Make a Pop-Up Card Mechanism from Two Slits

Two parallel cuts and three controlled folds make a simple pop-up step

These are original printable digital plans for adult paper crafts. Dimensions are calculated; every finished size is nominal. Paper thickness, printer scaling, adhesive, cutting accuracy and folding technique can change the fit. There has been no physical printing, cutting, folding, gluing, fit test or durability test. Work at a clear table, keep sharp edges and wet adhesive away from children, and use only materials and adhesives that are suitable for the intended craft according to their labels. Keep food, flame, heat and electrical loads away from these objects.

The result you can see

You will make a folded greeting-card blank with an internal step that rises as the card opens. The mechanism comes from two parallel cuts made into the folded edge, followed by controlled inward folding. It can support a very light paper drawing or a small paper label, provided the user tests that the card still closes. Unlike an external glued paper flap, this pop-up step is integral to the original sheet; no adhesive is needed to create its basic moving form.

The unfolded blank measures 160 mm wide by 120 mm high. Its vertical spine is at x = 80 mm; the closed card is nominally 80 x 120 mm. Two parallel cuts sit at y = 45 mm and y = 75 mm and extend 30 mm into the folded edge. Once cut through both layers from the fold, the corresponding opened-flat cut segments lie at x = 50..110 mm. The cut spacing is 30 mm vertically. The resulting mechanism is a modest box step, not a load-bearing shelf or an engineered hinge tested for repeat use.

Keep the outside card and the pop-up step visually distinct. The outer spine stays folded in its original direction above and below the slits, while the short spine segment between the slits is redirected inward as the step is formed. The full-size drawing marks the two red solid cut paths and the green and blue crease locations. The diagram is meant to guide the reader; it is not a record of an assembled physical model.

Materials and printer preparation

Use a sheet of cardstock around 140-200 g/m2 as a starting point, with a blank surface that folds without cracking. You need a millimetre ruler, ordinary scissors, pencil, blunt scoring tool and a stable table. A sheet of scrap paper allows you to rehearse a fold before starting. The guide avoids craft knives: when the card is folded as directed, both cuts can begin at the folded edge with scissors rather than piercing the middle of a flat sheet.

Print the full-size card layout on the matching A4 or Letter page using Actual Size or 100%. Measure its separate 50 mm scale bar. Look at both card edges: the width is 160 mm and the height is 120 mm on the original template. Do not use a screen ruler, image thumbnail or printer driver Fit to page function as proof of physical dimensions. If the printed cut line or the calibration mark is incomplete, reprint or draw the full numeric dimensions on clean cardstock.

For a first attempt use expendable paper and reserve any valued photograph or artwork for after you understand the mechanism. Do not cut, score or glue an original photograph, historic document or important handwritten note. The

Library of Congress advises careful handling of paper collections and avoiding routine adhesive on originals; this project intentionally uses ordinary craft card instead.

Read the full-size cut-and-fold map

The diagram uses millimetre coordinates from the lower-left corner of an open 160 x 120 mm rectangle. The central spine is x = 80 mm from bottom to top. Two horizontal solid cut paths are at y = 45 mm and y = 75 mm, each from x = 50 to x = 110 mm when the card is opened flat. These are the same as cutting inward 30 mm from the folded spine through both layers. The two cutting paths are 30 mm apart and perpendicular to the spine.

You will work with two short new crease lines at x = 50 mm and x = 110 mm between y = 45 mm and 75 mm, plus the existing centre fold x = 80 mm. Outside the step, the centre fold remains a normal card spine. Inside the step, the centre line must be pushed to the other side as the step projects inward. It is easy to confuse a score with a cut; only the two horizontal lines are cut. The vertical guide lines are never cut. The short vertical lines at x50 and x110 show where the tongue will hinge against the unchanged card panels.

One way to picture the mechanism is to imagine a rectangular tongue spanning both halves near the middle of the card. Each half contributes 30 mm of the tongue depth, so the entire opened cut across both halves is 60 mm. The tongue remains attached at its two outer crease boundaries. If you accidentally cut those vertical boundaries, the pop-up step will detach and can no longer operate as intended.

Construct the two-slit mechanism

1. Print the matching full-size template at Actual Size and read its 50 mm reference with a ruler. Confirm the card outline measures 160 x 120 mm if transferred correctly.
2. With the print face visible, mark the two parallel horizontal cut guides at y45 and y75, and label the vertical central spine x80. The printed diagram shows what the cuts look like after unfolding.
3. Score only the card spine x80 using a blunt tool and ruler, from top to bottom. Do not score through the paper and do not cut this vertical line.
4. Cut around the 160 x 120 mm exterior rectangle using ordinary scissors. Orient the wider side left-to-right before proceeding.
5. Fold the card in half on the x80 spine, aligning both 80 x 120 mm halves. Keep the fold toward you and the open edges away. The closed card is now nominally 80 mm wide.
6. Mark two starting positions along the folded edge, 45 mm and 75 mm from the same lower edge. Keep the marks 30 mm apart. Measure 30 mm straight inward from the folded edge along each horizontal line.
7. With the folded layers held still and fingers out of the scissor path, make the first straight slit from the fold to the 30 mm depth mark, cutting through both stacked layers. Stop at the measured endpoint.
8. Make the second slit from the fold to its own 30 mm endpoint. Do not connect the outer slit ends with a third cut and do not cut through to the exterior card boundary.

