



## Customer Engineering Reference Manual Preventive Maintenance and Adjustments

### CARD VERIFIER Type 56

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# CARD VERIFIER

## Type 56

THIS MANUAL condenses and revises Type 56 adjustments previously published. Preventive maintenance and servicing hints are included in each machine subdivision.

Most of the base adjustments of the Types 24-26 and 56 are identical. To conserve space in this manual, identical items are referred back to the Type 24-26 Reference Manual, form 22-8941-0. If a difference exists between adjustments, the Type 56 procedure is set forth here in its entirety.

The usefulness of IBM equipment is increased by an effective preventive maintenance program. Keeping machines abreast of current engineering changes is almost as important as cleaning and lubricating. These changes contribute to customer usage by improving machine features. Less service time and increased machine life result from the installation of improved parts.

### BASE

Base adjustments to be found in the Type 24-26 reference manual are:

- Card lever and switch
- Card lever pressure finger
- Card pusher hood plate
- Pressure rolls
- Program sensing mechanism
- Program drum interlock arm
- Escapement magnet
- Friction drive
- Pressure rails
- Stacker unit
- Reduction drive
- Pin sensing unit
- Eject unit

### Card Registration

Registration starts with moving the card from under the top rail and, for the detail card, continues until column 80 is processed and notched. From column 1 through column 80, registration on the verifier is not critical because the verifying pins can read the detail card throughout a variation in card placement of plus or minus .020".

Feeding the card into the feed

wheels then becomes most important. Cards should not be left under the top rail for long periods because they become curved and will not snap off the aligner fingers.

The most satisfactory operation of the aligner fingers is obtained when they travel .040" or less ahead of the rail. Greater force than this merely throws the card into the front pressure rails. Keeping the left pressure rail in the detail station to its low limit of adjustment (23 grams to move away from the card) will also help snap the card off the aligner fingers.

Multiple punch a card in column 12. Adjust the card pusher arm in the same manner as the Type 24, using the scribed line in column 12 as a guide. The card should be registered so that the line on the verifying frame evenly divides the holes in column 12. The line can be used any time throughout verification for a check on registration. The card pusher pad should not grip the card and is adjusted the same as on the Type 24 punch.

### Program Cam Contacts

This adjustment is affected by the forked arm adjustment and must be remade each time the forked arm is changed. If the column indicator dial has the program cam mounting screw head on the outside of the dial, the cam may be moved to compensate for the forked arm adjustment.

Although the timings are given in card columns, the adjustments are made and checked with the escape wheel teeth. Each tooth is as long as the width of a card column (.087"). The usual cause for skipping past column 81 is the adjustment of the 12 program contact.

1. The stationary contacts should have a minimum of 15 grams tension against their supports. The operating straps should be tensioned toward the N/C contact with enough tension to cause .005" to .025" rise. Avoid tension that would cause the operating strap to touch the support strap.

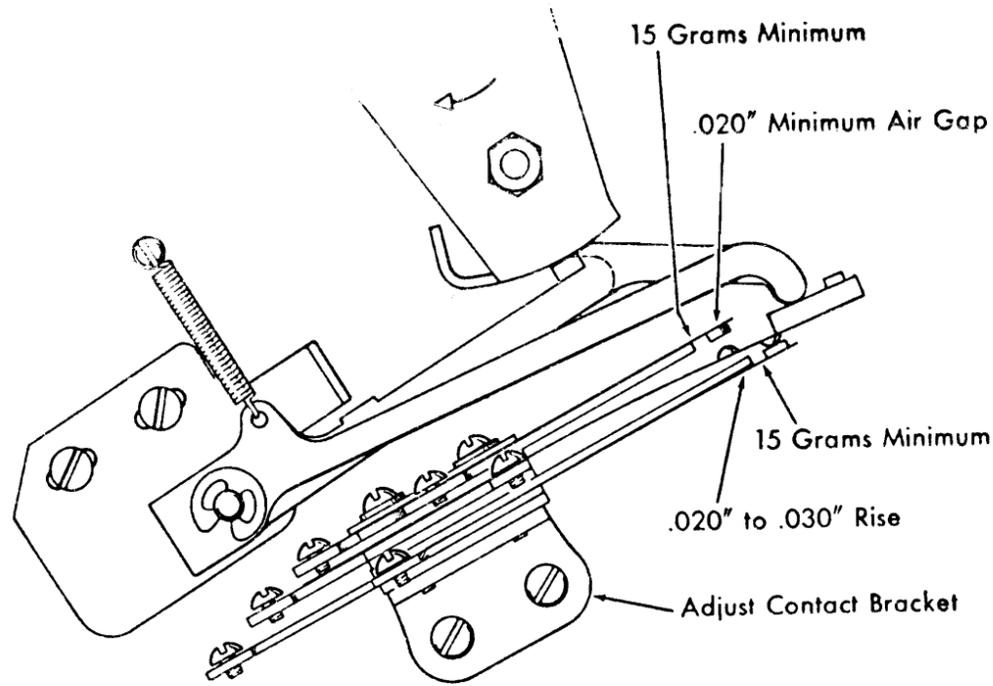


Figure 1. Program Cam Contact Adjustment

2. Set the contact levers on the high point of the cam (approximately column 84 as shown in Figure 1). Position the contact bracket for a make of the N/O points with .020" to .030" rise off the support. Form the N/C support for a minimum air gap of .020". Rotate the lever bracket to hold the levers 1/64" from the phenolic pads on the closest transfer strap. There should be a minimum of .020" air gap at the N/O contacts when the contact levers are off the cam. See that neither lever grounds out the rivet on the contact.

