

Walkie One

Concept 20.2 / R8 Astra

Assembly development and supplier handoff

6 September 2026 | Preserved R7 source | No website publication



Start with C01-C03 mechanism fixtures, then C04-C06 material samples. Geometry and calculations have been checked; physical assembly, calibration, switch loading, casting, bonds, acoustics and RF qualification remain open.

Body depth 27.2 mm. Retained LED-inclusive depth 28.5 mm. The separate O1 flush-window option is not included in the primary build.

Supplier release sheet

Priority 1: install and remove all captured keys with the documented staged paths and removable stops. Priority 2: achieve the specified finished datums and record calibration for every key. Priority 3: approve the material and appearance coupons. RF remains a separate installed-system hold.

34 product STEP files reimport as valid single solids; 34 product meshes are watertight. The case-only STEP assembly contains the same 34 solids and matches their summed volume.

16 ordered installation paths were sampled at 1136 poses with no detected intersection. Reverse paths reuse the same rigid configurations. This is a sampled geometry check, not a physical assembly demonstration.

Four full nominal operating strokes have no detected fabricated-part interference. Static fabricated-part pairs and 23 tool/adjustment checks pass the documented screen.

PTT tilt: 15 of 21 sampled poses clear; 6 larger-tilt/near-rest poses contact the retaining lip. The contact map and physical top/centre/bottom tests are supplied.

Added R8 material clears unchanged modeled hardware in the delta screen. Full-length front switch terminals clear the supplied PCB at all three carrier positions tested. Solder, insulation and harness still need physical clearance verification.

Finished interval calculations give side freeplay 0.20..0.74 mm and front 0.13..0.61 mm. Carrier demand -0.46/+0.52 fits the allowed -0.52/+0.58 interval. The 0.08 mm post-make setting remains a provisional test condition, not maker-approved overtravel.

C01-C06 fixtures/material samples and the separate O1 optical option have valid connected geometry. The O1 LED remains unscaled; the option fit screen is separate from optical/retention qualification.

All 250 source R7 files and 10 copied placed hardware references are byte-identical. No website publication or shared-branch change was performed.

ME / RPS: Fixtures, insertion/removal, threads, switch seats and controls

Material supplier / design owner: PU casting, bond map, cloth, rims and appearance master

EE / RF owner: Actual board and conductors, harness, battery, antenna and OTA

No physical test is marked PASS in this package. Source R7 evidence is historical and is not a substitute for R8 reports. The new upper-left closure screw position and offset upper-left front stop are shown in the drawings.

Inspiration and appearance authority



Inspiration: preserve the soft cream / sage / metal / woven character. Current CAD governs control, W and rear-brand placement.

01 - Build instruction and release limits

Build the C01 volume, C02 PTT and C03 front mechanism fixtures first. Record installation AND removal, finished dimensions, freeplay, contact travel, hard-stop travel, carrier position and force curves. Make C04/C05 rear casting/bond comparison and C06 textile sample in parallel. Only then build the full fit enclosure. This package does not represent a physically calibrated, production-qualified radio.

ME / RPS owns assembly, machined datums, fastener proof tests and control calibration. Materials supplier owns casting, surface preparation, bond and cloth trials. Design owner approves the cream/sage/metal/cloth appearance master. EE owns the real PCB revision, soldered harness, continuity/firmware behavior and power safety. RF owner selects/qualifies the installed antenna. Record named people and sample IDs in the qualification traveler before production.

The 88 x 136 x 27.2 mm figure describes the nominal body/fabricated depth. The retained unscaled Kingbright dome extends to Z15.3, so the rear Z-13.2 to LED tip depth is 28.5 mm. Side controls can extend outside the 88 mm shell width; the product STEP assembly spans X-44.70..44.464, Y-68..68 and Z-13.20..14.00, about 89.164 x 136 x 27.2 mm; add the primary LED to obtain 28.5 mm depth. These nominal solid bounds exclude solder/harness and tolerance. No electronic part has been scaled. Option O1 is separate and must not be mixed into the primary assembly.

02 - Exterior authority

Retain the soft cream body, woven front and exact 34 mm W, metal rims, concave action key and sage side keys. Action centre is X0/Y-46.5; indicator X0/Y-27.5; W X0/Y24. PTT is 69.6 mm visible length, centre Y10; volume centres Y24 and Y0. Rear wordmark stays 44 mm wide at X0/Y0; origin line X0/Y-8, 3 mm em. CAD and artwork are the approved placement authority; the inspiration is a finish/form reference, not a dimensioned drawing.

One closure screw moves from X-34/Y46 to X-26/Y51 with its tower, pilot, cover clearance and skin counterbore. This necessary assembly-path change is visible on the rear screw layout; the old hole is restored using the original curved shell surfaces. It clears the PTT's upper insertion envelope. Control and artwork locations do not change. Three other cover screws stay at their R7 locations. The structural rail lip is locally relieved for flange passage; validate PCB support and retention on the actual board.

Matched CAD views include the W and rear/action decoration. Ink solids are reference appearance geometry only, never fabricated parts or BOM quantities. The cloth CAD solid is a porous-material thickness envelope, not an instruction to print a solid panel.

03 - Captured keys and ordered assembly

R7 straight inboard side-key and rearward front-key paths collide with the integral geometry. This is a finding about the tested paths, not a proof that every possible six-axis manipulation is impossible. R8 deliberately provides a simple sequence with removable supports and no forced snap-through of the aluminum flange.

Before starting, the PCB, battery tray, speaker/cradle, microphone, rear cover, switch carriers and all removable stops are out. The tub and front skin may be together. Deburr the flange pockets, mask paint/adhesive from guides, and use soft jaws on visible surfaces.

1. Hold a side key 15 mm inward from its final X position and 30 mm rearward in Z. Advance in +Z to its final Z orientation, then move outward in X to its rest lip. Keep Y and orientation fixed. Repeat for the other keys. The full PTT end geometry is included in this path, not a short surrogate.
2. For each fixed stop cassette, start 10 mm inward and 30 mm rearward. Advance in +Z, then move outward in X against the seating position. The installed key is included as an obstacle. A direct rearward slide at final X collides with the rail: do not use that shortcut.
3. Fix the cassette with two M1.6 x 4 screws from the rear at $X=\text{sign} \times 36.0$, $Y=\text{key centre} \pm 5$. Heads sit in dia3.6 counterbores; underhead Z6.8, nominal tip Z10.8. Bore bottom Z11.8 leaves 1.00 mm nominal end allowance and 1.0 mm wall to the rigid outer face; measure actual screw length and bore depth before assembly. The assembled stop face must be measured at $|X|39.05 \pm 0.03$. Screw clearances alone are not precision location: hold the cassette in the C01/C02 fixture with a calibrated depth-gauge setup while tightening, then measure. Recheck after every service removal.
4. Put the return springs in the carrier bores, engage the hidden key pegs, and insert the carrier by the same 10 mm inboard / rearward staging path. Guide ribs permit the final X slide. Use temporary assembly support to retain loose springs; do not glue spring coils. Install the M2 x 5 carrier clamp through its side head opening, and access it from the rear through the elongated driver channel. The M2 thread is in the removable cassette. Replace a stripped cassette rather than retapping oversized.
5. Insert the front key in +Z from 35 mm rearward at fixed X/Y, with its four stops absent. Retain it against the recess ceiling using soft temporary support. Insert each of the four stops from the rear and fix with an M1.6 x 3 screw at (16.6,-53.5), (16.6,-39.5), (-16.6,-53.5) and (-8.0,-29.8). The upper-left stop is offset to clear the unchanged microphone board. Underhead Z8.5, tip Z11.5; bore ends Z11.8. Stop tops are Z9.30.
6. Assemble the front switch and retainer on the bench. Place return springs over the hidden key pegs. Fit the carrier with two M1.4 x 8 jack screws at $X \pm 17.2/Y-46.5$. Actual catalog springs fit over these screws; the R7 M2 screw is too large for the candidate spring's specified guide rod. Springs bias the arms against the screw heads. Keep both arm heights matched within 0.03 mm.
7. Complete calibration and solder/strain-relief inspection while the PCB is absent. Fit the cosmetic rims over the exterior caps only after the running gaps pass. Their bond is outside all moving interfaces. Install acoustic parts, mic, tray and electronics only after these tests, then close the rear.

