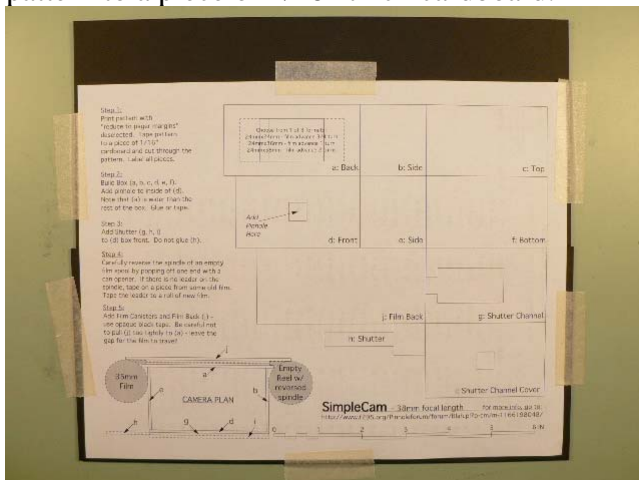


**Parts List:**

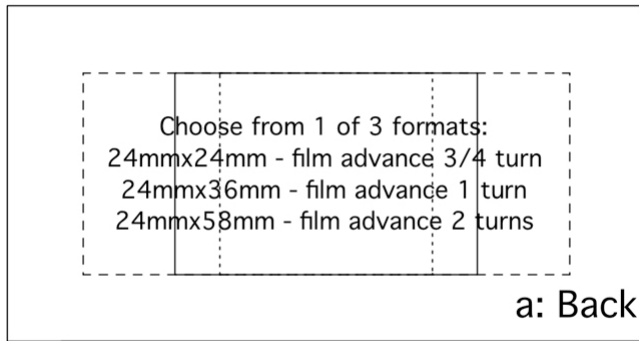
- 1/16" Thick Cardboard – 7"x8" – Black is ideal, but not required
- 35mm Film – 100 or 200 asa
- Used 35mm Film Canister – Available at any photo processing store. Also ask for a Short length of film leader – 3" is enough
- Bottle Opener
- Matt or Exacto Knife
- Elmer's Glue
- Popsicle Stick
- Opaque Tape – black paper, black electrical, duct, etc. Use several layers if it is not completely opaque
- Straight Edge
- Rubber Band – a thick one to provide some tension on the winders
- Ballpoint Pen
- Sharp Needle – a sewing needle is perfect
- Either: a soda can and some very fine sand paper (this makes a better pinhole)
- Or: a small piece of aluminum foil (the picture quality will be lower)

**Step by Step Instructions**

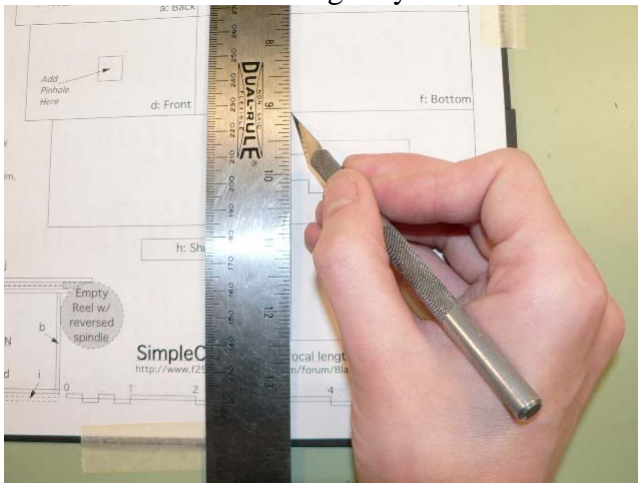
1. Print the last page of these instructions with the "reduce to page margins" option deselected. Confirm that the scale of the pattern is correct by measuring the scale at the bottom corner of the page. Tape the pattern to a piece of 1/16" thick cardboard.



