

CHAPTER III

REBUILDING THE KEYBOARD ADJUSTING TOUCH OF THE KEYBOARD MISCELLANEOUS KEYBOARD QUESTIONS

Rebuilding the Keyboard

QUESTION: Can you tell me how to go about rebuilding a keyboard? The boss is talking of buying a new machine, but the old one is adequate for us. The only difficulty is that we have lots of trouble on the keyboard. I maintain that even if it costs several hundred dollars for parts, it is far cheaper to rebuild the keyboard than to buy a new machine. — P. C., Crowley, La.

LOOMIS: How right you are. If it does take considerable money, it will be money well invested. Linecasting machines don't wear out, and if by a judicious selection of new parts and some careful work you can rebuild the keyboard in good shape, you can stave off buying another machine that much longer.

In rebuilding linecasting machines for Minneapolis' biggest used printing-machinery dealers for many years, I learned something about keyboard parts.

In the first place, of course in a small shop you cannot tear a keyboard down, order the parts, and sit around sorting mats until the parts come in. It may be months. So while you are thoroughly cleaning the keyboard, make careful note of all parts needed. As soon as the keyboard is back together, order the parts. When they come, put them away carefully. Six months or a year later you will get a chance to clean the keyboard again. Then you can do the actual job of rebuilding.

Examine the key levers. On the inner tip, on the end opposite the key-button, you will often find notches worn up to 1/16" square or more. I make careful note of these key levers. (The shortest ones are called the first bank, and so on, but I always note them by the letters they control.) In reassembling I put the worn levers on the far right, and try to keep all good levers in the first three rows and in any spots of constant use. You will then need to switch the keybuttons. You can remove them with a pair of keybutton pliers, or an ordinary pair of pliers if you need to. In using ordinary pliers, pad the key-button on top with a piece of chipboard, grasp the button firmly at one side, and rock it front to back. When you put it on the other key lever, use the pliers again, and also pad it again. This time you will have the bottom jaw of

the pliers under the key lever, and squeeze it on. Then see that the edge of the key lever is not burred. (You *can* push the buttons onto the key levers when they are in place in the keyboard without the pliers — just your fingers — but you'll be sorry. The key levers will bend and cause doubles later on.) If any keybuttons split, make a note of them also.

If the fulcrum rods are well grooved, you can shift them around to present new surfaces to the key levers. If they have been moved too many times already, make a note to order new ones.

Now examine the keybars or weights. Sometimes you will find them badly worn in the notches where the key levers fit. You can switch these around too, to present new surfaces to the key levers, unless they are the old style with only one notch in each. But note how you come out. If you have to use some in the worn notches, make a note of the letters affected.

Note if you need new guides for the weights.

If the banking bar is badly beaten up, a new one doesn't cost too much.

Now let's look at the cams and cam frames.

If the tips of the stop strips look worn, I would get new ones, especially if the old one are the thin kind (in that case, they've earned their cost already).

Always get new trigger wires and cam yoke wires. At two for a quarter (pre-inflation price) it's the cheapest keyboard insurance there is.

Occasionally you will find a trigger worn on one end or the other. Put it in some little used channel and make a note.

If you want to do a good job, examine the cams. Where the teeth are worn down pretty smooth, order new cams and yokes, assembled. Where only the stop pins are worn, order those. (See page 17 for suggestions on repairing these.) Where the pivot hole in the cam is worn so there is excessive movement, order cam and yoke assembled. Be especially critical of the spaceband cam. On machines that have the spaceband cam a little larger, it is well to have an extra new one always. Also examine the stop strip at this point.

Examine the spaceband keyrod. If it is beaten down at the point where it comes to rest, order a new one. If the upper hole is worn out of shape, it is a good idea to replace it.

Examine the keyrod lower guide. If some of the slots are badly worn, I'd replace the guide.

On machines of the Model 5 type, you will often find the keyrods chewed up where they come down on the verges. These need replacing. See page 41 and 48.