Removal reverses this order: power off/disconnect battery; remove rear, board and tray as necessary for driver access; label and unplug harness; remove carriers, catch springs, remove stop screws, draw cassettes inward before moving rearward, and remove keys along the reverse paths. Calibration must be repeated after removing a cassette or switch module. Bonded switch subassemblies are serviced as replaceable carrier modules; do not pry on switch plungers or terminals.

Digital evidence is a sampled BRep motion screen with step size recorded in `assembly_validation.json`. It is not an exhaustive continuous configuration-space proof or a hand/tool dexterity test. Physical fixtures must demonstrate the complete ordered sequence and reverse sequence, with finished parts and the actual driver. An exploded view and a press-stroke test are not substituted for this evidence.

04 - Finished datums and tolerance correction

Coordinate system: millimetres, X width, Y height, Z toward the front. Datum A is the tub's controlled internal/front reference plane; B is the width midplane X0; C is the action/Y reference. Establish these from the CAD using machined fixture pads, not the compliant skin. Side rest lip |X|40.70; finished flange thickness 0.80 +/-0.04. Side stop |X|39.05; matched lip-to-stop span 1.65 +/-0.06 after screw tightening. The resulting side stroke is 0.85 +/-0.10 mm. Front ceiling Z10.90; stop Z9.30; ceiling-to-stop span 1.60 +/-0.04, aluminum flange 0.80 +/-0.03: front stroke 0.80 +/-0.07 mm.

These are secondary-machined / measured assembly requirements, not assumed SLS capabilities. Do not apply a general +/-0.2 mm print tolerance to them. Cast shrinkage, paint and adhesive must not enter the rest/stop/seat chain: mask, machine and measure these lands after all finishing. Stop location tolerances include cassette placement and clamp movement. Confirm supplier capability on C01/C03 before ordering complete finished parts.

Verified switch data: Omron B3F-3150 has pretravel 0.15 to 0.45 mm, nominal 0.25; B3F-4000 has 0.20 to 0.50, nominal 0.30. R7 source models use nominal actuator heights 6.15 and 4.30 mm, respectively; budget +/-0.20 mm and measure the actual incoming height. OF is 0.98 +/-0.29 N (side), 1.27 +/-0.49 N (front). No numeric permissible post-actuation travel is established by the cited datasheet. These are switches intended for PCB mounting; a hand-wired bonded installation needs separate qualification.

The R7 finished stack reproduces side stroke 0.55..1.15 mm and freeplay minimum 0.55-0.15-0.45=-0.05 mm. Its cited carrier demand -0.7/+0.8 exceeds +/-0.5. R8 uses controlled finished spans and a centred, larger usable setting interval. A provisional bench contact-before-stop margin $m=0.08 \pm 0.02$ mm is used to evaluate geometry. It is NOT a manufacturer-approved overtravel and cannot release a functional pilot without switch-loading approval/qualification.

For calibrated operation, $f = S - m - PT$. R8 worst-case side f is 0.75-0.10-0.45=0.20 mm minimum and 0.95-0.06-0.15=0.74 maximum. Front f is 0.73-0.10-0.50=0.13 minimum and 0.87-0.06-0.20=0.61 maximum. This positive geometric reserve is conditional on the finished dimensions and calibration accuracy being achieved.

Carrier demand must not double-count the flange/lip errors. Side switch mounting coordinate is $L_{stop} - pad + m + PT - h - seating\ offset$. The key flange/lip terms cancel when calibration references the measured hard stop. For the front, it is $Z_{stop} + stem\text{-relative-to-flange} + m + PT - h - seating\ offset$. Bound stop datum +/-0.03, actuator pad/stem +/-0.03, setting +/-0.02, carrier seat +/-0.04, bond/seating contribution +/-0.02, switch height +/-0.20. Worst summed symmetric error is +/-0.34; PT contributes -0.10/+0.20. Relative to the R7 neutral placement the m change adds -0.02, giving demand -0.46/+0.52 mm. Centre the usable interval at +0.03 mm: -0.52/+0.58, or +/-0.55 about that centre. Each demand extreme retains 0.06 mm reserve. This is arithmetic coverage, not proof of clamp accuracy.

Side slot overall length 3.40, width 2.30, nominal slot centre |X|35.97 allows a 2.30-mm gauging pin +/-0.55; actual M2 shank has additional geometric slack which is NOT permitted calibration range. Front jack permissible displacement is the same -0.52/+0.58 relative to R7 neutral Z, measured directly. M1.4 coarse pitch is 0.30 mm/turn; verify the selected screw. Do not retain the R7 0.4 mm/turn M2 instruction. Carrier top/outer face was relieved: minimum nominal carrier-to-flange-at-stop gap is about 0.27 mm at the outward extreme, before the residual finished error budget. Accept at least 0.15 mm measured. The fixed stops, not carrier or switch terminals, carry additional finger load.

05 - Calibration and acceptance traveler

Use a low-force displacement gauge of 0.01 mm resolution with stated expanded uncertainty ≤ 0.02 mm, continuity logger, calibrated force gauge, depth micrometer, gauge pins and 0.05/0.08/0.10/0.15/0.20 mm feelers. Measure the actual switch's height, electrical make and release travel, and force-displacement curve on a supported bench fixture before installation; keep lot/serial identity.

A. Measure finished lip/ceiling, flange, pad/stem, stop and carrier seat. Record S without a switch touching the key. All stops must contact within 0.03 mm of each other under a light reference load. Gauge the cassette position after final screw tightening. Inspect all pilot floors, screw protrusion, bores and spring pockets.

B. Verify each spring's free length and force at the actual installed rest and stop lengths. Fit the switch fully against its hard seat; adhesive is confined to external body-side fillets, never beneath the load datum or in switch seams. Cure before calibration. The allowed ± 0.02 seating/bond contribution is a measured limit, not an arbitrary glue thickness.

C. Set the bench prototype to make at S-0.08 using measured displacement/continuity, then tighten and repeat. Do not infer make from an audible click alone. Record rest freeplay independently; lifting or operating the plunger at rest is a failure. Record carrier displacement to 0.02 mm and the two front jack heights. Make-before-stop remaining travel must read 0.06..0.10 mm after tightening. This provisional range is a test variable pending Omron/ME approval of the actual load history.

D. Accept freeplay only when measured value minus measurement uncertainty is ≥ 0.15 mm side and ≥ 0.10 front. Require electrical open at rest, return to the datum within 0.03 mm without sticking in every tested orientation, measured ≥ 0.15 gap between moving flange and carrier at the hard stop, and adjustment inside $-0.52/+0.58$ with no bottomed screw. Do not preload, file a purchased switch, resize hardware or use adhesive as a shim to rescue a reject.

E. PTT measurements: apply an 8 mm diameter finger surrogate at Y=-19.8, 10.0, 39.8 (5 mm from the visible ends), and at Z ± 4 near the centre; record applied-point displacement, centre displacement, force, first make, release and first hard-stop contact. Test volume caps at both ends; front key at centre and four edges. Require make before stop at every location, full return in face-up/face-down/both side orientations, no rim rub, and no switch chatter under a held press. End-to-centre motion and force ratios are measured results, not assumed equal to a central press. The 21-pose digital tilt map contains 15 clear poses and 6 retaining-lip contacts. At ± 0.8 degree the end-to-centre offset is 0.486 mm; this is incompatible with a 0.2 mm centre press without the opposite end attempting to cross the rest lip. Use the map to choose additional near-contact tests; do not describe every tilted pose as clear.

F. Prototype proof load: ME to approve and apply a controlled 20 N stop-load trial on fixtures while monitoring displacement and electrical state; proposed acceptance is no fracture/stripped thread, < 0.05 mm permanent set and < 0.03 mm calibration drift afterward. This is a proposed test, not a demonstrated load rating. Select clamp torque from sacrificial strip tests with the actual tapped PA12 and screw lot; no generic torque is approved here. Record torque, threadlocker compatibility and cure. Repeat the measurement record after agreed environmental, wear and drop tests. A 100,000-cycle mechanism endurance trial is a proposed prototype gate; it does not inherit the switch's catalog life rating.