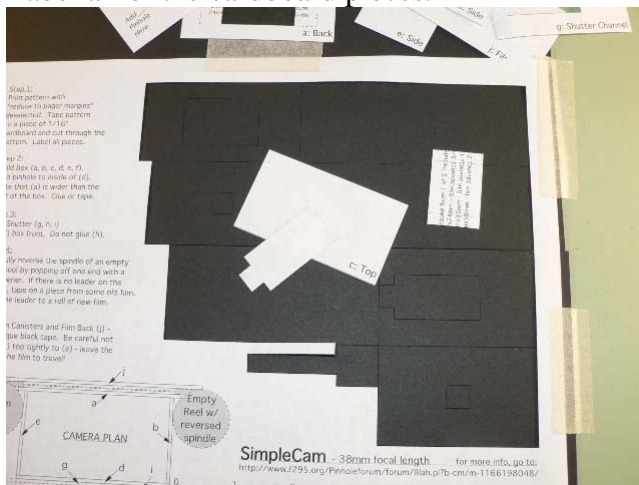
- Choose the film format that you would like to use. You have three format options: Square (24mm x 24mm), Traditional (24mm x 36mm) and Panoramic (24mm x 58mm).



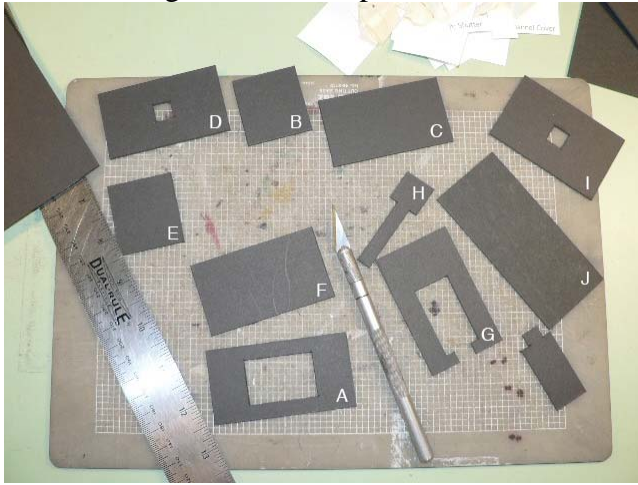
- Using a sharp knife, cut through the pattern to score the cardboard. First cut all vertical lines, then all horizontal lines. Cut along only one film format.



- Label all of the cardboard pieces.



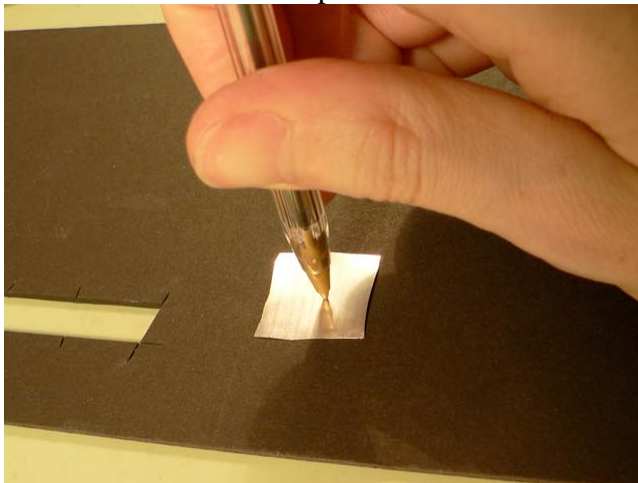
5. Finish cutting out all of the pieces.



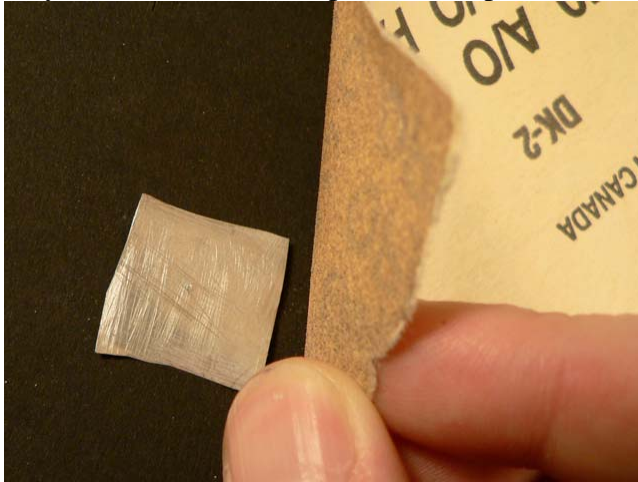
6. Cut a square piece out of a soda can. About  $\frac{3}{4}$ " x  $\frac{3}{4}$ " is fine. Flatten the piece as much as possible.



7. Using a ballpoint pen, push firmly straight down on the piece with a scrap of the cardboard underneath. You should create a dimple in the aluminum.