3. Turn the machine over by hand to column 88-1/3. Watch the escapement for a 1/3 tooth overlap of the armature on the tooth.

Position the contact lever bracket to cause cam contact lever 1 to drop off the cam. Rotate the contact lever bracket for the .010" to

.020" clearance from the levers to the contact pads (Figure 2).

4. Refine the adjustments to meet the following conditions on the escape wheel teeth. All references are to program columns.

Number 1 N/O make at column 80-1/3 to 80-2/3 to pick R48 for the start of an OK notching cycle, or skip if the card was in error.

Number 1 N/O break at column 88-1/6 to 88-1/2 to drop out the escapement armature and stop the drum in column 1. This is a critical adjustment.

Number 2 N/C break at column 81-1/2 to 83 to drop out R3. If R3 drops early, the machine will lock in column 81. If the machine skips too far through a programmed skip to column 80, the machine will lock in column 82. R3 must hold until 180° of the OK notching cycle. The transfer number 2 points cause

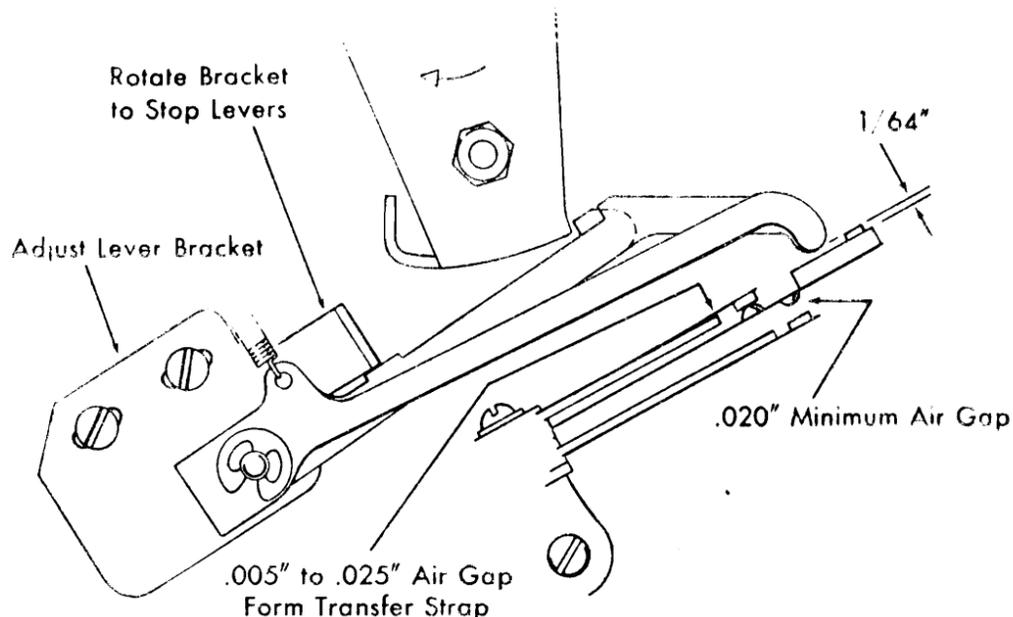


Figure 2. Program Cam Contact Bracket Adjustment

an auto feed cycle after an OK card is notched.

Number 2 N/C make at column 87-1/2 to 88-1/2 so that a hold circuit is available for R3.

## VERIFIER DRIVE

MANY of the drive unit adjustments differ from the Type 24; therefore, all of the unit adjustments are contained herein.

### Clutch Magnet

1. With the magnet energized, position the rubber mounted armature stop for .006" to .008" between the armature and outer yoke.

2. Form the armature spring to require a force of 140 to 160 grams to attract the armature, and to require 75 to 150 grams to move the armature away from its pivot. The keeper at the pivot end of the armature must not bind.

3. With the armature attracted, pivot the magnet about its support bracket to obtain an unlatching clearance of .008" to .012" to the step on the sleeve.

### Index Pointer

With the clutch detent back against the detent latch, position the index pointer at  $345^\circ \pm 2^\circ$ . Be sure the indicator clears the index periphery.

### Clutch Spring and Collar

1. Install the clutch adjusting collar against the side of the detent.

2. Lubricate the clutch spring, and insert it under the collar against the shoulder on the shaft. Avoid scratching or marring the spring.

3. Install the sleeve over the spring and engage the stud in the sleeve with the outer end of the spring. Rotate the sleeve clockwise to expand the spring and install the pulley. Install the retaining collar, and, when the pulley is properly located inside the spring, the outer face of the collar will be flush with the end of the shaft.

4. With the clutch sleeve latched on the armature, uncoil the spring within the sleeve, by means of the adjusting collar, until it is tight within the sleeve. Rotate the punch index to  $348^\circ$ , and lock the collar. When the index is turned by hand, there should be an overthrow of

$3^\circ$  to  $5^\circ$  past  $345^\circ$  to permit the detent to drop in.

### Guide Comb and Bumper

1. Position the interposer section of the verifying bail at its highest point of travel (between  $234^\circ$  and  $350^\circ$ ). Adjust the bumper downward toward the bail to give the error cam arms a firm seat on the bail without vertical play.

The object of this adjustment is to provide a means of maintaining .003" minimum clearance for the interposers when they pass under the bail.

Test this adjustment by placing the palm of the hand over all error cams while squeezing the verifying bail toward the error cam. Trip all magnet positions, and all the interposers should latch under the bail.