06 - Spring and switch installation

Primary spring candidate for eight key returns and two front jack biases: Lee Spring CID016AB01S, stainless steel, squared ends, nominal OD2.16, ID1.84, wire0.16, free length4.30 +/-0.38 mm, nominal rate0.22 N/mm, solid height1.04 mm, recommended hole2.50 and guide rod max1.50. R8 bores are dia2.60 finished, and key pegs dia1.40 x0.65. Front jacks use M1.4 screws so the spring guide fits. The product page's zero rate-tolerance field is not treated as a zero-tolerance promise; obtain the lot force curve and fatigue working limits.

Side return spring seat floor |X|36.75 and flange39.90 give $L_{rest}=3.15$ mm at neutral; front floor Z7.00 and flange10.10 give $L_{rest}=3.10$. At nominal stops the lengths are 2.30 mm both side/front. Nominal per-spring forces are approximately 0.25/0.26 N at rest and 0.44 N at the stop. Include carrier adjustment and +/-0.07 installed length error: shortest return lengths are approximately 1.55 mm side and 1.58 front, leaving about 0.51/0.54 mm to catalog solid. Longest rest lengths are about 3.74/3.69, below minimum catalog free length3.92: geometric spring preload remains positive. Force and friction are not thereby qualified.

Jack seat gap is Z7.40-Z5.00=2.40 at neutral and varies approximately 1.75..2.99 including setting and length errors; shortest remains >1.04 solid by 0.71 mm. Nominal jack bias is 0.42 N each. The M1.4 thread is the guide; inspect for coil snagging, spring squareness and scraping. Free L/OD is about 2.0; the blind bore and opposite peg guide the return springs, while the screw guides the jacks. Do not run springs loose or let a peg bottom in a spring bore. Record compressions and actual force; these are candidate spring checks, not a qualified fatigue calculation.

Alternate investigated: Gutekunst D-001, wire0.20, OD3.10, free length7.50, rate0.095 N/mm, minimum dynamic length2.97. It does NOT fit the existing return bore or the minimum jack gap; do not substitute it or cut coils. It is an identified catalog alternative requiring a further seat/envelope redesign. The previous generic 2mm spring specification is superseded.

Switch loading path is key -> plunger -> switch body -> carrier hard seat. Additional stroke load should become key flange -> fixed stop -> tub. The stops do not prove that all post-make force bypasses the switch: measure deformation and force sharing. Side bodies remain rear-loaded and bonded on external sides; the front body is captured by the original pegged/bonded retainer. Supply compatible, non-wicking, low-volatility adhesive samples; R7's casual CA instruction is not sufficient. Keep adhesive ≥ 1 mm from the operating seam and terminals; test actual PA12/switch-body adhesion and solvent compatibility. Use a sacrificial bonded carrier coupon for push/pull and thermal cycles. Reject a bond that shifts the body >0.02 mm after the agreed load test.

Solder the switches on the bench, using the component maker's solder-temperature/time limits and the intended wire/flux process. Keep the original full-length switch terminals. R7's proposed 2.0 mm trimming instruction is superseded: no purchased hardware is resized or trimmed to obtain fit. Route and support the harness on the full terminals, and verify clearance to the actual PCB with solder and insulation included. Provide insulating sleeves and 5 mm minimum service loop beyond the joints; anchor the insulated harness to a fixed carrier/tub tie point before it enters the board area. No terminal is a structural support. Check the real solder fillets, cable bends and connector mating; they are not completely modeled in the R7 hardware files.

07 - Rear lettering, casting and bond coupon

The R7 thin control coupon C05 preserves 0.80 mm skin with 0.25 mm deboss, nominal floor 0.55. R8 C04 and the full rear skin add a broad hidden 52 x 22 mm, R2 pad centred X0/Y-3, extending 0.50 mm inward. Local skin becomes 1.30 and residual material beneath the unchanged lettering 1.05 mm. The matching cover pocket is 52.4 x 22.4, floor Z-11.80; skin pad ends Z-11.90, leaving a nominal 0.10 bondline. Cover wall at the pocket is 1.40 mm. The perimeter skin remains 0.80; external rear face stays Z-13.20. Antenna-facing cover surface remains Z-10.40, so the pad does not consume antenna/PCB space.

Coupon requirements: cast actual proposed 40 +/- 5 Shore A PU over representative finished PA12; document mix, cure, shrinkage, mold orientation/parting, venting, release agent and primer. The inward pad has no undercut; split the tool on the broad mating plane and avoid lettering-side gates/ejector witnesses. Thin lettering strokes and the transition to 0.80 perimeter still require a casting trial. Inspect incomplete fill, tears, glyph rounding, bubbles, bond voids, show-through and demold distortion. Do not add draft by rescaling the artwork. Any stroke/draft change needs an artwork-specific revision.

Measure local skin 1.30 +/- 0.10, deboss 0.25 +/- 0.05, minimum floor 0.90 under worst combined thickness/deboss limits. Specify cured local bond 0.10 +/- 0.03, with dry perimeter registration lands. Bond elsewhere only in supplier-machined recessed adhesive islands inside the existing interface budget; an unbudgeted full-face film increases the assembled depth and is not permitted. Quote and return a marked bond map for the full skin. This process remains open until the coupon demonstrates adhesion without read-through, edge peel or distortion. Compare C04/C05 under diffuse daylight and grazing light, with tonal sage fill and no extra coating that fills the deboss. Approve the actual-size master and retain a matching supplier sample.

08 - Textile, metal rims and finish interfaces

Candidate sample: Acoustone FR402 beige speaker/amplifier grille cloth. The manufacturer describes the intended acoustic application, but does not establish this package's 0.60 mm installed thickness or exact weave/color. Measure the actual lot. Do not silently substitute an upholstery fabric or assume polyester content for FR402. A material change is acceptable only after the actual sample meets the drawing, appearance and acoustic test. Keep the R7 .60 mm thickness envelope unless a full interface revision is approved.

Use warp parallel to body +Y (long grille axis), weft along X; mark the warp on the offcut before cutting even if the fabric is sold as non-directional. Installed cut outline 53.8 x 67.8, R7.9; no bulky folded hem. Cut oversized in C06, apply light biaxial tension of 0.5 +/- 0.25 percent extension measured between 50 mm witness marks, then trim to the installed outline after bond cure. This is an initial process window to test, not a catalog recommendation. Reject skew >1 degree, ripples, sag or weave distortion. Use a compatible edge stabilizer on a <=0.5 mm hidden perimeter band only; heat cut only after a sample proves the fibre can take it without hard/melted beads.

Bond an uninterrupted 1.5 +/- 0.2 mm perimeter band on the backing's solid border, outside the 48 acoustic openings; no face laminate or adhesive over the open field. The 0.60 installed budget is cloth plus cured perimeter adhesive, provisionally 0.55 +/- 0.05. Verify the real cloth can achieve it without crushing the weave. Keep backing a uniform matte warm taupe/dark shade, including visible webs; no opaque additional sheet across the field. Assess the real speaker silhouette from front and oblique views. The CAD weave shader communicates direction only, not an approved material sample.

Apply the exact supplied 183-dot W, 34.00 +/- 0.20 mm width at X0/Y24 +/- 0.25, rotation <=0.5 degree, after tensioning so its final size is correct. Registration uses the backing centre and C06 corner gauges, not a raw fabric edge. Ink must follow fibres without a continuous pore-blocking carrier. Inspect print and cloth transmission together; measure speaker frequency response/SPL with the final cloth/backing/print and compare with the bare reference. Provisional test objective: <=2 dB additional loss averaged 500 Hz-4 kHz and no narrow severe resonances; the acoustic owner must approve final limits. No acoustic PASS is inferred from open area.

Side key substrate width 13.00 +/- 0.05; paint build 0.04 +/- 0.01 on each running side. Rim opening 13.60 +/- 0.04 before anodize; allow 0.010 +/- 0.003 inward growth per edge. Finished opening 13.58 +/- 0.046 and cap 13.08 +/- 0.07 gives nominal 0.25 per-side clearance. Worst smaller-side gap with 0.05 centring error is 0.142 mm. Front aluminum key 24.80 +/- 0.03 and opening 25.40 +/- 0.03, same anodize growth on both mating edges, gives 0.28 nominal per-side gap, >=0.194 with 0.05 centring error. Apply the same limits to height/radii and verify with profile gauges. These are explicitly pre-finish STEP sizes and finished acceptance dimensions; supplier must confirm actual anodize growth.

