IBM®

Customer Engineering Reference Manual

IBM 548, 552 Alphabetic Interpreters

IBM MACHINE RECORD	Order No.	
Mach. Code	Mach. Ser.	Wiring Diagram
AC Voltage DC	Cycles	Phase
X-Elimination	O-Elimination	
Digit Selectors	Class Selectors	
Special Symbol Type Bars		

Special Features - Eng. Change - B/M - Notes

M.E.S.	Description	Diagram or B/M	CEM	Installed		Removed	
				Man No.	Date	Man No.	Date

CONTENTS

CURRENT REQUIREMENTS	60 cy.	50 cy.	25 cy.	DC
115 volts 1 phase	8.0 amp.	9.6 amp.	7.3 amp.	
115 volts 3 phase	5.0	6.0		
208 volts 1 phase	4.4	5.3		
208 volts 3 phase	2.8	3.3		
230 volts 1 phase	4.0	4.8	3.6	
230 volts 3 phase	2.3	3.0		
115 volts DC				4.8
230 volts DC				2.6

WEIGHT 552

Unpacked—770 pounds

DIMENSIONS 552

Length—34 inches
Width—20 inches
Height—51 inches

WEIGHT 548

Unpacked—682 pounds

DIMENSIONS 548

Length—40 inches
Width—25 inches
Height—50 inches

General

The purpose of this reference manual is to provide preventive maintenance recommendations, lubrication specifications, and adjustment procedures relative to the alphabetical interpreters.

In most instances the basic operating units of the IBM 548 and 552 are identical; therefore, to avoid duplication of reference material which is common to both, the greater part of the subject matter is presented under the heading of IBM 552.

The alphabetical interpreters IBM 548, 552 are used to print the alphabetical and numerical codes punched in an IBM card. They interpret 60 cards per minute, and are furnished for 80-column cards only.

The machines may contain a motor-generator set or a metallic rectifier power supply which supplies 46 volts DC for the control circuits.

IBM 552

DRIVE

LUBRICATION

IBM 9

1. Reverse friction lock, especially at the point where the steel shoulder of the drive pulley operates against the reverse friction lock arm.
2. Bijur lubricator.
3. Motor and motor-generator.

IBM 17

1. Light film on all linen delecto gears and cams.
2. All gears and cam surfaces not lubricated by Bijur System.

IBM 20

1. Zerk fitting in drive pulley.

Adjustments

Drive Belt

The belt consisting of about 85 links should be installed with the small ends of the links leading in the direction of rotation. Open the belt, place it around the drive pulley, and bring the ends up around the driven pulley. The ends should lack three to four inches of meeting. Add or remove links to obtain this condition. This should provide the correct belt tension. Check the tension by operating the machine under power. The tight side of the belt should be a straight line from pulley to pulley, but the slack side should be slightly bowed.

Dynamic Braking

After the machine has warmed up, adjust the 25-ohm variable resistor to cause the machine to stop between 260° to 285°.

CARD FEED

Preventive Maintenance

The feed knives are adjusted for vertical printing registration, not for brush timing. The bush timing is obtained by shifting the brush holder.

The hopper side plates are adjusted for lateral printing registration. Brush tracking is corrected by shimming the brush assembly holding brackets.

Clean the contact roll drum with trimite paper or crocus cloth.

LUBRICATION

IBM 6

1. Roller throat
2. Card lever pivot points
3. Gripper finger felt wipers

IBM 9

1. Feed knife guide slides
2. Feed knife guide pin
3. Brush separator roll bearings
4. Card stacker shaft assembly pivots
5. Bell crank assembly pivot
6. Ribbon shield operating arms
7. Gripper finger pivots

IBM 17

1. Card levers. Very light film between operating lever and phenolic pad on contact strap.
2. Both ends of bell crank assembly.

Adjustments

Magazine Side Plates and Posts

Lateral Printing Adjustment. The printing adjustment is obtained by delivering the card to the printing position in the proper registration. Position the hopper side plates by means of the adjustable bushings so the card is aligned to the print bars to cause printing as shown in Figure 1. There should be a .005″-.008″ clearance over the length of the cards.

Position the hopper posts by adding or removing shims to obtain a .005″ -.008″ clearance over the width of the cards.

Feed Knives

1. Adjust the feed knives for .004″ to .0045″ projection above the knife block.

2. At the extreme rear position the feed knives should travel .020″-.040″ beyond the 9 edge of the card. This clearance is obtained by loosening the setscrew and adjusting the knife block adjusting screw.

3. Turn the machine to 32°. Insert a card in the magazine and move it against the first feed rolls. The card should just touch the knife edges. This shows that the feed knives are feeding the card evenly to the first feed rolls. If this timing is incorrect, the vertical printing registration should be checked before proceeding.