When installing new error cam arms and when the above adjustment is being made, there must be .003" minimum clearance as the interposer latches under the bail.

### Interposer Magnet Unit

The Type 56 interposer magnet unit assembly, P/N 227784, is the same type of unit used for the Type 24 drive units. The difference in knockoff bail timing is accomplished by a different knockoff cam. All the coils in the assembly are of equal resistance (1800 ohms).

1. This adjustment is only required if an armature pivot strip is replaced. The two pivot strips are identical.

- a. Facing the armatures with the seven-coil side up, position the pivot strip  $13/32''$  from its left end to the inside of the yoke bracket.
- b. Position the lower pivot strip  $5/32''$  from the inside of the left-hand yoke bracket. These two settings should center the armatures over their respective cores.

2. The bottoms of the notches in the pivot strips should extend .028" to .030" beyond the yokes.

3. There should be at least  $1/8''$  free movement to the operating ends of the armatures, measured to the farther yoke. Form the pivot strip by lifting the end of the armature when necessary.

4. Form each armature to contact its core and both yokes within .005".

## Interposer Magnet Assembly

Positioning the magnet unit affects three interrelated adjustments: unlatching clearances; interposers relatching in their armature notches; and the knockoff bail.

1. Install the magnet unit with reasonable unlatching clearance as a preliminary step. Make the screws friction tight and restore all but four interposers across the unit. While manually rotating the index clockwise, the unlatched interposers in their downward motion should start to enter their armature notches at 73° and all should be in their notches by 84°. The space interposer will vary from the above but may not be later than 90°.

2. The heel of the latching end of interposers has been ground away to avoid contact with the opposite side of the notch in the armatures. The .025" to .030" clearance between the heel of a tripped interposer to the back of the armature no longer applies to all machines.

The actual unlatching clearance for the space interposer at the point of unlatching is .005" minimum, with .008" minimum clearance for all others. These clearances should result from adjusting the magnet unit for .040" to .050" armature travel with the interposers latched. Measure between the armature and yoke.

3. Adjust the eccentric screw in the knockoff bail to cause the bail to meet an attracted armature at both ends of the unit between 355° and 2°. If the eccentricity is insufficient, inspect the cam follower for wear. It may be necessary to pivot the entire magnet unit about the armature latching point to bring the bail closer to the armatures.

4. When an armature is attracted electrically, its spring should cause the armature to fall away from the core. If the armatures hang up when the pick circuit is broken, they should be replaced. The residual magnetism will cause excessive wear on the knockoff bail.

## High Speed CB's (V Cams)

1. With the CB removed, shim for .027" to .032" air gap when the plunger rests on the CB frame.

2. It should require 100 to 150 grams to close the contacts when measured at the end of the operating point. Replace weak straps.

3. It should require 475 to 550 grams pressure to close the contacts with .020" to .030" overtravel of the cam follower. Replace weak or worn cam followers and be sure the rollers are free.

4. Obtain .017" to .023" air gap at the low cam dwell by means of the CB adjusting screw. Loosen the holding screw before adjusting.

## Interposer Bail Contacts

Bail contact assemblies are accessible by removing the master bed plate or the verifier drive unit.

1. With the contact assemblies removed from the drive unit, form the operating strap near the mounting to require 20 to 25 grams to close the contacts. The gram gage blade and the phenolic pad should overlap 1/4" when checking.

2. Form the stationary contact strap to require 30 to 35 grams to raise it off its support. The forming should be within the area of the support strap to reflect a true condition. Form the strap for a point to point contact at the outer tip of the support. When properly adjusted, a crack of light will appear at the tip of the support during measurement. A total of 50 to 60 grams should be required to close the contacts and raise the stationary strap off the support. It is necessary that both front and rear contact assemblies are adjusted within 5 grams of one another.

3. Reinstall the contact assemblies and adjust their mounting brackets for an air gap of .017" to .023" with all armatures restored.

## Verifier Drive Unit Timing Test

Test the timing of the drive unit before readjustment. Sometimes only a slight change is necessary to correct a condition, and considerable time will be saved by avoiding unnecessary alterations. This adjustment corresponds to the punch penetration adjustment on the Type 24 and is made with the adjusting screw in the anchor bar.

Remove the notching assembly and test as follows:

1. Hold a flat object over all the verifying pin openings and turn the index to 50°. Remove the object and the pins should remain latched out.