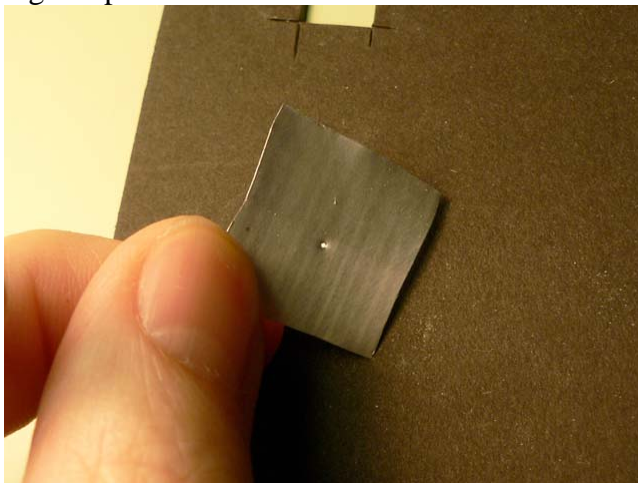
8. Turn the piece over, and very lightly sand the dimple. You do not want to make a hole, just to create a very thin section at the top of the dimple. If a hole appears, try again with another piece of soda can.



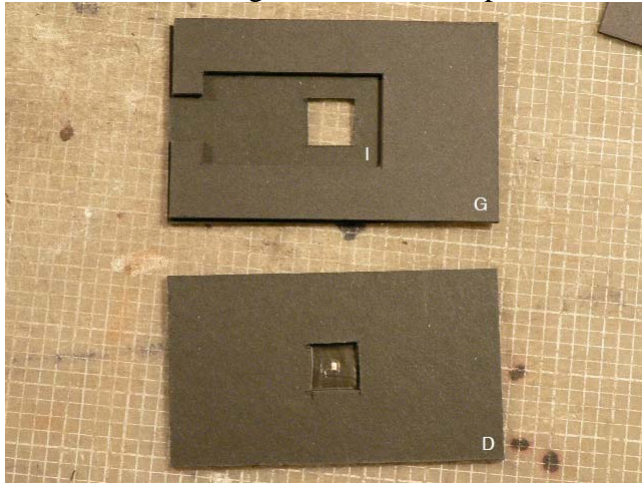
9. Turn the piece over again and gently prick a sewing needle through the center of the dimple. The needle should barely go through the metal – only about 1/8" at most.



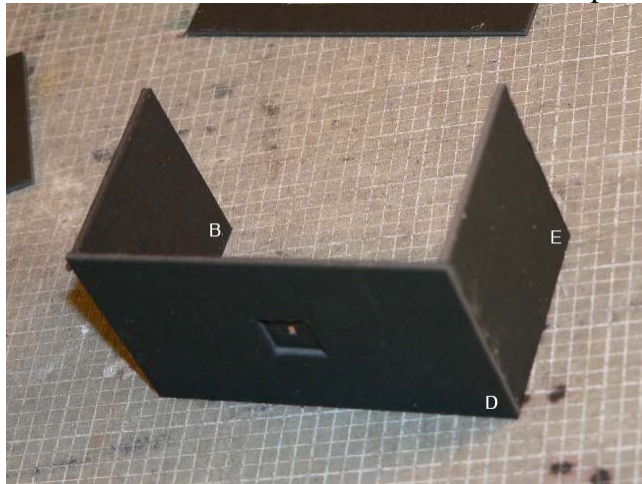
10. You should now see a very small, round hole in the middle of the metal. Or: a crude pinhole can be formed by gently pushing a needle into a piece of household aluminum foil. Advanced: You can determine if your pinhole is the ideal .25mm diameter by scanning it next to a metric ruler. Scan at the highest possible resolution. If the hole is not round or is too small or large, keep trying!



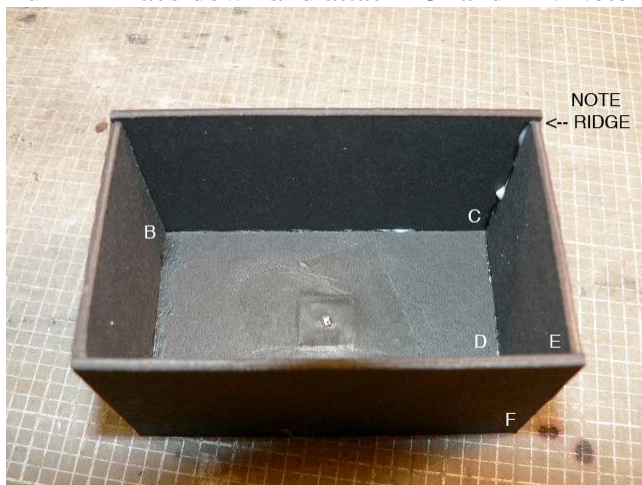
11. Glue 'G' and 'I' together. Center the pinhole in the window of 'D' and tape it on.



