

## 001-Keypunch restoration report 2-14-2024

In my last report the 001 keypunch was punching holes, but the escapement was not functioning correctly. The escapement should move the card one column per hole punch, move the card one column when Skip (S) is activated, and move the card to column 80 when Release (R) is activated.

There was an additional confusion around a special escapement action based on pressing the minus key, which in addition to punching a hole in the 11 zone, sets a mechanical toggle that can activate the escapement.



11 punch with X label



11 punch with minus label

Thanks to documents located at the IBM Hursley location we have two documents which helped resolve the minus function.

### MACHINE METHODS OF ACCOUNTING

A good history of the development of keypunch machines describes incremental improvements in the human factors of key punching, including keypunches 001, 011, 012, 015, 016, and 031.

This document was the first we found that describes the strange function of the minus key. In older machines this minus key, which is labeled X, can cause the escapement to skip a preset number of spaces (like the tab key in a typewriter).

## IBM-011 ELECTRIC PUNCH SERVICE MANUAL

This document is the best we have so far as an aid to restoring our 001 generation of punches. An electric punch motorizes the actual punch mechanics and converts the keyboard into key switches. Much of the escapement of the 011 is the same as the 001.

This photo is the escapement control portions of one of our verifier machines.



This silver bar at an angle is the skip bar, and is out of place in this image, in normal use it is vertical and goes under portions of the escapement. This bar is also used to connect the Release function key to the escapement. The bottom end of the skip bar is attached to the skip toggle hardware which is activated by the 11 zone punch.

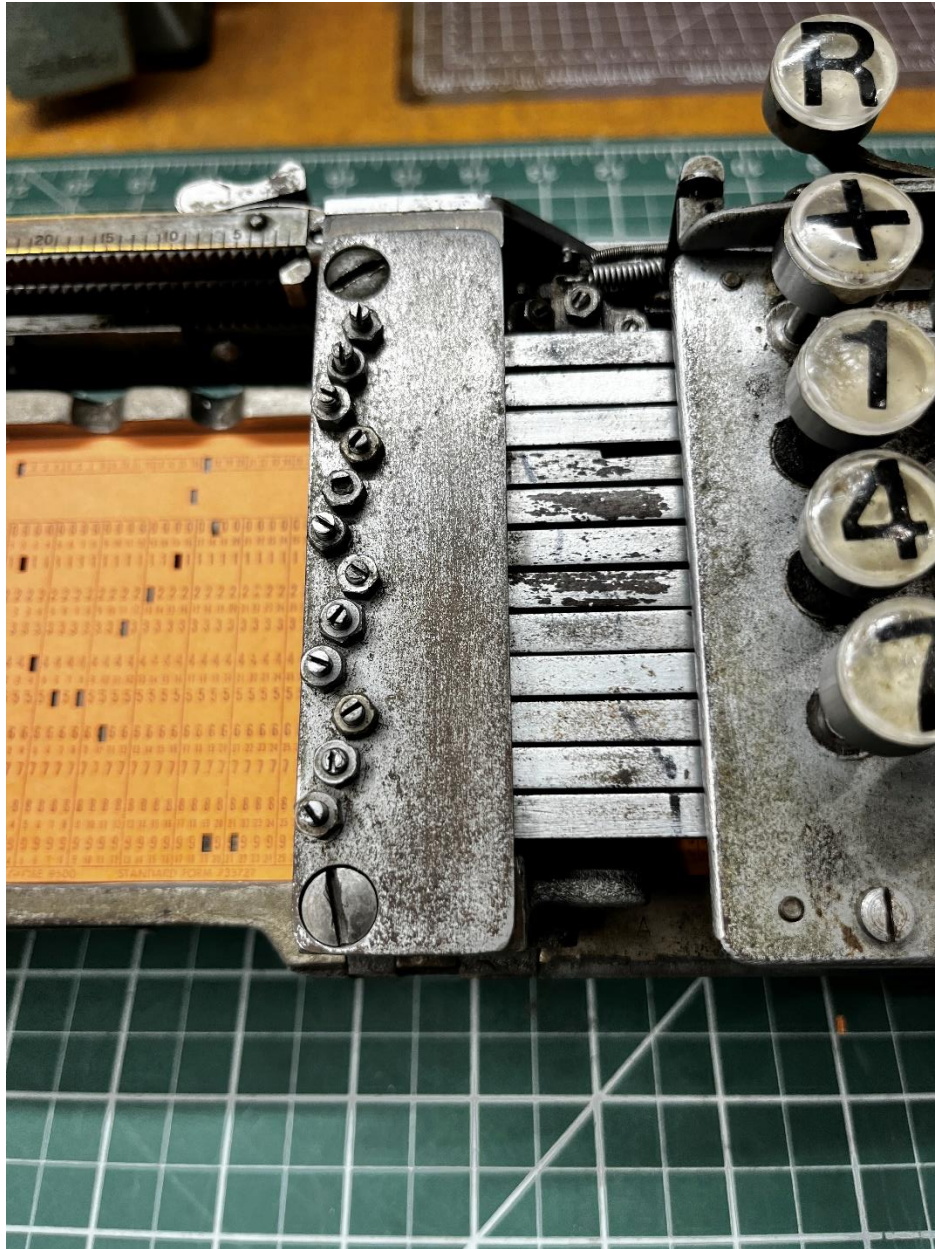
The skip bar in the 001 keypunch was broken and is marginally long enough to activate the escapement. The design point is that the entire right side of the bar should connect the escapement control hardware with the actual escapement pawl.



The longer skip bar (from the verifier) is now installed in the 001 keypunch and has resolved the issues with intermittent and failing escapement motion.

The service manual for the 011 electric punch does not cover the adjustment procedure for the individual punches in a 001 machine, because it uses an interposer method of selecting which punch to activate.

The 001 punch has an individual height adjustment for each of the 12 punches, shown here with lock nuts in groups of 3. My idea was to use the card as a feeler gauge and adjust each fulcrum so that the punch is just above the card.



This week I brought the machine into CHM and reviewed its operation with Frank, prior to returning it to the demo room. The device works but there is a small jumping motion of the card as it moves

after each punch, which is not normal. This week I will try to find an alternate adjustment method that eliminates this motion.

John