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RESTORATION OF ERADICATED SERIAL NUMBERS BY AN INEXPENSIVE ELECTRO-ACID-ETCH METHOD

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The author holds the position of Chief Technician in the laboratory of the Investigation Division, Indiana State Police. He has held this post for the last ten years and has been a member of the State Police for fifteen years. His special fields of interest in the laboratory include microscopic examinations, chemical analyses, and firearms investigations and identifications.—Error

The use of electricity in the restoration of eradicated serial numbers in metal has been suggested as a means of speeding up the acid-etch method. Some of the equipment that has been suggested is rather expensive (1, 2, 3). A simple, inexpensive method is described in this article which is easily within the most limited budget, and it is just as efficient as more expensive equipment.

The problems facing the police investigators where the method is used are varied. The usual problems are the identification of guns, typewriters, calculating machines, any kind of tool or instrument which is identified by a serial number in stamped metal. Thieves who steal such equipment frequently eradicate the serial number by grinding or filing away the part of the surrounding metal so the equipment cannot be traced through the number and identified.

The act of stamping the numbers in the metal changes its structure beneath the surface of the metal depressed by the die. Treatment of the metal so altered enables the investigator to reproduce the stamped number so that it becomes visible again. However, before such treatment is initiated, it is necessary to prepare the metal surface.

The scratches left by the eradication must be carefully removed by using abrasive materials such as sandpaper and emery cloth. Remove only enough metal to eliminate the scratches; start with the finest abrasive that is practical and as the depth of the scratches is reduced, use successively finer abrasives until the metal surface is actually being polished. The more level, smooth, and highly polished and mirror-like the surface, the more successful the restoration.

After all scratches have been removed and the surface of the metal highly polished, the etching process is started. The best etching solution for steel is 50% hydrochloric acid with 5 gms. of cupric ammonium chloride added for each 100 ml. of solution. This solution is stable and may be kept indefinitely in glass containers with glass stoppers. To prepare 50% hydrochloric acid, add one volume of concentrated hydrochloric acid to an equal volume of water. (Always add acid to water *never* add water to acid.)

The etching solution may be applied with a cotton swab attached to a glass rod or a wooden stick. The etching will be speeded up, and better definition will be obtained, if an electric current is permitted to flow through the etching fluid. An ordinary flashlight battery may be used to supply the electrical current. Solder an alligator

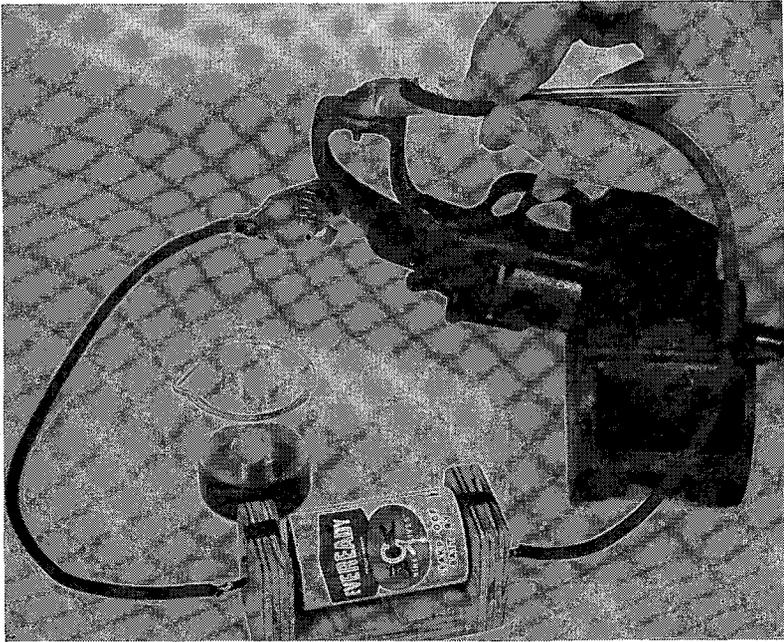


Figure 1

clamp to a piece of wire about 12 inches long, this wire will ground the circuit to the metal to be etched. The ground wire goes to the positive pole of the battery. Another wire about 12 inches long is attached to the cotton swab by enmeshing it in the fibers; this wire completes the circuit by being connected to the negative pole of the battery, and the current will flow when the swab is touched to the metal (figure 1). The cotton swab is dipped in the etching solution and then gently rubbed over the polished metal. The speed of etching can be controlled by varying the position of the wire on the cotton swab. Faster etching may be produced by placing the wire near the end of the swab close to the metal being etched, and slower etching is effected by placing the wire on the end of the swab away from the metal being etched. Stopping the movement of the swab across the metal will cause pitting and is to be avoided. Slow, steady strokes across the metal as if one were painting with a light brush will produce the best results. If too much metal has not been removed, the numbers will become visible as the less dense parts of metal are etched, leaving the numbers more shiny and slightly raised above the surface. Usually a few minutes is enough to restore the numbers.

If by chance the poles of the battery are reversed, and electroplating of copper occurs on the metal being etched. The appearance of such a metal coating is a signal to reverse the poles of the battery.

Tests on metals other than steel should be made before using the etching solution described. It might etch too rapidly. The solution may be diluted by adding water slowly while stirring. Frequent tests will indicate the proper strength for the metal being etched. Make tests on portions of the same piece of metal bearing the serial number but not at the location of the serial number.

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