On Models 8 and 14 it is seldom the keyrods but more often the goosenecks. Test them as advised on page 43, and in addition note replacements for any that are bent or twisted. It is good to have half a dozen on hand, for once in a while a gooseneck gets caught when you are changing magazines.

The verge rack, if very old, may have to be rebuilt also to bring the machine up to first-class assembly condition. Proceed as suggested on pages 7-8. Replace verges that have worn holes or gouges made by keyrod or plunger. Replace gouged pawls made by mats' striking them. This is not usually too expensive; it is work — tedious, painstaking work — that is required here.

Now send in your order for the parts you will need. Ordinarily it won't require much of anything but key levers and keyrods. Some old keyboards have a very bad set of cams, but it will run into money to replace them all. If the shop won't stand it, do your best for the first three rows, and the quads, comma, period, figures, first two rows of caps, and the dash.

Adjusting the Touch on a Keyboard

QUESTION: I have heard there are ways to make the touch lighter on a keyboard. Can you tell me how to do this? — A. G., Mason City, Ia.

LOOMIS: Yes, the old-time piece operators can tell you how — and I will. On most machines there used to be a thin and narrow strip of metal below the keybars or weights; this was about the size of a keyrod and was dropped into the brackets before the weights were put in. I am not sure what its purpose was, but the first catalog I find it in, is for Models 16 and 17, and there it is called a keybar guard. The old-timers would get 18 or 24-point thin spaces (somewhere from two to six points thick) and put one under the guard at each bracket. This would have the effect of raising the weights a little, thus requiring less movement of the keybutton.

On a machine with the parts in good shape, this would help, but on a machine that's maybe forty years old, I doubt it. However, it's easy to try, and nothing will be hurt whether it works or not. You may get a lot of doubles.

I have come to the conclusion that a heavy touch is to quite an extent due to worn parts working against each other, as at the end of the key lever where it fits into the keybar. The loss of metal at these points requires a longer and often a harder stroke because you have actually to jar the cam yoke into action. Also, the rust that usually is present at these points makes the parts work harder against each other.

Therefore a lightening of the "touch" of the keyboard is most effective after you have rebuilt the keyboard as outlined in Chapter II. Let us suppose you have done that. Now I can tell you how to achieve a perfect touch. For this knowledge I am indebted to Frank Phillips of the Teletypesetter Corporation. (At the time he showed me this, he was installing two teletypesetters in a shop where I worked, but he is now manager of the Chicago branch.)

It is easier to do this with the keyboard off the machine, but not essential.

Take off the back cam frame; have the front cam frame in place. Prop up the keyboard and take off the banking bar. Knock the dowel pins all the way

out of the banking bar. Put the bar back in place and see that the keyboard is fairly level.

Get six 2-point leads twenty-five or thirty picas long. Face the keyboard from the back. Now lift the weights at the left end and put one lead on top of the banking bar and up against the weights in their notches. Let the weights down on the lead. Do the same at the right end. You have now raised the weights two points at each end.

Turn the front rubber roll shaft away from you (anti-clockwise). None of the cam yokes should drop. Increase the two points to four. Try the roll. Approximately half the yokes should turn over (counting only those supported by the leads, of course). Increase the four points to six. Try the roll. Now all of the yokes should drop and all cams turn over.

But let's say, with two points under, that some of the cams turn. Then the banking bar is too high. Tap it down a little and try again. Sometimes you have to file out the screw-holes in the ends to get a full adjustment.

If, with six points, not all cams turn, then, if it is not the fault of the individual cams, the banking bar is too low. Tap it up.

Note that you do not touch the keybuttons. You merely turn the rubber roll. The crucial stage is the 4-point lift. Count the raised weights and count the cams that are tripped. The cams should be very near half the weights — on each end.

When you get it exactly right, be sure the banking bar is tight. Then drill new holes for the pins and dowel it back in place (this is where you need to have the keyboard off of the machine).

