engineering + supplier: Complete dimensional, finish, fastening, control-cycle, retention and environmental qualification. Production tooling and material grades remain to be agreed.

Start with these files

cad/ - assembled, exploded and per-part STEP. meshes/ - 17 millimetre STLs. three_mf/ - ten polymer-part mesh containers. documents/ - this guide, BOMs, fit checks, source inventory and file manifest.

source/ - editable Adam geometry and reviewed preview exporter. renders/ and preview/ - actual CAD views and GLBs. inputs/ - unchanged Concept 26 reference package and vendor geometry. validation/ - integrity and geometry evidence.

The original Concept 26 F3D is a baseline reference. There is no native Concept 27 Fusion feature timeline in this release. Concept 27 is editable through its Python/parameter source and STEP solids.

Checksums cover the delivered files. Prototype physical qualification includes fastening, control cycles, rubber installation/retention, bonding, acoustic behavior, optics, RF and battery integration.