9. While still folded, gently push the rectangular cut tongue away from its original position. Pre-crease the new outer edges at the two cut endpoints with fingertips, without cutting or forcing them.

10. Open the card partly. The short centre-fold segment between the slits should be able to reverse direction while the spine above and below the slits retains its original crease direction. Support the step on both sides.

11. Form the two short vertical hinges at x50 and x110 on the flat coordinate map, and reverse the central x80 segment between y45 and y75. Bring the card toward closing position while guiding the tongue into the card rather than leaving it outside.

12. Open to a comfortable viewing angle. A rectangular step should project inward across the space between the card halves; do not demand that it carry a heavy decoration or form a perfectly rectangular box at every angle.

13. Close the card slowly to check that the step folds flat without trapping a corner. If the step resists, open it again and correct its crease direction before adding any image.

14. If desired, attach one light duplicate drawing to a face of the step using a small amount of labelled paper-safe adhesive, kept away from all hinges and slit ends. Check closure again after the adhesive dries.

15. Record the cut lengths, slit spacing, measured calibration bar, fold orientation and any adjustment on the printable two-page mechanism log.

Diagnose the common mistakes

If the central tongue remains outside when you close the card, the original spine segment between the two slits probably has not been reversed. Support the centre and turn the tongue toward the inside as the outer spine closes; never rip the fold to force it. If one cut extends farther than the other, the step may skew sideways; compare each 30 mm cut depth from the same folded edge and remake a clean blank rather than concealing a tear.

If you have three slits, you are no longer constructing the specific two-slit pattern in this guide. If you cut the vertical lines at x50 or x110, the tongue may detach. Those are hinge positions, not cut paths. A card that buckles when closed may have a thick picture attached too near a crease, or its middle fold may be heading in the wrong direction. Remove the decoration on a disposable practice model and verify that the unadorned mechanism closes first.

The digital geometry is 30 mm deep on each layer and the two slits are 30 mm apart, but real cardstock thickness affects the movement. No cycle-life, tear-force, child-toy, load or durability testing was performed. Ordinary paper mechanisms are suitable for light craft presentation only. Do not use the step to support sharp objects, batteries, candles, food or any item whose failure could be dangerous.

Make a meaningful card

A short message can appear on the two outside panels while a small drawn skyline, plant or celebratory word rises on the centre step. Make the moving element the focus; avoid a heavy embellishment that catches inside the folded card. Put names or private information only on a card intended for its actual recipient. For a keepsake of a valuable photograph, use a copy rather than altering the original.

If you redesign the step, keep track of both the cut depth and the spacing. Increasing the depth without changing card width reduces the paper remaining outside the tongue; increasing spacing changes the tongue height. An alternative 25 mm cut depth with 30 mm spacing would place endpoint creases at x55 and x105 on this 160 mm blank; this is a calculated example, not the printed reference layout. Mark any new prototype as a reader variation rather than claiming that its behaviour has been tested by Steadleaf Press.

References, rights and scope

Adobe Acrobat Help, Adjust page size for printing PDFs: https://helpx.adobe.com/acrobat/desktop/print-documents/set-up-and-print-pdfs/page-size.html . Used only for the distinction between Actual Size and Fit printing, and its warning that oversized content can be cropped.