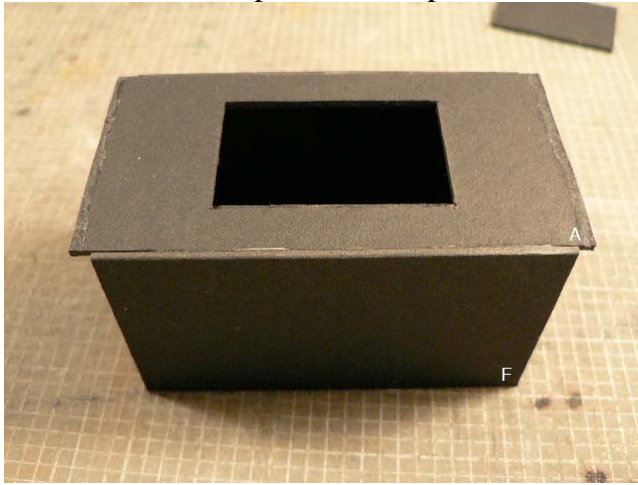
12. Glue 'B' and 'E' to the back side of 'D'. The pinhole should be on the inside of the camera.



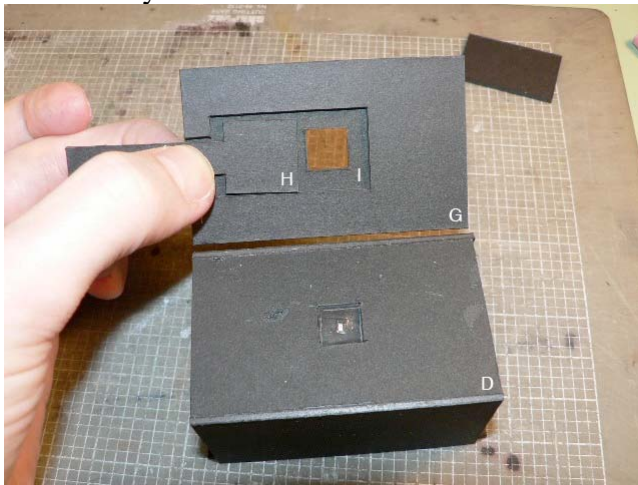
13. Turn 'D' face down and attach 'C' and 'F'. Note that they are slightly taller than 'E' and 'B'.



14. Attach 'A' to the top. Center the piece side to side as shown.



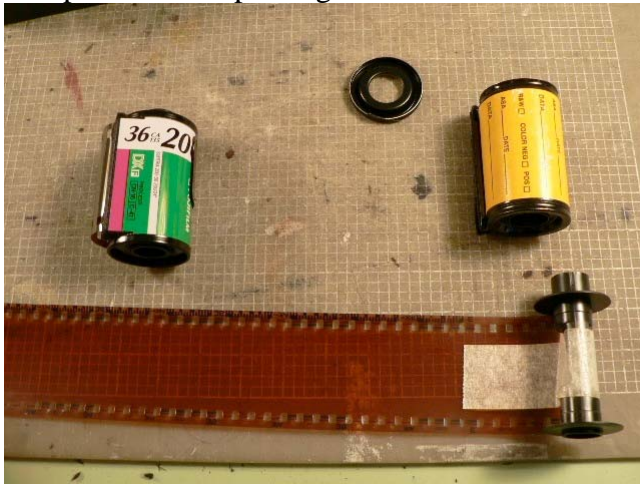
15. Turn the camera over. Insert 'H' into 'G' without gluing it and attach 'G' to 'D'. The shutter 'H' should move freely side to side.