2. Turn the verifier shaft slowly and watch for the last pin to pop up between 180° and 195°. If the

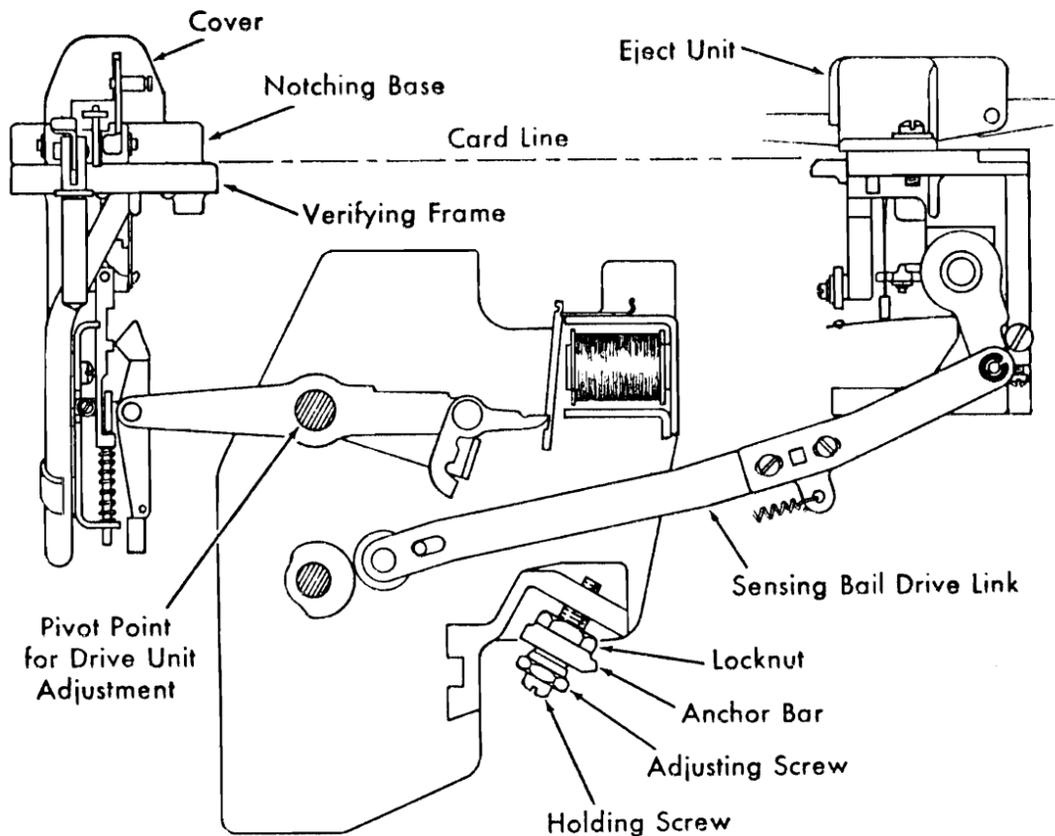


Figure 3. Drive Unit Adjustment, Rear View

machine does not meet these timings, remake the anchor bar adjustment.

#### Verifier Drive Unit Anchor Bar

When the preceding test shows that the drive unit must be retimed, or when a new verifier drive unit is installed, the following procedure is recommended:

1. Remove the notching base (assembly above the bed at the verifying station).
2. Loosen the sensing-bail drive-link screws.
3. Loosen the two support screws in the anchor bar.

At this point, the lock nut and

holding screws can be loosened and small adjustments made with the adjusting screw to obtain the correct timing (Figure 3). Remake the notch drive link adjustment, tighten the drive unit support screws lightly, and extend the bail drive links.

*If a new unit is being installed, continue with step 4, etc.*

4. After installing the unit and the anchor bar, back off the adjusting screw about two turns.

5. Hold a flat object over the verifying pins while turning the machine by hand to about 70° of the verifier index. Remove the flat object and the pins should stay latched down.

6. Turn the index to 190° and hold it there. Turn in on the adjusting screw until the last pin has snapped up; then tighten the holding screw. Turn the machine through a cycle, again latching out the pins to be sure the adjustment has not changed. Remake the notch drive link adjustment, tighten the two support screws lightly against the side frames, and extend the bail drive links. Tighten the adjusting screw lock nut to avoid readjustment if the drive unit is removed.

#### Error Contact Assembly

1. Form the operating point support spring to require 30 to 40 grams to break the N/C contacts. Measure at the arrow shown in Figure 4.

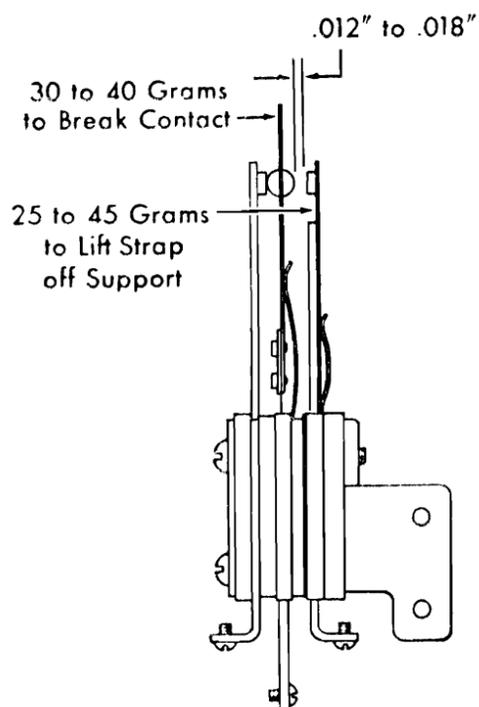


Figure 4. Error Contact Adjustment

2. Form the stiffener spring to require 25 to 45 grams to lift the N/O contact off its support.

The two steel contact straps and the center stiffener spring can be removed or lined up by loosening the holding screws in that area.

## VERIFYING FRAME

### Verifying Frame Removal

It is advisable to insert a blank card between the verifying frame and the notching base when handling the unit. If this precaution is not taken, the bottom of the pin drivers will leave the guide, and considerable time will be lost replacing them.

The verifying pin latches must pivot freely on the pin drivers. Set all the latches on the second step of the pin latch stop (Figure 5) to hold the drivers in their guides for the next step. Position the retainer for a clearance of .002" to the closest pin drivers. The drivers must not bind.

When reinstalling the verifying frame, be sure the pin latches are straight up and down. It is possible to bump the lands on the pin drivers and pull them low enough to allow them to slip under the pin latch guide. If this should happen, those positions will not verify. Be sure to check this condition before replacing the bed plate.