Flanges, spring seats, stop contacts and carrier bores are masked, finished and uncoated. Keep cap/rim adhesive entirely out of the running gaps. Side metal rim face nominal |X| 44.00 against adjacent cream surface; front rim Z 14.00. Target finished flushness -0.05 to +0.10 mm relative to adjacent soft surface, measured without compressing the skin. Nominal rim seat leaves 0.10 mm beneath a 1.00 mm rim; anodize and cured adhesive must share this budget, provisionally 0.01 +/- 0.09. Do not add an arbitrary tape layer above the nominal rim. Confirm chamfers, grain, gloss and bead blast on an actual paired cream/sage/metal sample. No paint on acoustic openings, optical faces, control datums or screw seats.

09 - Indicator option O1, separate from the primary release

The inspiration suggests a small integrated point of light; the R7/R8 primary dome remains 1.3 mm proud. O1 is a separately modeled optical proposal retaining X0/Y-27.5 and the complete unscaled Kingbright LED, translated 1.8 mm rearward. Its tip becomes Z13.5. A PMMA disc dia 5.20, 0.40 thick occupies Z13.60..14.00, nominal 0.10 air gap at the tip, with a black nonconductive support/light well. O1 includes the revised hidden tub/skin counterbore and LED seat. The lower seat has a battery-facing relief to Y-26.30 below Z4.60; inspect its remaining retention stiffness on the optical sample. Primary depth remains 28.5; O1 would give 27.2 overall nominal depth if the complete stack qualifies.

O1 is a selectively seated, measured optical subassembly. Control the lightwell/window underside at Z13.60 $\pm$ 0.02 and the actual LED apex at Z13.50 $\pm$ 0.02 using an assembly gauge; this gives 0.06 mm worst-case geometric air gap. With disc thickness 0.40 $\pm$ 0.02 the exterior is Z14.00 $\pm$ 0.04, within the stated flushness limit. Catalog lens-height variation is not assumed to fit a 0.10 mm gap: machine or replace the custom POM seat to suit the measured intact LED, then inspect the complete lead and holder clearances. Do not force the LED against the window or silently use the nominal seat as an interchangeable production fit. Accept measured air gap minus instrument uncertainty $\geq$ 0.05 mm.

Use machined POM for the light well and optical PMMA for the disc; no cast opaque resin substituted for the window. Polish the coupling faces; lightly diffuse the exterior only after checking brightness/view angle in all intended RGB states. Bond only the peripheral seat using an optically/material-compatible grade tested on the coupon. Do not machine, flatten or scale the LED lens. Nominal axial clearance must remain $\geq$ 0.05 after measured tolerances; if it cannot, move the whole LED rearward and recheck the leads and PCB, not its dome geometry. Verify light leakage through cream PU, direct sun visibility, scratches, window retention and cleaning. Sealing/IP performance is not claimed. O1 is an engineering sample option with separate part files and fit screen; do not include its parts in the primary BOM quantity.

10 - RF, PCB and conductor honesty

The actual retained antenna reference is Taoglas FXUB63.07.0150C,96 x21 x0.2 mm with150 mm coax and I-PEX MHF I. Manufacturer guidance calls for at least10 mm from metal, ideally20 mm. Its rear placement is not established as acceptable. The previous0.7 mm distance is to the modeled PCB solids, not verified to the nearest copper, shield, connector or solder joint. Some solids may be dielectric, and source CAD does not identify all conductors. R8 retains that distinction and does not claim the requirement passes or fails solely from a PCB assembly distance.

Keep the existing antenna/PCB placement as a packaging reference only. A full populated-board stack, conductor/ground map, actual mated antenna connector, coax bend limits, cable routing and matching network remain required. The ambiguous supplied filename does not establish a particular vendor board revision; related SIM7670G boards found online are not substituted. Ask the electrical owner for the actual BOM/board drawing and Taoglas/RF owner for installation-specific guidance. No unverified smaller antenna is depicted as solved.

Antenna selection could affect the rear depth, top/bottom housing zones or metal rims. A moved antenna may approach the speaker frame, USB shell, screws or metal action key. Therefore freeze cosmetic tooling/metal trim only after the RF owner confirms an installed layout. Perform final passive tuning and active OTA/TRP/TIS across required bands, with the final cream skin, metal, cloth, battery, live PCB, harness and hand/head loading as appropriate. Use the installed-system certification plan. No computational nonintersection or body-distance figure proves RF performance.

11 - Delivered evidence and rebuild

Editable sources are code/build_r8.py plus the immutable baseline_geometry BReps and retained baseline_code_R7. They form a reproducible CadQuery feature-delta model, not a native Fusion feature tree. Per-part STEP and STL share assembly coordinates. STEP assemblies are provided with and without artwork, and with the reference PCB. Coupons and O1 are separated from product quantities. Python-generated drawing/PDF sources, source hashes, test logs and JSON/CSV travelers are included.

Only the current validation reports determine computational results. R7 evidence is prefixed R7_ and does not certify R8. The full untrimmed front switch model was checked against the supplied PCB at carrier displacements -0.52, 0 and +0.58 mm; no intersections were found. The nearby-solid distances were 2.27 and 2.78 mm at the first two positions; all solids at +0.58 were outside the 3 mm broad-phase screen. These are modeled component distances, not conductor or solder/harness clearances.

Geometry checks cover BRep validity, solid counts, mesh integrity, bounds, sampled assembly/reverse paths, operating travel, PTT tilt, fabricated interference and conservative hardware hull clearances. Cable motion, adhesive chemistry, castability, real switch behavior, thread strength, tactile feel, acoustics and RF remain physical work. All physical record fields start NOT TESTED; do not convert them to PASS from CAD results.

Source references: Omron B3F datasheet https://components.omron.com/sites/default/files/datasheet_pdf/A070-E1.pdf ; Omron tactile precautions https://omronfs.omron.com/en_US/ecb/products/pdf/precautions_tactile.pdf ; Lee Spring <https://www.leespring.com/product/compression-spring-cid016ab01s-stainless-steel> ; Gutekunst https://www.federnshop.com/en/products/compression_springs/d-001.html ; Taoglas <https://www.taoglas.com/datasheets/FXUB63.07.0150C.pdf> ; Kingbright <https://www.kingbrightusa.com/images/catalog/SPEC/WP154A4SUREQBFZGW.pdf> ; Acoustone <https://www.acoustonegrillecloth.com/product/fr402-series-grill-cloth-72/> . Reviewed 6 September 2026; archived downloads and errors are listed in evidence/component_sources.json. A blocked download is not represented as an archived PDF.