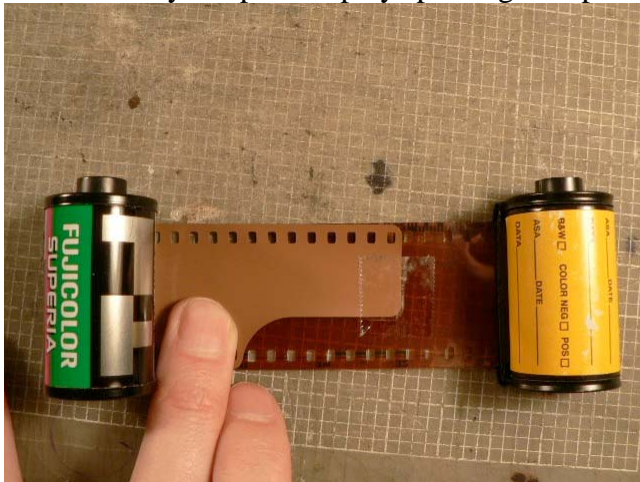
16. Using a bottle opener, carefully pop off one side of an old film canister. Work gently and slowly around the edge of the cap, prying only slightly each time until the cap is released from the sides of the canister.



17. Remove the spindle of the canister. Tape on a short length of old film to the spindle as shown, and reinsert the spindle into the canister upside down. It should look like the yellow canister on the right. Replace the cap as tightly as possible and tape it firmly to the sides of the canister without preventing the spindle from spinning or the film from advancing.



18. Tape new film onto the old film as shown. Tape both sides. Advance the film an inch or so into the canister that you opened up by spinning the spindle clockwise.



19. Orient the film and canisters on each side of the camera as shown.



20. Tape 'J' to the backside of the canisters, covering the film and leader.



21. It should all look like this.



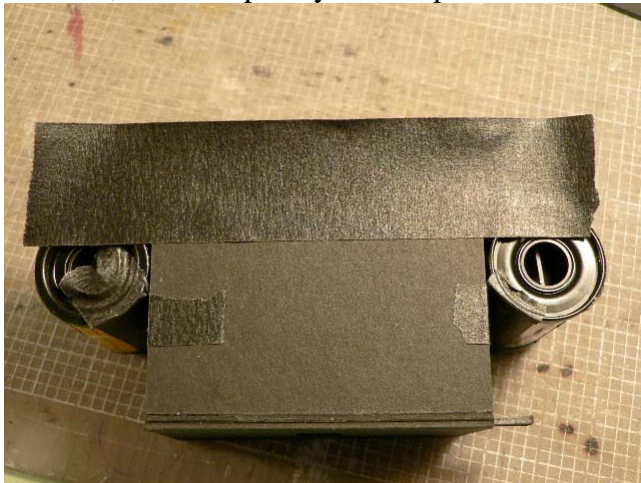
22. Fold a piece of tape in half – sticky side out. Tape the inside corner between the camera and film. Repeat on the other side.



23. Split the ends of the tape as shown and stick down.



24. Tape the top and bottom as shown. Be careful that you do not pull the cardboard back 'J' against the back of the camera. Make sure that you do not tape the spindles in place – they must be able to spin. If in doubt, use multiple layers of tape to insure that all light is blocked out.



25. Continue taping all areas between the film and camera.



26. Snap a popsicle stick in half and insert the pieces into each spindle. Add the rubber band for tension. Mark one stick with an 'x' so that you can keep track of winding. Advance the film two complete revolutions prior to taking your first picture.



Enjoy!

### Taking Photos

Exposure times are dependent on the size of the pinhole. Here are some guidelines based on the ideal (.25mm) pinhole size:

	<b>100 ASA</b>	<b>200 ASA</b>
<b>Bright Sun</b>	6 Seconds	4 Seconds
<b>Partly Cloudy</b>	30 Seconds	15 Seconds
<b>Overcast / Cloudy</b>	1 Minute	30 Seconds
<b>Dawn / Dusk</b>	4 Minutes	2 Minutes
<b>Indoors with Sun</b>	14 Minutes	8 Minutes
<b>Indoors Bright Light</b>	24 Minutes	14 Minutes
<b>Indoors Dim Light</b>	40 Minutes	25 Minutes
<b>Night Time</b>	80 Minutes	50 Minutes

For long exposures, find a firm surface to place the camera. Open the shutter, and have a cup of coffee while you are taking a fantastic pinhole picture.

After each exposure, advance the film according to this chart:

Square Format (24mm x 24mm):	$\frac{3}{4}$ turn per picture.
Traditional Format (24mm x 36mm):	1 turn per picture.
Panoramic Format (24mm x 58mm):	2 turns per picture.

After you have reached the end of the film, rewind it all the way. Carefully remove all tape and get your film developed!

Note: Tell the photo processor that your pictures are not regularly spaced and that they will need to be manually aligned when printing your images.

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