For a double check, try the leads again. You will find this can be a very touchy setting, but, once set, it will stay. Be sure both ends are alike. Try the cams a number of times. When you are satisfied, put on the back cam frame and see if you get the same result. I have not encountered one where the cam frames differed substantially, but I suppose if one should, he would have to move the cam frame up or down a little in the same manner.

To Replace a Single Keyrod

QUESTION in *The Graphic Arts Monthly*: Will you be kind enough to detail operations necessary to remove a keyrod on a Model 5 and put in a new one without taking all the keyrods off? — L. E., Kalispell, Mont.

This situation does not occur too often, but it causes worry when it does happen. Therefore it is worth putting down here:

1. Lock and remove the magazine.
2. Elevate the keyrods to clear the verges with lever at the right above the keyboard.

3. Release and push back the verge rack to separate completely the rods and the verges.
4. Remove verge rack (one screw in each end).
5. Remove the detaining bar that keeps the keyrds in their upper guide-plate slots.
6. Remove the spring at lower end of the keyrod.
7. By slightly warping and manipulating, plus a slight loosening of the two screws that hold the lower keyrod guide-plate (but be careful—this is touchy!) you will be able to raise the keyrod out of the lower plate. It can be twisted a little to clear the keyrod elevator bar.
8. Be sure the new keyrod is the correct length. You may have a Model 1 keyrod.
9. Remove the spring hook and attach it in the same position on the new keyrod. Reverse your warping and manipulation and insert the keyrod first above, then below. Replace the spring. Tighten the screws. Replace the upper detaining bar. Replace verge rack. Move keyrod assembly back over the verges. Lower the keyrds. Replace and unlock magazine.

This general type of procedure applies to all machines without the keyrds in a frame which lifts out as a unit.

Thin Mats in Split Magazines

QUESTION in *The Graphic Arts Monthly*: What causes thin mats to hang up in the $\frac{1}{2}$ -split channel? They seem to hang and overlap, but I have not yet worked out the remedy. I will appreciate your suggestions.

HARDING: The split magazine was made for display mats and will give trouble when thin mats are used without alteration of the magazine channels at the top of the lower magazine. This must be done by a repair house. You may have to trade your split magazine for a standard magazine.

Auxiliary Magazines

QUESTION in *The Graphic Arts Monthly*: We have trouble with the distributor and escapement when using the auxiliary magazine on our Model 14 Linotype. Do you have any suggestions that will help?—F. H., Madison, Minn.

HARDING: Your letter presents a common problem. Some mechanical devices give trouble because of continued use without proper care while others develop trouble because they are not used enough to keep them in working condition. Your auxiliary falls in the latter category.

Because auxiliary equipment generally handles large and heavy mats, and because it is not used much, comparatively speaking, and so does not suffer from wear as does the main keyboard, it will operate for a long time rather dependably, even though the magazines seem to gather more dirt, and the entire mechanism gets much less care. But trouble shows up when a font of ordinary sized mats is run into it, for the smaller mats do not have enough weight to overcome the resistance offered by dirt.

Certain routine care is advisable. Get a channel entrance cleaning brush and use carbon tetrachloride to polish the channel entrances. The manufacturers have such a brush, or you can get a small round brush from a creamery.

Brush out both top and bottom magazines as advised in *Cleaning the Magazine*, page 31.

Here you can squirt a little high-test gasoline and graphite into the verge rack also. On the old style "punchboards," you will note many of the keyrods have double springs. Be sure they pull the keyrods back down. Check verge springs. Try the keyrods with pliers. From the plungers on up, all the suggestions under *Keyboard Troubles* in Chapter I apply.

If a single-keyboard machine, all suggestions applying to the keyboard proper are applicable.

Note the lugs on the backs of the auxiliary keyrods under which the bail box levers rest. See that the bail box levers are not slipping from beneath these lugs. Check also the lugs on the main keyrods that operate the bail box levers.