Always place a blank card in the verifying position before removing the verifying frame to keep the pin drivers from rising out of their lower guide.

1. Turn the verifier index to 100° for the maximum rise of the verifying bail to clear the pin drivers.

2. Remove the following: eject unit, pressure rail covers, master bed plate, and the notch drive link from its cam follower arm.

3. Hold the notching base on the verifying frame and extract the four mounting screws. Keep the card in place and swing the bottom of the frame to the right to clear the bail. Lift the units out of the base. Lift out the eject pins, which are interchangeable.

When reversing the procedure to install the verifying frame, place a blank card between the units to keep the pin drivers in place. The

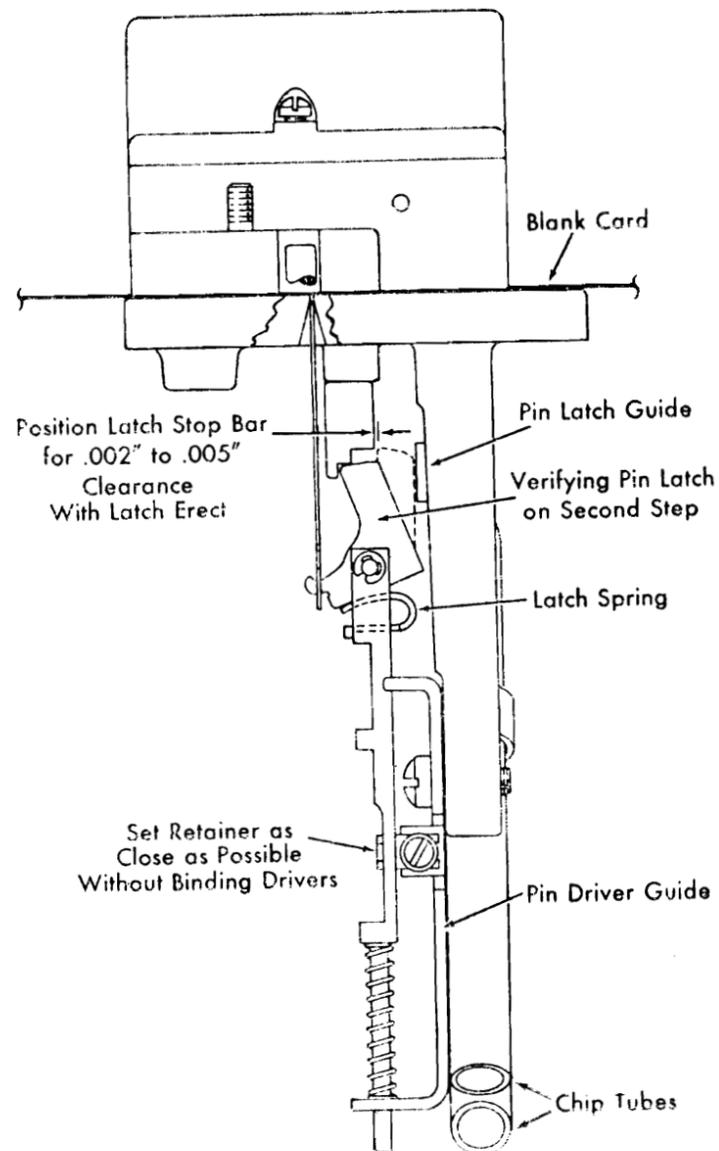


Figure 5. Verifying Frame Adjustment

chip tubes must be tight against the bottom of the dies to avoid chip jams. Close the top loop of the plunger spring to make it stay on the plunger. When replacing the plastic card bed, keep the right end as close to the top rail as possible to prevent cards from catching.

## NOTCHING

NOTCHING punches and dies have the same limitations that any other dies and strippers have. The punches are selected to fit; therefore, they are not interchangeable. Machines prior to the AP suffix contain punches .141" in diameter which are obsolete. To date, .109" punches are being used, of which the OK punch is offset. Parts are not stocked for the large punch styles. If replacements are needed for the large punches and linkage, the entire notching base and verifying frame (308654) should be replaced.