4. ***Vertical Printing Adjustment.*** Loosen the setscrews which hold the card-feed crank to the shaft and shift the knives to deliver the card to the printing position at the proper time. This should result in causing the printing to be centered on a line 1/8″ from

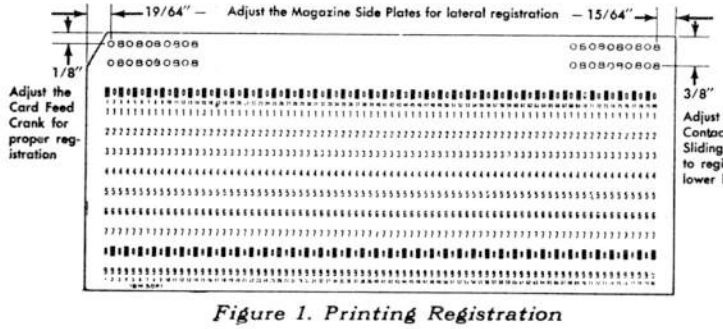


Figure 1. Printing Registration

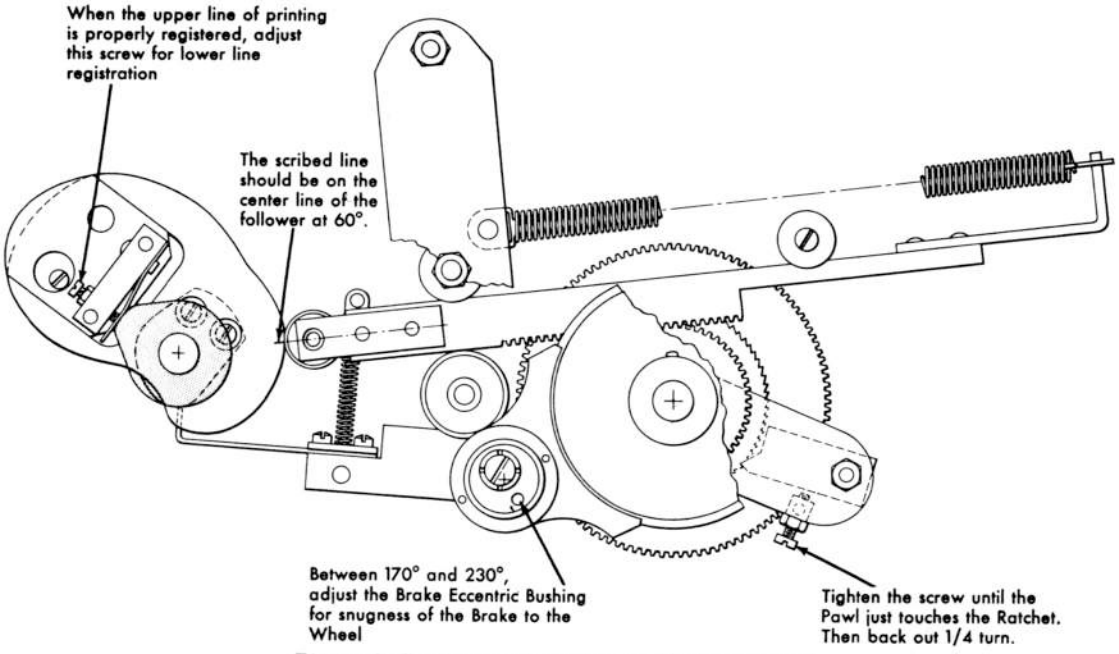


Figure 2. Contact Drum Cam and Ratchet Pawl

the leading edge of the card (Figure 1). If the condition of step 3 is met and the printing is off registration, check the contact drum brake.

NOTE: When the feed knife adjustment is changed, the brushes must be retimed.

CONTACT DRUM RATCHET PAWL (FIGURE 2)

When released and moved in a counterclockwise direction, the pawl should clear the ratchet gear by .003" to .008". This adjustment can be obtained by tightening the screw until the pawl just touches the ratchet and then backing the screw out ¼ turn. Check the entire circumference of the ratchet for clearance between it and the pawl.

Make your check operations on lower line printing for ⅓ to ⅔ tooth overlap of the ratchet pawl and the ratchet gear when the ratchet pawl is in the restored position. A small change in the vertical printing adjustment can be made to obtain this condition.

CONTACT DRUM BRAKE (Figure 2)

Turn the machine to a point between 170° and 230°. Adjust the brake eccentric bushing for snugness of the brake to the wheel. It must engage the brake disc firmly enough to prevent overthrow of the contact drum, but must not twist the contact drum shaft.

THROAT KNIFE AND ROLLER THROAT

1. Loosen the throat block clamping screw and position the throat block so that the scribed line is directly beneath the edge of the throat knife facing the magazine. Tighten the clamping screw.