Examine matrices for damage.

LOOMIS: I have had some interesting experiences with these auxiliaries. In the course of maintenance and later in rebuilding, I tried many things to improve assembly from them. I took one apart and emiered the parts and graphited them, and saw that every part worked perfectly, but the result was no improvement. I took this same one apart a number of times without any better outcome.

My final experiment was to remove the box containing the auxiliary levers (a small box, on the punchboards — a long box called the coffin or bail box, on single-keyboard machines) and dunk it thoroughly in kerosene. Let it drain for a day or two, wipe off the surplus with care, so it won't be dripping on your clothes and your copy, and put it back. This worked better than anything else. But on the punchboards I have improved things by squirting the keyboard mechanism liberally with gasoline and graphite (always high-test white gasoline) and wipe off the surplus. Even though this is essentially messy, you don't have to do it messily.

To Remove the Bail Box

There are two rounded-head bolts and a dowel pin at each end. Also at the right end are six semi-circular holes through which you can thrust cam frame wires to lock the levers. Take off the distributor driving belt and the grease cup. Then loosen the screws, pull the box from the pins, and slide it out. That wasn't hard, was it?

Much Trouble May Come from Lack of Alignment

The day before I wrote this, it was called to my attention in the shop where I care for the machines, that a certain letter in an old style auxiliary never had dropped dependably, and was that day worse than usual. The mat just stopped. The operator could pull it down with a touch of the hook, but it wouldn't come down alone.

I took a couple of hours, got a light, and went into it. Wound up with the escapement cover off. The mat acted as if the magazine had been cleaned with something that had left a residue. But I had just polished it with carbon tet. Got a pair of tweezers and pushed the mat slowly up and down at the exact spot where it stopped.

Finally discovered the channel in the verge rack was not exactly parallel with the channel in the magazine. When the mat made the slight turn, the ears would bind. We thinned down the toes of a mat, and it went through fine. We filed them all down rather than butcher the verge block. Since then I have recalled others that have acted that way, over the years, and I wonder if a lack of perfect alignment may be the answer to a lot of them.

Warped or Sprung Magazines; Taking a Magazine Apart

QUESTION: One of the magazines for our Model 5 fell off the wall during the night, and now we are having trouble with it. Mats in the figure section don't seem to drop — and we have tried everything. — C. B., Gettysburg, S. D.

LOOMIS: If this trouble originated abruptly after the fall, and if you have checked everything else, it is entirely possible your magazine is sprung or warped. A magazine falling on a corner will take a permanent wave that interferes with assembly.

First, take two long pieces of strip material; lay them flat on a stone and push their bottoms together. If they are straight, there won't be any crack between them. Turn one over, end for end, and try them again. If there is still no crack, you probably have a couple of straight pieces.

Use one of them to try the magazine. If a magazine is really sprung, it is generally quite obvious when you put a straight-edge on it. If it is noticeably bowed, there's not much you can do. You may try loosening the magazine screws a little, but if this doesn't work, you're probably stuck for a new magazine. As far as I know, they cannot be repaired. I have had them apart and tried to

take out the kink in the top or bottom plate, but without success. When you get it out one place, it appears in another.

This also can happen in a fire, when a magazine gets hot and water is thrown on it. And sometimes a magazine that goes through a fire will look all right but will have "lost its temper" — will be soft.

Minor bends in a magazine plate can be remedied. Let's say you are hanging up a magazine and you bounce it against a nail and bend in the first section at the top of the magazine. Get a Hempel quoin and file the sides smooth. It will just fit in a magazine. Now get a long piece of $\frac{1}{4}$ " rod and square one end to fit the quoin. You can maneuver the quoin and expand it and do a pretty good job of minor straightening. You will have to expand almost to the limit of the quoin to do any good, and you may pop off a few screw-heads, but there are times when this is a life-saver.