### Notch Drive Magnet

Energizing the notch drive magnet eliminates the action of the

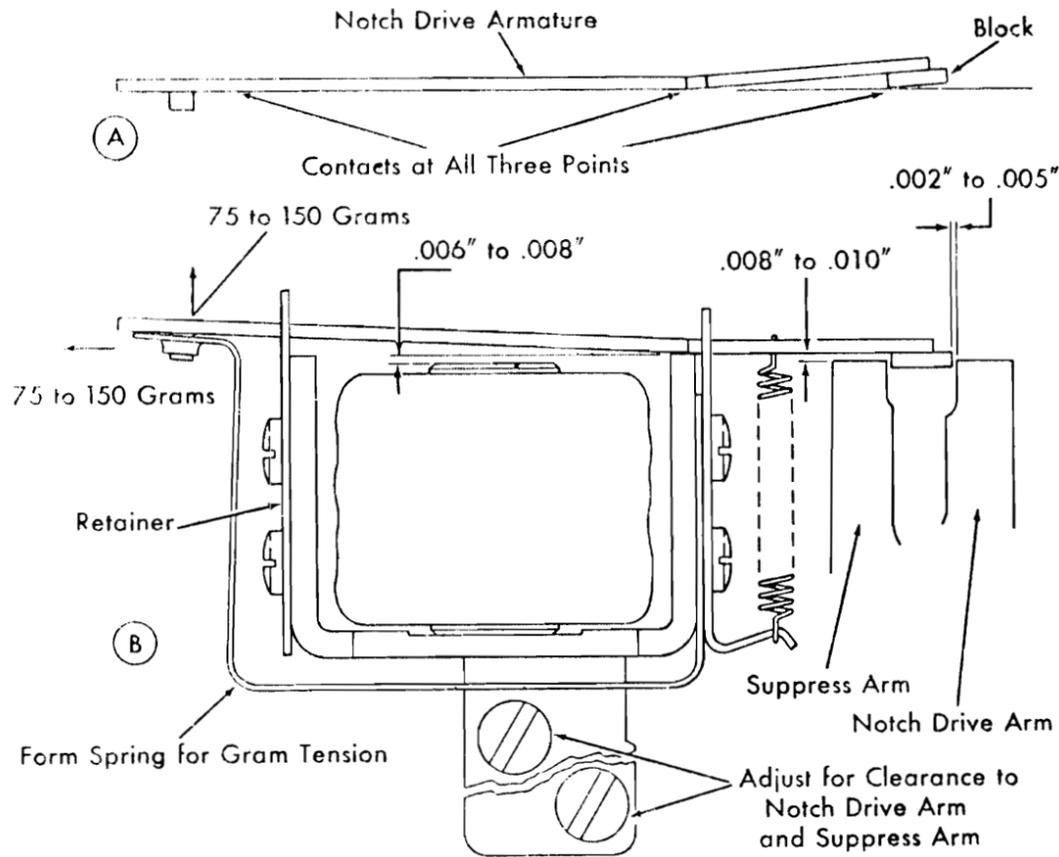


Figure 6. Notch Drive Magnet Adjustment

suppress arm, and the cam follower rides into the low dwell to cause notching. Faulty adjustment of the eccentric screw in the suppress arm can cause failure to suppress error notching or can prevent error notching when notching is desired. The eccentric screw (228369) is the same as the part used on the Type 26.

1. Form the notch drive armature so that a straight edge will contact the three points shown in Figure 6A.

2. The armature should be free to move across the yokes and must not bind in the armature retainer. Lubricate the pivot point of the armature where it slides on the lower yoke with IBM 22.

3. There should be  $.006''$  to  $.008''$  air gap at the core with the armature attracted. If it is necessary to shim the core, use  $.003''$  steel shims (305271).

4. Position the armature retainer on the yoke opposite the interposer block for maximum armature travel without binds.

5. Position the entire magnet bracket for a clearance of  $.008''$  to  $.010''$  between the armature at rest and the end of the suppress arm; at the same time there must be a clearance of  $.003''$  to  $.005''$  between the interposer block on the armature and the inside cut of the notch drive arm (Figure 6B). Every time the drive unit is readjusted at the anchor bar, this step must be

checked. It may be necessary to move the suppress arm to perform step 5.

### Notch Suppression

The high side of the eccentric bushing on the back end of the verifier cam shaft contains a groove which should line up with the mark near the center of the low dwell of the notch drive cam. The left-hand threaded screw in the end of the shaft must be loosened to position the bushing.

Trip the verifier clutch and turn the drive unit index to  $245^\circ$  (Figure 7). Adjust the eccentric screw in the suppress arm for  $.010''$  to  $.012''$  clearance to the interposer block on the armature.

When loosening or tightening the screw in the end of the shaft, take precaution to avoid damaging the clutch spring on the other end of the shaft. Each time the drive unit is readjusted by the screw in the anchor bar, this adjustment must be checked.

### Last Column Notch Solenoid

Round embosses or OK punches in the middle of the card are caused by a worn punch interposer bar or the solenoid plunger travels may be off. The punch usually appears about 3 columns to the right of the column that should have been error notched.