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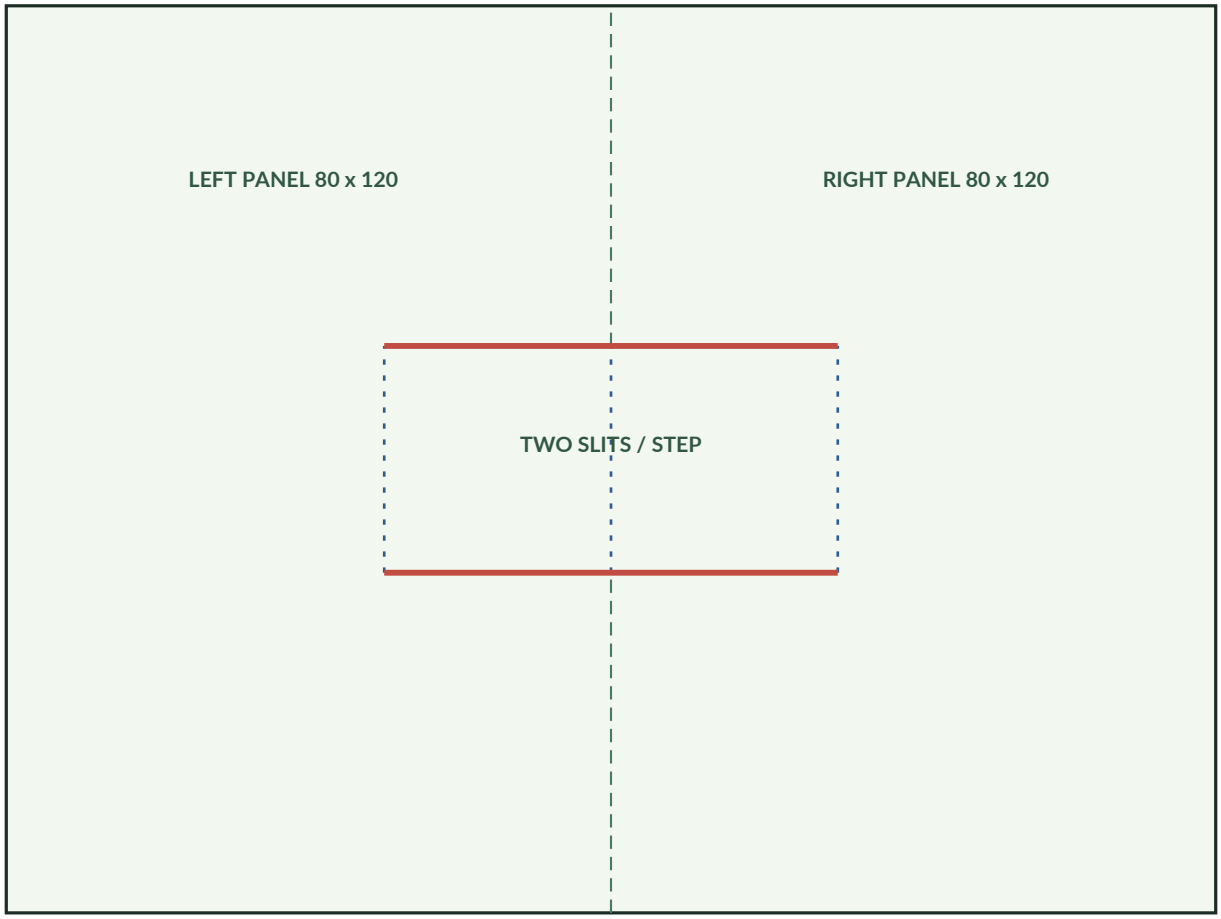
All instructions, rectangle and slit coordinates, illustrated mechanism, cover art and maker log were drafted as new Steadleaf Press digital assets. No copied commercial pop-up template or photograph is included. No paper sample was physically printed, cut, folded, cycled, glued or load-tested for this publication.

Printable diagrams and build record follow on the next pages.

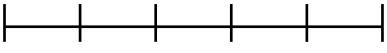
STP-MAKE-F031 / FULL-SIZE TWO-SLIT CARD

Flat 160 x 120 mm. Cut RED horizontal lines only; vertical guides are folds, never cuts.



Fold on x80 first. With card CLOSED, cut at y45 and y75, from FOLDED EDGE 30 mm into BOTH layers. Open cuts become x50..110. Push central tongue inward.

50 mm SCALE CHECK - measure with a ruler; must equal 50 mm



STP-MAKE-F031 / STEP FOLD SEQUENCE

A paper diagram, not a photograph of a physically built mechanism.

A Fold the 160 x 120 mm card at its x80 spine.

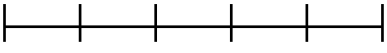
B Cut two 30 mm parallel slits through both folded layers.

C Invert only the tongue between the slits toward the card interior.

D Form x50 and x110 hinges. Close and open gently.

A completed step has three central crease segments; the rectangular tongue remains attached at its two outer hinges. No physical fitting or cycle tests performed.

50 mm SCALE CHECK - measure with a ruler; must equal 50 mm



STP-MAKE-F031 / MAKER RECORD / PAGE 1

Write your own readings and decisions; no physical trial was performed by Steadleaf Press.

Cardstock type and approximate weight

Actual Size print / 50 mm reading

Unfolded blank dimensions 160 x 120 mm

Slits y45 & y75, cut depth 30 mm each layer

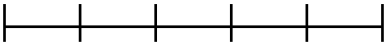
Central reversal: inward / outward / not tried

Step clearance and card closure observation

Reader changes and final decoration weight

Record an actual observation only if you perform it yourself.

50 mm SCALE CHECK - measure with a ruler; must equal 50 mm



STP-MAKE-F031 / MAKER RECORD / PAGE 2

Write your own readings and decisions; no physical trial was performed by Steadleaf Press.

What changed from the full-size original?

How was each score/cut location measured?

Where did the paper bind, crack, wrinkle or slip?

What would you change for the next copy?

Date, version and initials

Safety or handling concern noticed by reader

Record an actual observation only if you perform it yourself.

50 mm SCALE CHECK - measure with a ruler; must equal 50 mm