If somebody else takes a magazine apart, you may want to know how to put it back together. Start at the bottom. Put in the screws in the bottom row. Now, at the top, spread the plates far enough to slide the short dividers into the grooves. Push them down with the handle of the magazine brush. More screws. More dividers. The dividers with the holes should have the holes lined up with the holes in the magazine. When you get all through, tighten all around two or three times — but be careful with the screws in the middle; they're fragile.

To Take a Burr From a Magazine Channel

HARDING: If somebody gets this careless, first sentence him to three days' sorting leads and slugs, then get a thin warding file that will go into the channel, grind it .762" wide to fit the channel from top to bottom, have a $\frac{1}{4}$ " rod welded to one end, and proceed cautiously to smooth out the burr. William Reid & Co. has a set of broaches (three sizes) for this job, but Chicago may be a long way from you, while press-day is just around the corner.

Taking All Magazines Off of an Old Style 8

QUESTION: Is it possible to take all the magazines off our Model 8? The bottom magazine has not been cleaned since the machine was installed.— M. S. T., Wheatland, Wyo.

LOOMIS: In tests from coast to coast, this question ranked No. 1 among those who know their back squirts best! It is indeed asked more than any other. Most m-o's have discovered it is wise to run the 14-point in the bottom magazine, because it is not affected so much by dirt. But the answer to cleaning is: yes — and it isn't too hard when you know what to do.

On the old style 8's — those with fixed side-pieces to hold the verge rack — you must take off all magazines to get the bottom one off. It *has* been done otherwise by experienced and dextrous machinists, but that is nothing for an m-o to try. He hasn't enough arms.

First, lock all magazines. There are openings in the right-hand side-piece for the middle and bottom one.

Next, go around to the back, up on the step. Pull the channel entrance down. At right and at left of the magazines you will see two gibs. They are flat pieces of metal about $\frac{1}{2}$ " wide and about 4" long, and each has four screws holding it down. The left one has a shallow notch in one edge. With somebody to maneuver the magazines up and down so you can reach these eight screws, take off the gibs.

Now run the top magazine into position. Take off the flat bar across the top, if there is one, then pull the arms down and lift off the magazine.

Move the arms to the second frame. Take off the top frame — it lifts out. Take off the top verge rack. Mark both of these with a "T", and also the magazine.

Run the middle magazine into position. Pull down the arms. Take it off. Mark it "M". Lift off the frame. Take out the verge rack. Mark them all with "M".

Now you can lift out the bottom magazine — it's easier with help — and then you can hold the verge rack while somebody loosens the two big slotted-head bolts that hold the right-hand side-piece, enough so you can lift out the verge rack.

When everything is clean, reverse operations. Get the bottom verge rack in first and tighten the side-piece. Then the bottom magazine, and be sure the copper magazine clamps at the top go into their proper places under the magazine.

The top frame, if you get them mixed up, is the one with the most knobs along the sides. The gibs go on last, and there is a right and wrong to them. If you don't make sure the holes are lined up first, you may get three screws in and have quite a tussle with the last — and lose. Watch the notch in the left one; it coincides with a notch in the guide to which it is screwed.

NOTE: It is possible to take out the middle verge rack without removing the top frame or even the top magazine. Lock the top magazine and raise it with the arms. Take out the top verge rack. Lower the magazine. Lock the middle magazine and run it into position. There are a couple of long fingers that stick up from the frame of the machine, one on each side about two thirds of the way to the top of the magazine. Pull these forward under the appropriate knobs on the middle frame. Lower the magazine slowly, allowing the fingers to push up the magazine frame. Presently you can reach in and take out the middle verge rack.

You need to be careful with this, but you'll find it sometimes saves a lot of time when a verge spring breaks on the middle rack.

DAMAGED MATS

LOOMIS: There are many questions asked about damage to mats. Let us give here a consensus:

Lower front toe has burr on left side: This is caused by the toe's hitting the glass as it comes out of the magazine. Install a pressboard or tin buffer. This may also be caused by hitting on the small assembler entrance cover.