1. It is necessary to remove the notching base cover to adjust the solenoid. The position of the

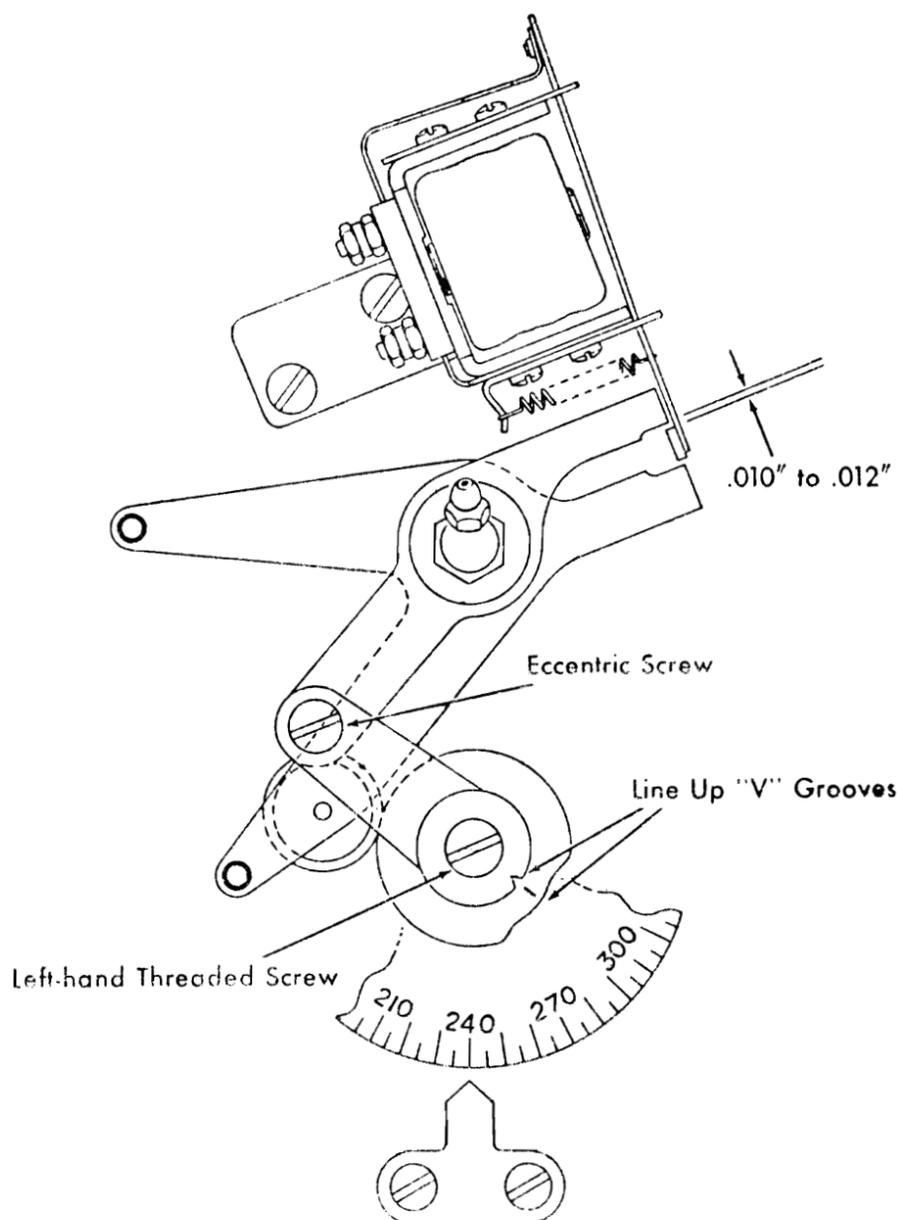


Figure 7. Notch Suppression Adjustment

plunger controls the operation of the notching punch interposer. Loosen the solenoid mounting screws and attract the plunger until it seats against its rubber mounted stop. Take up the play in the linkage of the interposer bar toward the front of the machine and position the magnet bracket vertically for .003" clearance between the error punch and interposer bar (Figure 8).

2. Form the stationary contact support for a minimum air gap of

.025" and a minimum rise after making of .025".

**Notch Drive Link**

On every clutch cycle that doesn't cause notching, the punches are driven upward by the suppress arm, armature block, and eccentric bushing. Since the punch motion is opposite to the direction for notching, a clearance must be provided by adjustment. It is always advisable to check the upward punch clear-

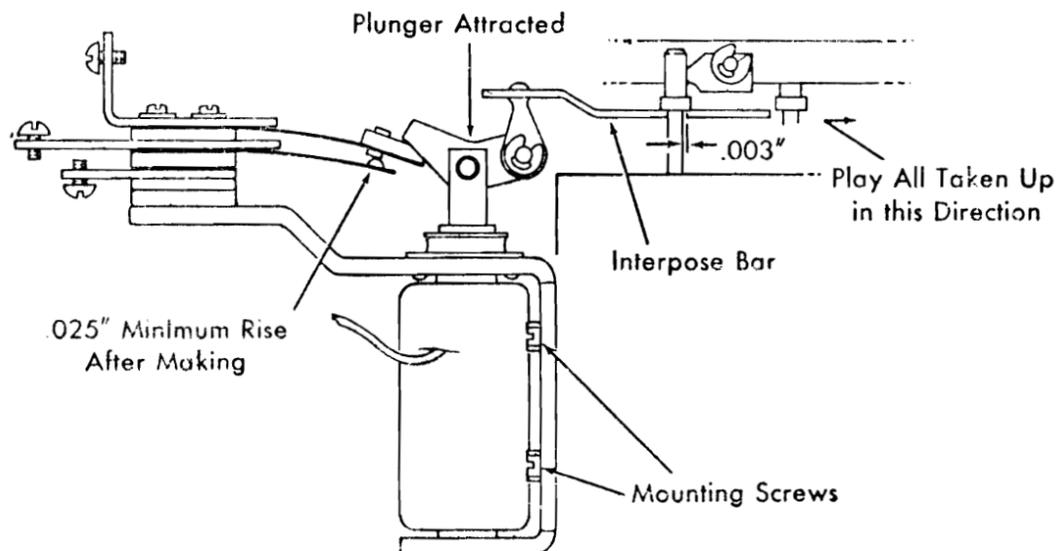


Figure 8. Last Column Notch Solenoid Adjustment

ance each time the verifier drive unit is adjusted at the anchor bar.

1. With the verifier clutch latched, unhook the notch drive link and lift the notch lever arm to make both punches seat on the cover. With the punches held thus, adjust the notch drive link until the bottom stud passes freely into the hole in the notch drive arm.

2. Shorten the link 1/4 turn for the suppression clearance, and test the machine. If any additional travel is needed, shorten the link by 1/4 turns, but do not exceed a total of 3/4 turn.

### Keyboards

Latch contacts with insufficient air gap may cause false error lights. Be careful not to rest the keyboard on anything that will bend the bottom cover against the contacts.

### Notching Contact

Machines wired to the D suffix and later do not have a notching contact. Many earlier models will have had it removed. On machines still using the contact, set the notching contacts as follows:

Trip the verifier clutch and the notch drive magnet. Turn the verifier index to 34° and form the notching contact support strap to make the contact between 34° and 38°. Latch up the clutch and set the contacts for an air gap of .025".