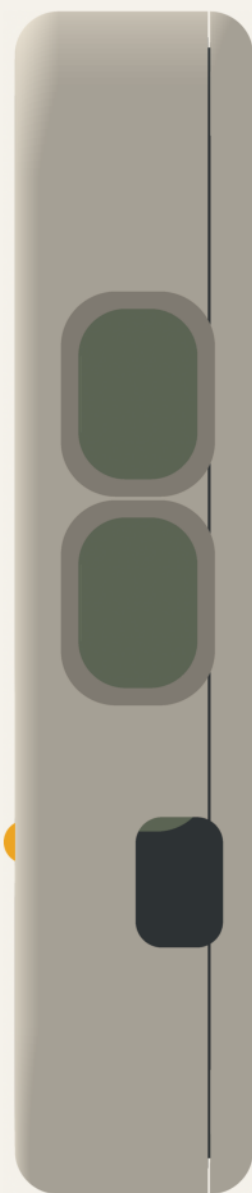
Matched artwork-inclusive CAD



WALKIE ONE 20.2 / R8 ASTRA



WALKIE ONE 20.2 / R8 ASTRA



Build quantities and purchased candidates

Item / Qty	Classification / material	Instruction
01_front_structural_tub / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	R8 removable side cassettes and four front stops; rear-access mounting bosses; M1.4 front jack pilots. Exterior retained. Critical dimensions finish-machined.
02_rear_structural_cover / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Local 52.4x22.4 pocket, floor Z-11.80; local cover wall 1.40. Rear skin pad ends Z-11.90; 0.10 nominal adhesive gap. Envelope unchanged.
03_front_soft_touch_skin / 1	Fabricated RPS Elastomer cast polyurethane, 40 +/-5 Shore A	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
04_rear_soft_touch_skin / 1	Fabricated RPS Elastomer cast polyurethane, 40 +/-5 Shore A	0.8 perimeter; local +0.50 inward pad behind exact artwork: 1.30 nominal skin, 1.05 beneath 0.25 deboss. All artwork stays R7 scale/position.
05_grille_backing_and_bond_flange / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
06_acoustic_fabric_cut_pattern / 1	Textile envelope Acoustic woven cloth: FR402 candidate; chemistry and thickness verify	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
07_speaker_edge_cradle / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
08_speaker_front_gasket / 1	Cut gasket/film Closed-cell silicone foam, 0.8 mm, adhesive one face	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
09_battery_tray / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
10_ptt_key / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Exterior R7 retained; two integral dia1.40 x0.65 spring-centering pegs on the hidden flange. Functional faces uncoated, flange 0.80 +/-0.04 finished.
11_ptt_metal_rim / 1	Fabricated 6061-T6 aluminum	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
12_ptt_switch_carrier / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Face X 38.20; +/-0.55 mechanical slot. 2 x dia2.60 blind spring bores, floor X 36.75 (depth1.45). Mask all functional surfaces.
10_volume_plus_key / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Exterior R7 retained; two integral dia1.40 x0.65 spring-centering pegs on the hidden flange. Functional faces uncoated, flange 0.80 +/-0.04 finished.
11_volume_plus_metal_rim / 1	Fabricated 6061-T6 aluminum	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
12_volume_plus_switch_carrier / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Face X 38.20; +/-0.55 mechanical slot. 2 x dia2.60 blind spring bores, floor X 36.75 (depth1.45). Mask all functional surfaces.
10_volume_minus_key / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Exterior R7 retained; two integral dia1.40 x0.65 spring-centering pegs on the hidden flange. Functional faces uncoated, flange 0.80 +/-0.04 finished.
11_volume_minus_metal_rim / 1	Fabricated 6061-T6 aluminum	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.

Item / Qty	Classification / material	Instruction
12_volume_minus_switch_carrier / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Face X 38.20; +/-0.55 mechanical slot. 2 x dia2.60 blind spring bores, floor X 36.75 (depth1.45). Mask all functional surfaces.
13_front_concave_action_key / 1	Fabricated 6061-T6 aluminum	Exterior R7 retained; two hidden dia1.40 x0.65 integral return-spring centering pegs. Anodize masked from flange datum and spring pegs.
14_front_action_metal_rim / 1	Fabricated 6061-T6 aluminum	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
15_front_switch_carrier / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Top Z8.45 for +/-0.55 adjustment; return spring bores dia2.60 floor Z7.00. M1.4x8 jack screws guided by actual CID016AB01S springs (ID1.84; rod max1.50).
15b_front_switch_retainer / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
16_rgb_led_support_ring / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
17_microphone_cradle / 1	Fabricated RPS Nylon PA, SLS; exact powder designation to be confirmed by RPS	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
18_microphone_acoustic_gasket / 1	Cut gasket/film Closed-cell silicone foam, 2.5 mm free thickness, 2.27 mm installed	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
19_lte_antenna_seat / 1	Cut gasket/film PET carrier film, 0.20 mm	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
20_service_notch_cover / 1	Fabricated RPS Elastomer cast polyurethane, 40 +/-5 Shore A	Retain R7 geometry; R8 Engineering_Handoff controls assembly/finish.
21_ptt_stop_cassette / 1	Fabricated PA12; machine critical datums	Removable fixed stop/guide cassette; seat Z8.6; stop X 39.05; 2 x M1.6x4 fixing screws; M2x5 carrier clamp. Finish to drawing.
21_volume_plus_stop_cassette / 1	Fabricated PA12; machine critical datums	Removable fixed stop/guide cassette; seat Z8.6; stop X 39.05; 2 x M1.6x4 fixing screws; M2x5 carrier clamp. Finish to drawing.
21_volume_minus_stop_cassette / 1	Fabricated PA12; machine critical datums	Removable fixed stop/guide cassette; seat Z8.6; stop X 39.05; 2 x M1.6x4 fixing screws; M2x5 carrier clamp. Finish to drawing.
22_front_stop_-1_-1 / 1	Fabricated PA12; machine critical datums	Removable stop, top Z9.30. M1.6x3 screw from rear; underhead Z8.50, tip Z11.50. Pad bears against fixed boss at Z9.30.
22_front_stop_-1_1 / 1	Fabricated PA12; machine critical datums	Removable stop, top Z9.30. M1.6x3 screw from rear; underhead Z8.50, tip Z11.50. Pad bears against fixed boss at Z9.30.
22_front_stop_1_-1 / 1	Fabricated PA12; machine critical datums	Removable stop, top Z9.30. M1.6x3 screw from rear; underhead Z8.50, tip Z11.50. Pad bears against fixed boss at Z9.30.
22_front_stop_1_1 / 1	Fabricated PA12; machine critical datums	Removable stop, top Z9.30. M1.6x3 screw from rear; underhead Z8.50, tip Z11.50. Pad bears against fixed boss at Z9.30.

Item / Qty	Classification / material	Instruction
REF_battery_body_and_protection / 1	Purchased reference - do not fabricate 01_battery_adafruit_2011_nominal_with_100mm_lead.stl	Unscaled source preserved. Actual lot, solder and harness envelope require physical verification.
REF_speaker_body_and_mounting_e ars / 1	Purchased reference - do not fabricate 05b_speaker_samesky_cms_40504n_152_round.stl	Unscaled source preserved. Actual lot, solder and harness envelope require physical verification.
REF_lte_flex_body / 1	Purchased reference - do not fabricate 08_lte_antenna_taoglas_fxub63_07_0150c.stl	Unscaled source preserved. Actual lot, solder and harness envelope require physical verification.
REF_front_Omron_B3F4000 / 1	Purchased reference - do not fabricate 04_button_front_omron_b3f_4000.stl	Unscaled source preserved. Actual lot, solder and harness envelope require physical verification.
REF_PTT_Omron_B3F3150 / 1	Purchased reference - do not fabricate 03_button_side_omron_b3f_3150_insert_3_copies.stl	Unscaled source preserved. Actual lot, solder and harness envelope require physical verification.
REF_VOL_PLUS_Omron_B3F3150 / 1	Purchased reference - do not fabricate 03_button_side_omron_b3f_3150_insert_3_copies.stl	Unscaled source preserved. Actual lot, solder and harness envelope require physical verification.
REF_VOL_MINUS_Omron_B3F3150 / 1	Purchased reference - do not fabricate 03_button_side_omron_b3f_3150_insert_3_copies.stl	Unscaled source preserved. Actual lot, solder and harness envelope require physical verification.
REF_Kingbright_RGB_LED / 1	Purchased reference - do not fabricate 06_rgb_led_kingbright_wp154a4sureqbfzgw.stl	Unscaled source preserved. Actual lot, solder and harness envelope require physical verification.
REF_Adafruit3421_mic / 1	Purchased reference - do not fabricate 02_mic_adafruit_3421_sph0645_breakout.stl	Unscaled source preserved. Actual lot, solder and harness envelope require physical verification.
REF_supplied_PCB_placed / 1	Purchased reference - do not fabricate sim7670g-ai-voice-terminal-3 (1).step	Unscaled source preserved. Actual lot, solder and harness envelope require physical verification.
Lee CID016AB01S / 10	Purchased spring candidate SS; OD2.16, L4.30, k0.22, solid1.04	8 key-return +2 front-jack. Lot force and fatigue qualification open.
Gutekunst D-001 / 0	Rejected alternate candidate OD3.10 L7.50 k0.095	Does not fit; no coil cutting or scale substitution.
M1.4 x8 jack screw / 2	Purchased candidate US Micro Screw M14-80-M-SS-TP / Accu SIP-M1-4-8-A2	Confirm head <=2.8 diameter x1.0 and M1.4x0.3; do not use R7 M2 jack screw.
M1.6 x4 cassette screw / 6	Purchased hardware Stainless metric machine screw; head <=3.2 x1.3	Underhead Z6.8; tip10.8; pilot bottom11.8; torque via coupon strip test.
M1.6 x3 front stop screw / 4	Purchased hardware Stainless metric; head <=3.2 x1.3	Underhead8.5; tip11.5; pilot11.8. Upper-left stop offset to clear mic.
M2 x5 carrier clamp / 3	Purchased hardware Stainless; head <=3.8 x1.3	Threaded into removable cassette; keep driver channel clear.
M2.5 x8 rear closure / 4	Purchased hardware Stainless; head <=5.3 x1.6	One upper-left location moved to X-26/Y51; other positions retained.
Acoustone FR402 beige / 1	Material candidate Acoustic woven cloth; chemistry/thickness verify	Qualify 0.60 installed budget and weave. Candidate, not an approved substitution.

