

# Transformation of Personal Grooming Tools into Paper Perforating Pens

Grace Owen-Weiss, Associate Conservator for Book and Paper, Barbara Goldsmith Preservation Division, The New York Public Library, [graceowen@nypl.org](mailto:graceowen@nypl.org)

Conservators commonly use needles and scalpels to cut intricate shapes from paper for filling losses in paper artifacts. This method is slow and often stressful on the hands. The Crayola Cutter, sold as a toy for children, uses a wand fitted with a retractable needle to perforate paper, so that it can be pulled apart without the use of scissors. Some conservators have adopted it for cutting fills. The concept of the cutter is ingenious. In practice, however, its lack of power and awkward design prevent it from being considered a serious tool. The quest began to find a hand-held

power tool that produces similar results without any of these issues. A design for a device seen on the Internet, made by prison inmates, came surprisingly close. It is a home-made tattoo gun, created by fitting a sewing needle to the shaft of a battery-powered spin toothbrush. The spin toothbrush actually operates in a linear motion, in that when a needle is attached to the shaft, it can punch a series of holes in paper, as the Crayola Cutter does. In fact, toothbrush tattoo guns are available for purchase online. They are fitted with a professional grade tattoo needle and are marketed to

breeders for tattooing identification numbers inside the ears of show animals. Unfortunately, both toothbrush devices proved too bulky to hold comfortably in the hand and to manipulate. Modifying a smaller, more ergonomically designed appliance became the next logical step. Personal grooming tools such as nose, ear, and facial hair trimmers were selected because they are small, powerful and many operate in a linear motion. The grooming tools of choice, powered by an AA or AAA battery, can be modified using parts from mechanical pencils, and a

sewing needle. Two versions, the larger for heavier weight papers, have been designed, built and tested. The paper perforating tools, paired with a cutting base, handle like a pen. They can be used effortlessly to draw a series of small holes in a fluid motion. The perforated line is then pulled apart to create a feathered edge. The beauty of these tools is that they can be used on a variety of paper thicknesses. Instructions on how to make two perforating pens from two models of trimmers presently on the market are illustrated below.

## PAPER PERFORATING PEN MODEL #1

### REMINGTON PRECISION PERSONAL TRIMMER

#### CONSTRUCTION

**MATERIALS** Remington Precision Personal Trimmer Model Mpt 3500, Zebra Z-Grip .7mm & Papermate Clear Point .9mm mechanical pencils, #24 chenille sewing needle, Elmer's epoxy, Plastruct Plastic Weld adhesive, disposable gloves, tape  
**TOOLS** Jeweler's saw, wire cutter, tweezers, utility knife

FOR USE ON LIGHT TO MEDIUM WEIGHT PAPERS



Finished Size: 4.75" L x 5/8" W; Weight: less than 1 oz (25g). Cost: \$20.00

<b>STEP 1</b> The Remington Precision Personal trimmer as purchased.	<b>STEP 2</b> Remove cover & razor blade. Pop tool halves apart with a thin tool.	<b>STEP 3</b> Discard cover plate and razor blade.	<b>STEP 4</b> Remove white plastic works & set aside. Cut back plate along inside ridge with jeweler's saw.	<b>STEP 5</b> Snap tool halves together. File cut edges smooth & level.	<b>STEP 6</b> Pop tool apart again. Replace works. Snap tool halves together.
<b>STEP 7</b> Disassemble lead pencils. Remove plastic sleeve from silver barrels. Keep barrels & Z-Grip plastic nose cone.	<b>STEP 8</b> Press arm down & trim to 3/8". Push .9mm barrel onto arm. Crimp end of barrel to arm with pliers for tight fit.	<b>STEP 9</b> Cut needle to 9/16" with wire cutters. Epoxy into silver barrel.	<b>STEP 10</b> Epoxy .7mm barrel into the nose cone. It should protrude 1/8".	<b>STEP 11</b> Place cone onto tool. Needle should protrude 1/32-1/16" from tip when arm is extended. Tape in place & test on paper.	<b>STEP 12</b> Tape cone to tool at back. Brush a line of Plastic Weld along front seam to bond. Let dry. Remove tape & repeat along back seam.

## PAPER PERFORATING PEN MODEL #2

### PHILLIPS NORELCO PRECISION TRIMMER

#### CONSTRUCTION

**MATERIALS** Philips Norelco Precision Trimmer Model NT 9130, Zebra Z-Grip .5mm & Papermate Clear Point .9mm mechanical pencils, #24 chenille sewing needle, Elmer's epoxy, Plastruct Plastic Weld adhesive, disposable gloves, tape  
**TOOLS** Jeweler's saw, wire cutter, tweezers, utility knife