2. Loosen the two screws holding the throat knife. Use the .0095" feeler gage to set the throat clearance. Tighten the screws.

CARD GUIDES

The card guides are attached to the magazine back plate and should be adjusted for a clearance of .012"- 018" to the lower guide plate.

CARD LEVER CONTACT

This contact is located underneath the feed magazine Adjust the contact for 1/16" air gap when open. When operated, the fixed strap should rise 1/32" off its support. Adjust by forming.

BRUSH ASSEMBLY

1. The reading brushes are adjusted for ⅛" projection beyond the separator. When the standard brush adjusting gage (IBM 450388) is used, the heel of each brush should be even with the line nearest the bend in the gage. This, however, should not govern the final setting of the brushes.

2. Correct tracking through the center of the punched holes in the card is obtained by shimming the brush assembly holding brackets located on the side castings. The tracking should be checked whenever the magazine side plates are adjusted.

3. The brushes are timed by loosening the brush holder clamping screws and moving the brush holder within the assembly. The brushes should make through a hole at least 1½° before the corresponding selecting impulse and break no earlier than 1½° after the end of the impulse. Check the timing at both ends of the card.

CAUTION: The card is moving fast at this time.

When the brushes are worn to the extent that the duration of contact through the hole is increased, difficulty may be experienced. A worn brush, making contact before CB5 and 6 have broken the circuit for the previous impulse, may result in energizing the magnets early. This causes printing under. With a worn brush making contact too long, it is possible for a zero hole to make contact for a one impulse, and the type bar will be stopped for a zero-one position which is normally blank. To overcome these conditions the timing of the main CBs should be very accurately performed.

Occasionally a brush will drop into a zero hole in the card while CB2, due to its long duration, is closed for an X. If the brush overlaps the CB by as little as 1° the charging of the 2 mfd. capacitor may operate the print magnet. Such an impulse will start the type bar moving too soon, and it may be deposited on the X bail. To overcome this condition, zone cams CB2 and 3 are now cut for a shorter duration. The shorter duration cams are part 160759.

CONTACT DRUM CAM (FIGURE 2)

As a means of timing the contact drum cam to the machine, the scribed line on the cam should be on the center line of the cam follower at 60°.

The vertical printing registration of the lower line is obtained by adjusting the screw on the sliding cam assembly. This adjustment should be made after the upper line has been registered by adjusting the feed knife timing.

LOWER RIBBON SHIELD (FIGURE 3)

The lower ribbon shield should be adjusted so that its upper edge is 6-17/64" below the top of the side frame. There should be a clearance of .012"-.014" between the shield and the contact drum. Adjust the mounting bracket to obtain these conditions.