Item / Qty	Classification / material	Instruction
Perimeter adhesive / primer / 1	Consumable Supplier-qualified for actual PA12, PU, cloth and metal	No unbudgeted film. Local rear0.10; cloth provisional0.05; rim provisional0.09.
W / rear / action pigment / 1	Decoration Exact supplied vector/outline; breathable W ink	Visual STEP solids excluded from fabricated counts.
PET straps / insulation / 1	Retained consumables Nonconductive straps;0.20 nominal pad	Do not compress pouch; electrical owner to qualify installed cell and swelling allowance.

WALKIE ONE 20.2 / R8 ASTRA | Envelope and preserved placement



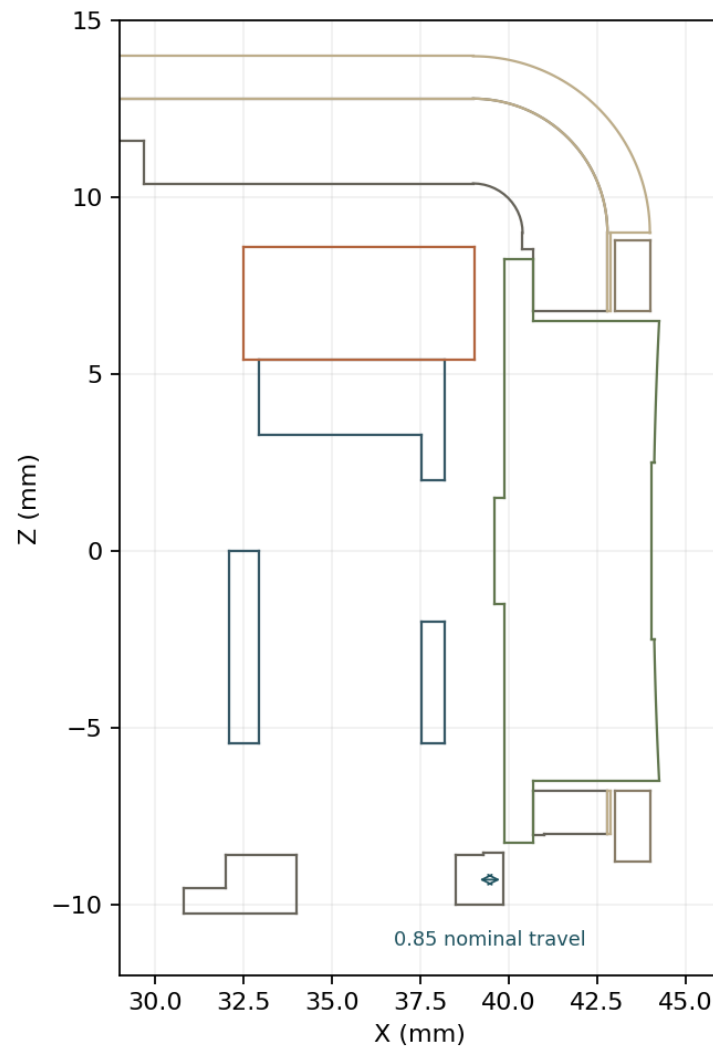
BODY: 88 x 136 x 27.2
Z rear -13.20; body front +14.00
PRIMARY LED tip +15.30
LED-inclusive depth 28.50

Action X0 / Y-46.50
Indicator X0 / Y-27.50
W width 34.00; centre X0 / Y24.00
PTT visible 69.60; centre Y10.00
Volume Y24.00 / Y0.00
Rear wordmark 44.00 at X0 / Y0
Origin line at X0 / Y-8

Closure screw relocated:
(-34,46) -> (-26,51)
Other three closure points unchanged.

O1 optical option is separate.
Primary retains the exposed dome.

WALKIE ONE 20.2 / R8 ASTRA | Side key / cassette / carrier



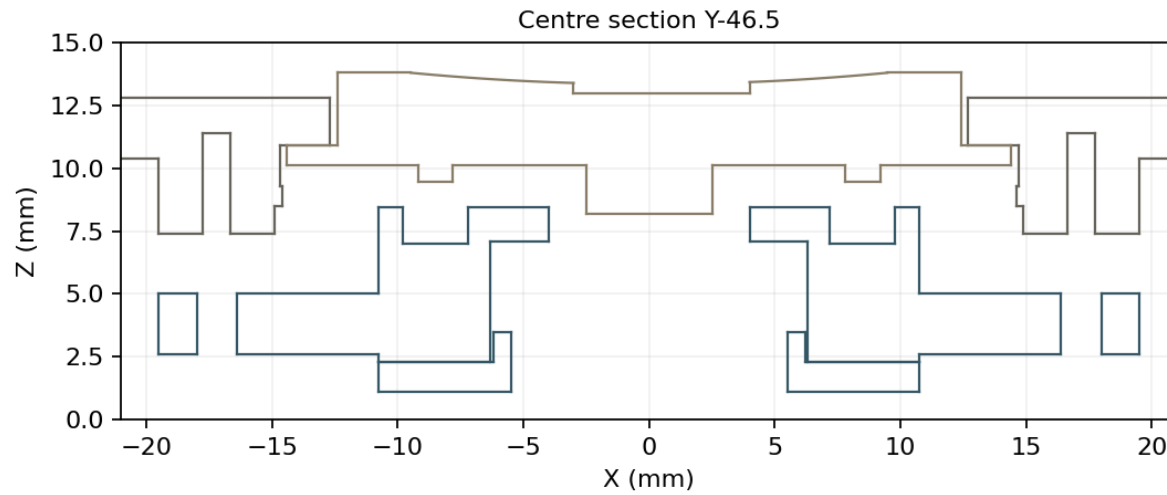
Section Y24; right-side volume key
Orange: removable stop cassette
Blue: adjustable switch carrier

Rest lip |X|40.70
Flange 0.80 +/-0.04 FINISHED
Stop |X|39.05 +/-0.03 assembled
Lip-stop span 1.65 +/-0.06
S=0.85 +/-0.10

Carrier face |X|38.20
Permitted delta -0.52 / +0.58
Slot 3.40 x 2.30; centre |X|35.97
Spring floor |X|36.75
Bore dia 2.60; peg dia 1.40 x 0.65

Cassette seat Z8.60
2 x M1.6x4 at |X|36, Yc +/-5
Counterbore dia 3.60 to Z6.80
Pilot dia 1.25 to Z11.80
M2x5 clamp at |X|36, Yc+9.2
Machine/mask all contact datums.