## SERVICING HINTS

The following outline is provided to assist in diagnosis of certain machine conditions which often prove difficult when they are encountered for the first time.

### *False Error Lights through escapement failures.*

Possible causes:

- A. Interposer bail contact pressure or gap
- B. Interposer armature
  1. Failing to trip off - drag
  2. Steel of high permeability
  3. Knockoff bail worn
- C. Friction drive torque
  1. Low torque, card moves slowly. Reading attempted before card stops moving.
  2. Heavy torque, escape armature fails to pull out of tooth. Operating pin closes escape contact so same column is verified.
  3. Oil off gears or from the

reduction drive getting on friction drive.

Insert a card between faces of disc and run until the card comes out nearly clean. Clean all parts before installation.

### D. Program Drum

1. Card held loosely.
2. Break of field definition late causing skipping too far.

E. Tube or chassis failures.

F. Excessive clutch overthrow-double spacing.

### *False Error Lights through verifying failures.*

Possible causes:

- A. Clearance to pin latch block causing nipping or failure to latch out pin drivers.
- B. Anchor bar adjustment affecting pin driver travel.
- C. Cards catching between upper rail and master bed plate.
- D. Pin sensing failures resulting from registration failure.
- E. Relay 5 slow to drop out causes an extra cycle after notching.
- F. Relay 5 slow to seal. Relay 5BL fails to break the circuit through error contacts during first column of auto-verification.

### *False Error Lights through clutch failures.*

Possible causes:

- A. Clutch sleeve pin missing.
- B. Broken clutch detent.
- C. Clutch armature spring tension.
- D. Excessive clutch overthrow.
- E. Tube or chassis failure.

### *False Error Lights through error contact failures.*

Possible causes:

- A. N/C contacts fail to pick R43. Next column would appear in error.
- B. N/O gap too close

### *False Error Lights through keyboard and miscellaneous causes:*

- A. Latch contacts so close they bounce closed.
- B. Burned keyboard bail contact may cause only one of two magnets to be energized. Adjust restoring bail contact to take the arc.

### *Drum Skipping failures*

- A. Drum stops in column 82, fails to notch and continues to auto-feed. If a program

card is punched to skip the last field and the card is off register, worn, or improperly installed, it may cause the drum to stop at column 82. Be sure the 12 contact drops out the escapement on 1/3 tooth when the field definition breaks.

- B. Drum stops in column 82 with R22 energized. If R22 has a slow drop out, relay 25 fails to pick in column 81 and one more escapement takes place. The extra escapement drops R3 making it impossible to take a clutch cycle to drop R22. Replace R22.

- C. Drum attempts to skip before or during OK notching on machines with D, E or F suffix.

Solution: R46 picks on the wrong cycle because the overlap of the make of V4 and the break of V5 permits the pick of R48 and R46 during the same cycle. Retime V4 to make at 132° and V5 to break at 138°.

## LUBRICATION REQUIREMENTS

This lubrication outline is based upon 40 hours per week usage and average working conditions. It is presented as a guide that can be varied in frequency to meet individual machine requirements.

A code number is assigned to each unit to simplify the chart. To find each item affected on a unit, the verifier drive for example, refer to each item labeled 2. The complete code list follows:

- 1—Verifying frame and notching
- 2—Verifier drive unit
- 3—Eject and pin sense
- 4—Program
- 5—Card feed
- 6—Stacker
- 7—Mechanical drive

For keyboards, see Figure 30 of the Type 24-26 Reference Manual.

### IBM 6, 3 MONTH PERIOD

1—Eccentric bearing and eccentric adjusting screw in the notch suppress arm.

- 2—a. Cam follower rollers
- b. CB rollers (be sure they are free).

### IBM 6, 6 MONTH PERIOD

- 1—Notching punch lever pivots.

1—Notching bell crank.

1—Punch interposer bar and punches (keep solenoid plunger dry).

1—Verifying pin latch pivots, sparingly.

2—Notch drive cam follower.

2—Error cam pivots and guide comb, sparingly.

2—Interposer pivots and felt washers.

3—Pin sensing bail shaft bearings. Saturate wicks by removing eject unit and using air holes in the moulding.

3—Pin bail arm stud.

4—Star wheel pivots, sparingly.

5—CF circuit breakers.

### IBM 6, YEARLY PERIOD

3—Eject unit mechanism.

5—Card feed knife linkage.

6—Stacker gripper block pivots.

7—Drive motor.

### IBM 22, 3 MONTH PERIOD

2—Notch drive armature block.

2—Verifier clutch spring, at least every 3 months. Wipe off excess. More frequent greasing is necessary if the clutch becomes noisy.

2—Knockoff bail cam follower.

2—Pin sensing bail drive link stud.

### IBM 22, 6 MONTH PERIOD

1—Notch drive link, both ends.

1—Sliding surfaces of the pin drivers and latch springs.

2—Rear mounting plug grease fitting.

2—Error cams at pin driver lands.

2—Verifying bail, thin film.

2—Notch drive spring loops.

2—Notch drive armature at yoke ends.

2—Interposers at latching points and bails.

5—Card feed steel pressure roll pivots.

### IBM 22, YEARLY PERIOD

1—Pressure roll release pin ends.

4—Program cam.

5—CF clutch, card pusher cam, card stop cam.

6—Stacker gripper cams, gears, and followers.

7—Escapement armature at pivot end.

7—Reduction drive housing. Keep grease 1/4" above the contact points of the grease when the housing is held in operating position.