FOR USE ON MEDIUM TO HEAVY WEIGHT PAPER



Finished Size: 6" L x 3 3/8" W; Weight: 3.2 ozs (90g). Cost: \$25.00

<b>STEP 1</b> Twist off removable trimmer head.	<b>STEP 2</b> Pop head apart with pliers.	<b>STEP 3</b> Remove white parts & set aside. Measure 5/8" from widest point & mark.	<b>STEP 4</b> Cut halves along mark with jeweler's saw.	<b>STEP 5</b> Snap halves of head together. File cut edges smooth & level.	<b>STEP 6</b> Remove Z-Grip nose cone & silver barrels with plastic sleeves from pencils & set aside.
<b>STEP 7</b> Remove arm from works. Pare edges with knife until .9mm silver barrel can fit onto arm.	<b>STEP 8</b> Cut arm to protrude 1/4". Remove plastic sleeve from .9mm silver barrel & discard. Push silver barrel onto arm. Crimp at base with pliers.	<b>STEP 9</b> Re-assemble head. Cut sewing needle to 9/16". Put a drop of epoxy into tip of barrel. Insert needle & let dry.	<b>STEP 10</b> Epoxy .5mm silver barrel with plastic sleeve into nose cone. It should protrude 1/8".	<b>STEP 11</b> Place nose cone onto tool. Needle should protrude 1/32-1/16" from tip. Tape in place & test on paper.	<b>STEP 12</b> Tape cone to tool at back. Brush a line of Plastic Weld along seam in front to bond. Let dry. Remove tape & repeat along back seam.

**PERFORATING PENS: HOW TO USE THEM** In order to operate smoothly, perforating pens must be used on a cushioned cutting base. Four techniques for using the pens are presented below.

## CUTTING FILLS FOR LOSS COMPENSATION

<b>Mouse pad cutting base: nylon on rubber 9.5" x 8"</b>	<b>STEP 1</b> Working on a light table, place fill paper over loss. Trace outline larger than loss in pencil.	<b>STEP 2</b> Transfer tracing to mousepad. Draw with perforating pen inside pencil line. Pull apart perforated line to remove fill.
<b>Mouse pad cutting base paired with Hollytex polyester web</b>	<b>STEP 1</b> Working on a light table, place Hollytex over loss. Trace outline slightly larger in pencil.	<b>STEP 2</b> Place tracing on fill paper. Transfer to mousepad. Draw with perforating pen inside pencil line. Pull perforated lines apart to remove fill.
<b>TIP</b> Perforate a line from outline to paper edge. Begin fill separation there.		

<b>Polyester (5 mil) or vinyl film (8 or 40 mil) cutting base</b>	<b>STEP 1</b> Working on a light table, position vinyl or polyester sheet over loss. Place fill paper on top.	<b>STEP 2</b> Dampen paper with cotton swab. Draw with perforating pen around loss.	<b>STEP 3</b> Pull perforated lines apart to remove fill. For heavy weight papers dampen perforations with swab before separating.
		<b>TIP</b> When working on vinyl or polyester, hold pen at an angle. Use light pressure.	

## PERFORATING STRIPS FOR MENDING

	<b>LONG FIBERED PAPERS &amp; HEAT/SOLVENT SET TISSUES</b>
<b>Gaming control mouse pad cutting base: fabric on rubber base 15 3/4" x 12 5/8" sold for computer gaming</b>	Strips for mending can be made in advance, by drawing lines consecutively across a sheet of paper with a perforating pen & ruler. They can be pulled apart for use when needed. Sheets can be perforated in long strips or in a grid pattern. Varying the distance between the grid lines creates mending strips in a range of sizes ready to use. With heat/solvent set tissues, the punched edge gives the illusion of being feathered while keeping the adhesive on the verso intact. When applied with heat or solvent, the perforated edge is subtle & almost invisible.
	<b>TIP</b> To make narrow strips separate easily, fold punched lines before pulling apart.

**MORE USEFUL TIPS**

**SPEED** Holes are spaced farther apart the faster the pens are moved across the paper. The distance between holes determines the degree of feathering on the perforated edge.

**WATER or SOLVENT** Can be painted onto perforated lines to make tearing apart easier & to increase feathering. They can also be used to dampen paper before perforating, sometimes useful when working with Western style papers.

**PRESSURE** The pens work best using light pressure.

**STROKE** A series of small closely spaced strokes or zig-zags can be also be used to perforate paper.

**GRAIN DIRECTION** For machine-made long fibered tissues, it is easier to separate perforated lines if they are drawn parallel with grain.

**SHUT DOWN!** Turn pens on & off several times & needle will retract fully into nose cone.

**SHARPENING** Should needle become dull, it can be sharpened using the emery-filled strawberry on a tomato pincushion.

**TROUBLESHOOTING: PEN CATCHES IN PAPER**

**NEEDLE LENGTH** The needle is too long. Elmer's epoxy can be softened in ethyl & Isopropyl alcohols. Remove needle & file end to shorten. There should be 15/16" between base of arm to tip of needle when arm is fully extended.

**NOSE CONE** The nose cone is tilted. The needle must be positioned so the tip is centered in the nose cone as it travels in & out. File tool where it meets cone to make join level.

**BATTERY** The tool will slow as battery loses power, sometimes catching in the paper. Replace battery.

**PEN MODEL** Check that the pen is matched to the paper thickness. Switch to the more powerful pen for medium to heavy paper.

**LOOSE PART** The plastic parts of the tool cannot be bonded with adhesive. The tool has been designed so that the plastic & metal parts are held together by friction.