WALKIE ONE 20.2 / R8 ASTRA | Front key / removable stops

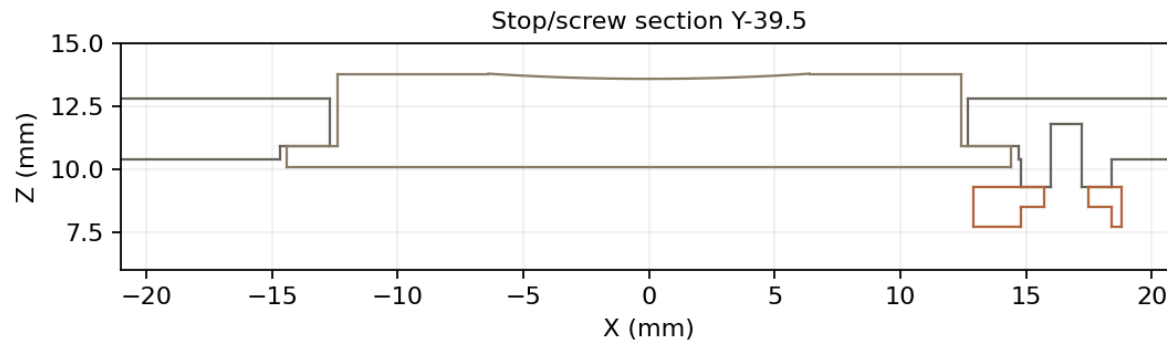


Ceiling Z10.90; flange 0.80 $\pm$ 0.03
Stop Z9.30; span 1.60 $\pm$ 0.04
S=0.80 $\pm$ 0.07 FINISHED

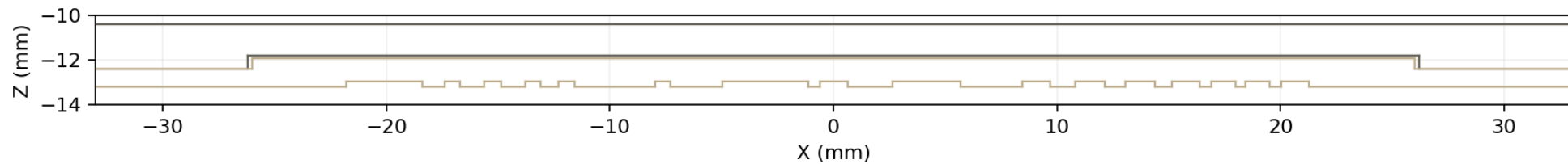
Four removable stop feet
3 screws: X $\pm$ 16.6, Yc $\pm$ 7
except upper-left: X-8 / Y-29.8
M1.6x3; underhead Z8.50
Tip Z11.50; pilot ends Z11.80
Front-wall floor $\geq$ 1.00

Carrier top Z8.45
Return floor Z7.00, dia 2.60
Jack screws M1.4x8, pitch 0.30
X $\pm$ 17.20, Y-46.50
Permitted carrier delta -0.52/+0.58
Two arm heights matched $\leq$ 0.03

Calibrate before PCB installation.
No post-make travel approval
is implied by the 0.08 test setting.

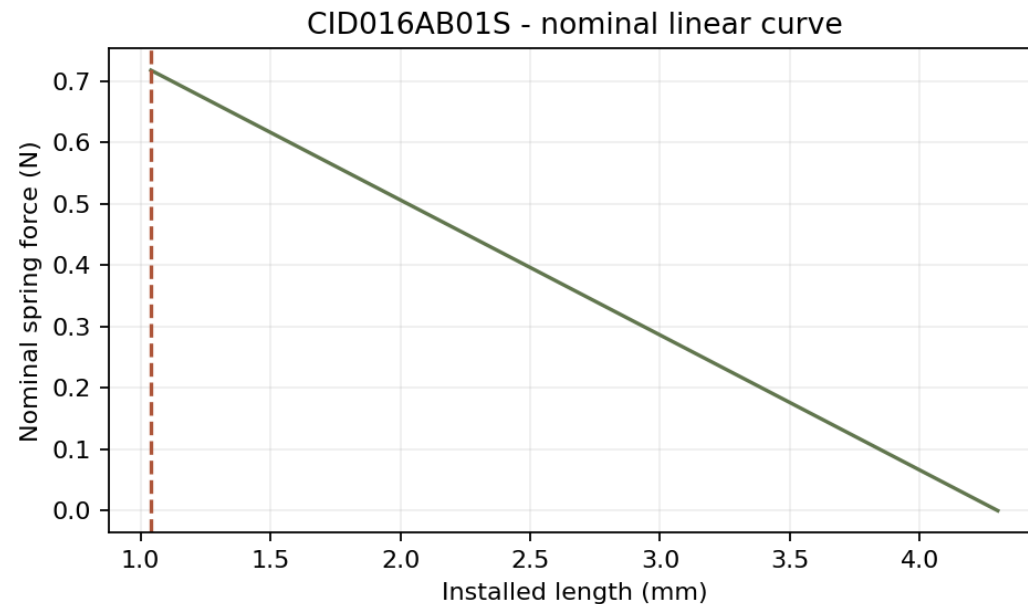


WALKIE ONE 20.2 / R8 ASTRA | Rear lettering and controlled bond



C04 representative actual-letter coupon: 64 x36 cut from the real rear assembly.
Outer rear face Z-13.20 retained. Perimeter skin0.80; local skin1.30 nominal.
0.25 deboss leaves1.05 nominal local floor (R7 control C05:0.55).
Inward pad52 x22 R2, centre X0/Y-3; pad face Z-11.90.
Cover pocket52.4 x22.4, floor Z-11.80; adhesive gap0.10 +/-0.03.
Residual cover wall1.40 to Z-10.40. No antenna-facing surface displacement.
Approve casting, demold, bond, grazing-light read-through and tonal fill on actual PU/PA12.

WALKIE ONE 20.2 / R8 ASTRA | Springs, finish and calibration limits

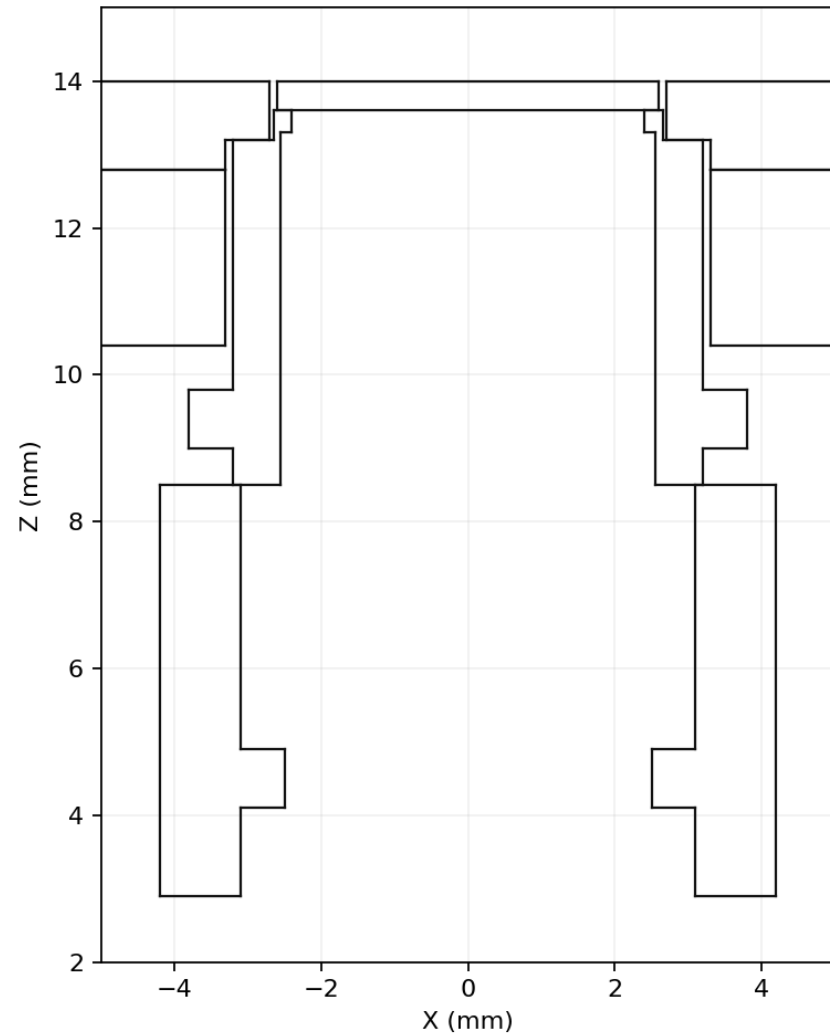


Lee CID016AB01S candidate
OD2.16 / ID1.84 / wire0.16
 $L_0 = 4.30 \pm 0.38$; $k = 0.22$ N/mm
Solid1.04; hole ≥ 2.50
Guide rod ≤ 1.50 (M1.4 selected)
8 returns +2 jack springs

Nominal returns: $L = 3.15/3.10$ rest
 $L = 2.30$ at stop, $F \approx 0.44$ N
No force/fatigue qualification implied.