A mark just above the lower front toe, on the left corner only: This is a frequent occurrence. Obviously happens in line delivery, either from the delivery channel aligning piece, a sharp corner or burr on the delivery channel (if solid, as on Intertype), or a first elevator duplex rail that projects out too far.

Toes damaged when casting short measure: This is caused by the last mat creeping up, because on short measure the line is often snug; it indicates a worn back jaw.

Upper side of lower front toe is sheared: This suggests a bent duplex rail and perhaps a sluggish vise automatic.

A deep dent on the casting side, just above and below the light-face die: This indicates a squabbled line. The mat was locked up out of square, and you're lucky you didn't have a squirt; it must have straightened out before the cast. This might be caused by damaged or improperly set elevator jaws, burrs in the jaws, interference from the duplex rail. Recurring squabbled lines call for careful examination.

Back toe (casting side) clipped off on top: The first elevator does not drop far enough in seating. End mat on a tight line was forced up.

The top of the lower back toe shaved off minutely: Probably indicates a sloppy back jaw, providing all the mats are not that way. If all are, the first elevator is seating a tiny bit too high.

Bottom corner of a back toe sheared: The first elevator seats too low.

A dent across the middle of the back toe: A double-black lockup.

This may also be caused by hitting on the small assembler entrance cover.

Tops of ears bent forward or scraped: Usually indicates faulty lifting of the mat onto the distributor bar. The mat lift may be set too low or may not be working right.

Burrs on the left-hand side of the teeth: These should be removed with care. A mat drops from its topmost tooth, so this one should be in good shape. On Models G and H Intertypes, however, the mat falls from all teeth at once.

A bright mark on the index side above the letter, all the way across: Probably the mat guard, between the two front screws, is set in too far.

Brass dust around the mat lift: This generally means the distributor box is set too high, so the top of the back ear of each mat is forced against the brass strip in the distributor bar while the mat is still riding the level space at the end of the distributor box rails.

A rather deep and sharp dent in the right side wall: Generally does not happen often; another mat hit it in the assembling elevator.

The back lower toe gets the most wear: The mat measures .750" across the toes in the beginning. Any mat that wears down to .730" should be discarded. Otherwise it will jump up on the lands between partitions of the magazine, or ride the magazine lands on its body and therefore fail to respond promptly to the escapement.

Do not use a mat file promiscuously: It is only for removal of actual burrs. Thinned toes cause trouble in the escapement.

Thin mats especially, or small sizes, may double up in the channels if their toes are thinned.

Remember: A sloppy back jaw or sloppy fit can produce a lot of different marks, for it allows mats to jump up out of their proper position.

Installing a New Font of Mats

From a leaflet by the MERGENTHALER LINOTYPE COMPANY: A full font of mats now is worth around \$500, so you can afford to use great care in installing them.

Magazine should be thoroughly cleaned.

Spacebands which are rounded, damaged, kinked, or have metal adhesion, should be discarded. (LOOMIS: I recommend a new set of bands for most country shops.)

The forward thrust of the mold disk must be properly set.

The pot lockup must be correct.

The elevator seating adjustment must be held within .010".

See that the mold disk retracts between justifications, the first elevator rises, and the pot itself recedes.

Line delivery channels should be checked for smoothness and correct setting.

First elevator jaws and duplex rails must be in good shape, square, and snug.

Have the vise jaws reground.

Set the pump stop lever.

Replace first elevator link eyebolts and pins if worn.

Oil in any form on front and back mold wipers will cause metal to collect on the side of the matrix and result in hairlines. (LOOMIS: This is where I disagree. It will do this if it reaches the mats, but I have found to my own satisfaction that it can be so used that it will not reach the mats, at least on the back wiper and perhaps on the front wiper, with resultant good to the molds — which also are expensive.)

Do not use oil on plungers or in remelting. (LOOMIS: I agree.)

LINECASTING OPERATOR-MACHINIST

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