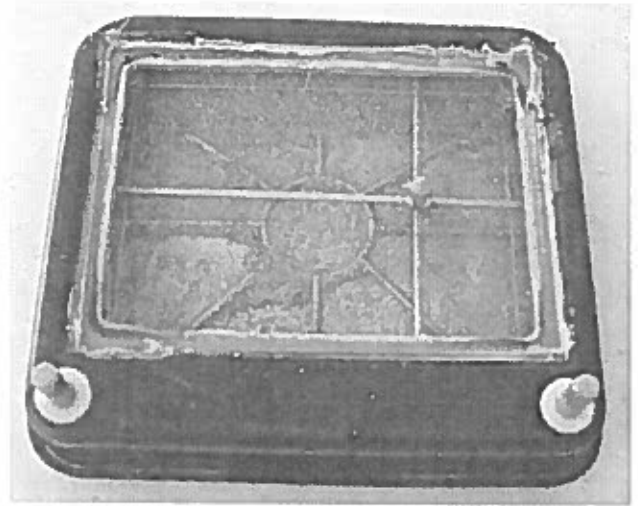
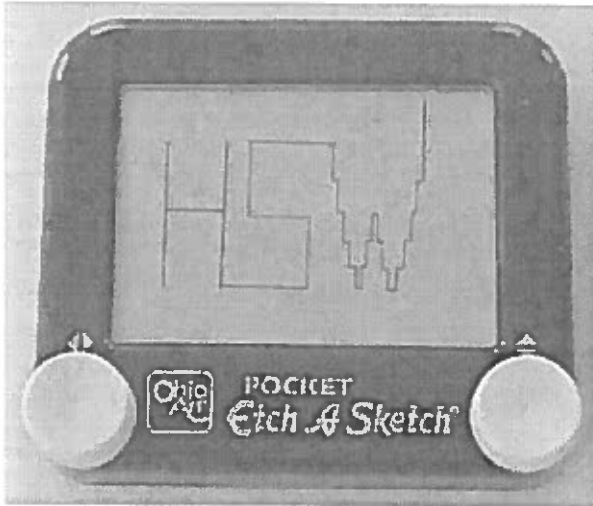


## HOW STUFF WORKS: Inside an Etch-a-Sketch

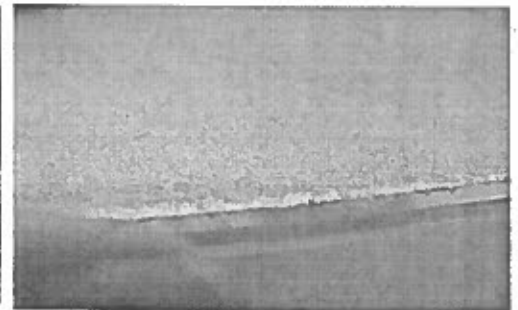
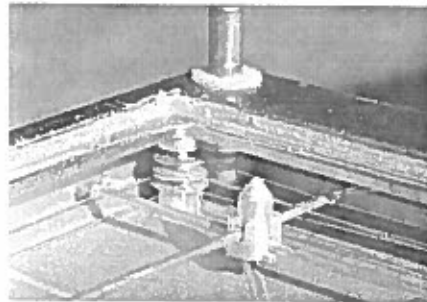
The Etch-a-Sketch drawing toy has been popular with several generations of children -- and it's a pretty amazing device. We cracked one open to see what was inside.



An Etch-a-Sketch® is actually a pretty amazing device! It is essentially a manually operated plotter with a built-in erasing system. Anyone who has used an Etch-a-Sketch before will recognize the familiar red plastic toy with the glass drawing window (now also available in other fashion colors).

It is not easy, but you can get inside by removing the outer case and the glass.

What you find inside is a stylus mounted on a pair of orthogonal rails. These rails move when you turn the knobs. Also inside is a mixture of extremely fine aluminum powder and beads. The beads help the powder to flow evenly.



When you turn the Etch-a-Sketch upside down and shake, it coats the inside face of the glass with aluminum powder.

An obvious question, prior to playing with this powder, is, "Why does the aluminum powder stick to the glass?" After you play with the powder, you know that the answer is, "Because it sticks to EVERYTHING!" It is amazing stuff! Notice how it has coated every single surface on the interior of the Etch-a-Sketch in this photo. Here, you can also see the key to the Etch-a-Sketch mechanism -- tightly strung and very thin steel wire that connects the knobs to the horizontal and vertical bars through a pretty complicated pulley system. The wires connect the ends of each bar to their respective knobs.

When you turn a knob, it moves its bar, and this moves the stylus. The stylus scratches off the aluminum dust coating the glass to create a line on the screen.