Finished smaller-side gap: side ≥ 0.142 ; front ≥ 0.194 (specified process stack).
Rim face flushness $-0.05/+0.10$ relative to uncompressed adjacent skin.
Record rest freeplay, make, release, stop, force and carrier position on every control.
Computed freeplay side $0.20..0.74$; front $0.13..0.61$ (conditional on finished limits).
Acceptance: freeplay reading minus uncertainty ≥ 0.15 side / 0.10 front.
Provisional make-to-stop margin $0.06..0.10$; manufacturer loading approval remains OPEN.
Carrier demand $-0.46/+0.52$; permitted $-0.52/+0.58$ from R7 neutral.
Machine, measure and mask datums. Do not rely on raw SLS capability.

WALKIE ONE 20.2 / R8 ASTRA | O1 flush optical option - separate build



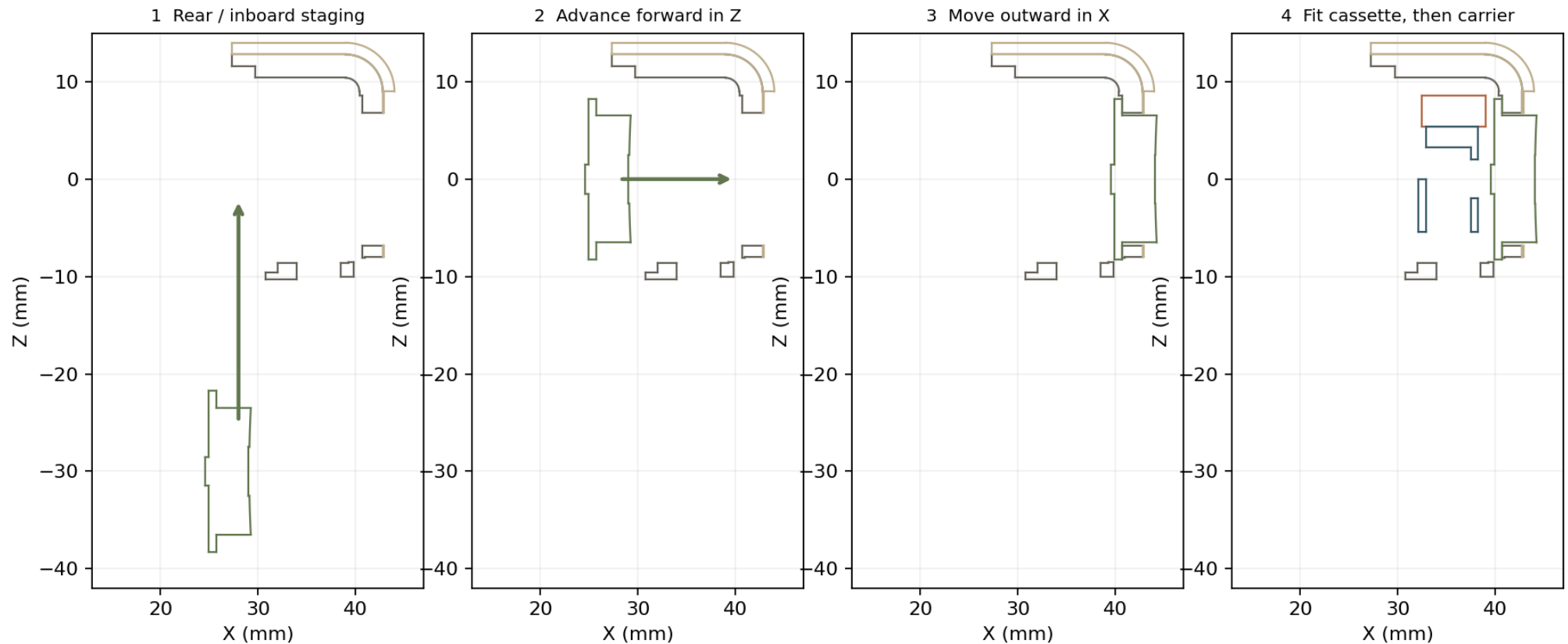
Visible centre X0/Y-27.50 retained
Unscaled LED translated -1.80 Z
LED tip Z13.50; window Z13.60..14
Disc dia5.20 x0.40 PMMA
Nominal air gap0.10; accept ≥ 0.05

POM lightwell OD6.40, ID5.10
Hidden dia6.60 counterbore
Z8.90..13.20 in tub/skin option
Visible aperture stays dia5.40
Upper shoulder bore dia4.80
Black nonconductive finish

Primary depth28.50 remains.
Option nominal overall depth27.20.

Test all RGB states, leakage,
brightness, retention and cleaning.
Actual lead/harness and bond
clearance require a physical sample.

WALKIE ONE 20.2 / R8 ASTRA | Ordered insertion - volume example



Actual Y24 CAD sections. Cover, electronics, mic, tray, stops and carriers absent for key insertion.

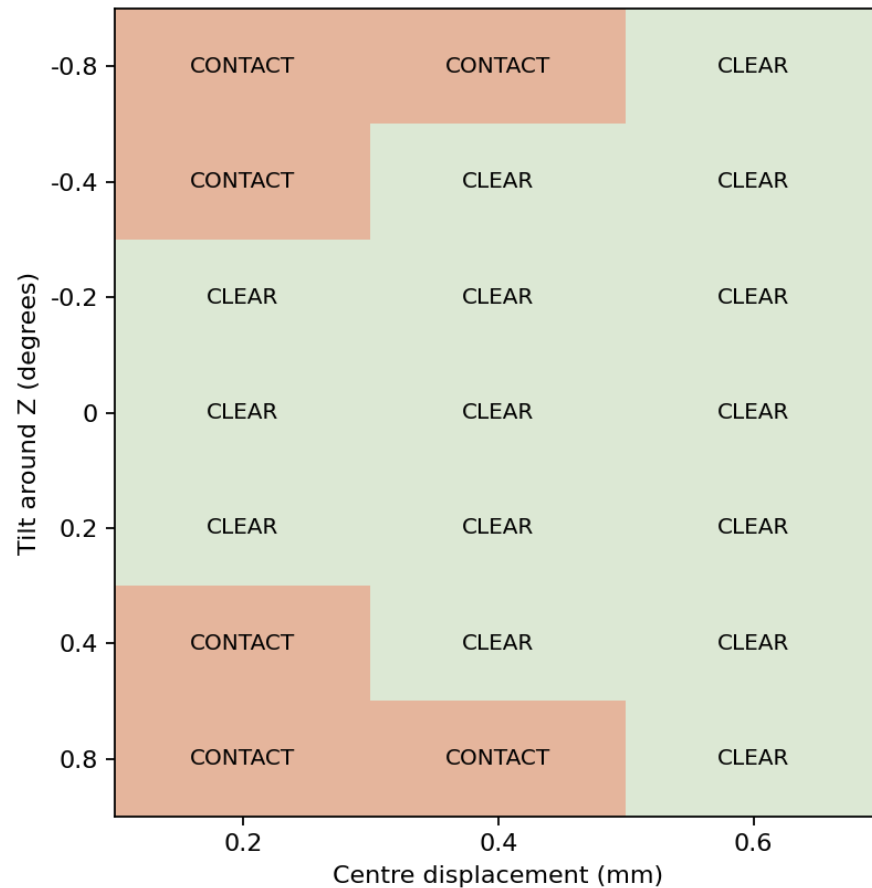
Mirror X staging for the left PTT; keep complete keys at fixed Y/orientation.

Cassette/carrier: stage 10 mm inboard and 30 mm rearward, advance Z, then move outward.

Front key enters directly from rear with four stops removed. Screw stops on afterward.

Reverse the sequence for service. Sampled nonintersection requires physical C01-C03 confirmation.

WALKIE ONE 20.2 / R8 ASTRA | PTT tilt screen and physical press locations



21 rigid PTT poses: 15 clear, 6 contact.
Contacts are against the tub/rest lip.
At 0.8 deg, end-centre offset is 0.486 mm.
A 0.2 mm centre press cannot permit that tilt without the opposite end trying to pass the retaining lip.

Physical 8 mm finger surrogate:
BOTTOM Y-19.8 / CENTRE Y10
TOP Y39.8; also test Z +/-4 edges.

Record applied-point and centre travel,
force, first make, release, hard stop,
rubbing and residual set.
Require make before stop at every point
and full return in all stated orientations.

Rigid-pose checks do not predict
friction, elastic tilt or tactile feel.