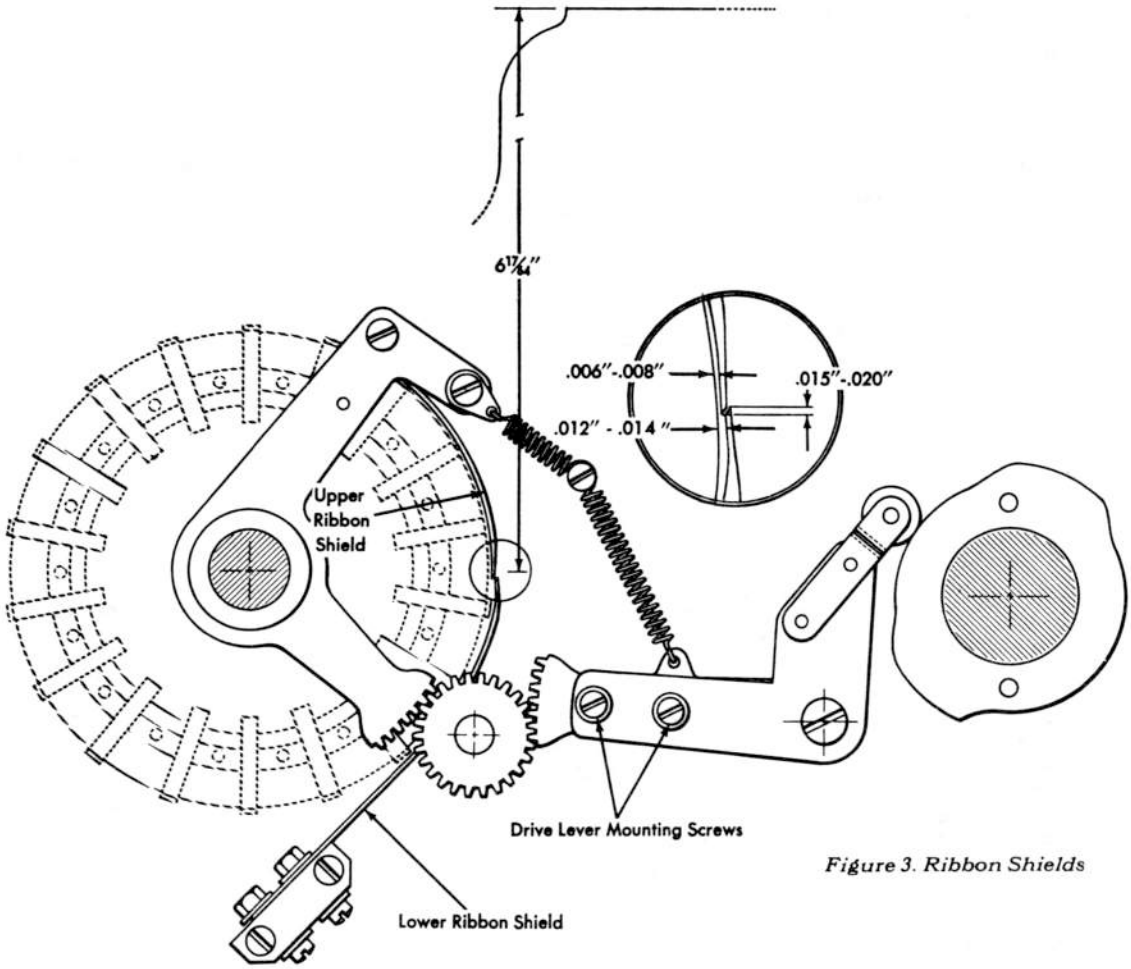


Figure 3. Ribbon Shields

UPPER RIBBON SHIELD (FIGURE 3)

The upper ribbon shield should have a clearance of .006"-.008" to the contact drum. This is obtained by adjusting the upper ribbon shield mounting screws.

Turn the machine to 100°. The upper shield should be overlapped by the lower shield by .015"-.020", and a clearance should be maintained between them. The drive lever mounting screws control this adjustment. At 210°, the opening between the shields should be 3/16" to 7/32".

STACKER CONTACT

In the normal position, the operating strap should raise the fixed strap 1/64" off its support. The contact should be positioned to open when approximately 900 cards are in the stacker.

JAM CONTACT

The jam contact operating arm should just touch the operated strap with no cards in the machine. Position the jam contact lever in the feed to obtain this adjustment. Open points should have an air gap of .020"-.025" normal or operated. Closed points should have .015" rise of the fixed strap from its support. These adjustments may be attained by positioning the mounting bracket and forming the contact support straps.

With no cards in the machine, there should be about .040" between the jam contact operating arm and the adjustable backstop screw. This clearance should allow the contact to be operated fully but prevent the contacts from being moved to the point where they lap. This causes a possible latching action and stopping the machine.

Removals

CONTACT DRUM GRIPPER FINGERS

Individual gripper fingers of the contact drum can be removed by turning the machine until the finger is opposite the elongated hole in the side frame. By removing the adjacent screws, the finger can be removed.

CONTACT DRUM

1. Remove the print unit.

2. Remove the ribbon from the upper ribbon spool. Remove the upper ribbon spool by loosening the screw which holds the rear end and sliding it out through the front side frame.

3. Remove the ribbon tensioner by loosening its pivot screws. Remove the posts which hold the other ends of the springs.

4. Remove the upper ribbon reversing shaft by driving the two pins which hold the pawls and sliding the shaft out through the front frame.

5. Remove the upper ribbon guide rod by unscrewing it and removing it through the front frame.

6. Remove the upper ribbon shield by removing four screws from the sectors.

7. Remove the two upper locating studs which position the print unit.

8. Remove the card guide plate.

9. Remove the ribbon feed operating arm and the ribbon feed pawl bar assembly.

10. Remove the screw and retainer from the front of the contact drum shaft.

11. Remove the brake shoe assembly.

12. Drive the pin holding the contact drum ratchet. (This has the same taper as the pin holding the brake disc.)

13. The contact drum shaft may now be removed from the rear of the machine. The drum cam guide bar tool, IBM 450367, should be used as a follower to hold the shaft keys and the card gripper opener cams in position. When the shaft has been removed, the contact drum can be lifted out through the top of the machine.

14. To replace, reverse the procedure. Use care when replacing the shaft because the bakelite drum ends can be cracked if the shaft is forced in when the keys are not properly positioned.

ALTERNATE METHOD FOR REMOVAL OF THE CONTACT DRUM

1. Take two pieces of wire approximately .12 inches in diameter and equal to the approximate circumference of the contact roll. Insert the wires under the gripper fingers while turning the machine over.

2. Complete steps 1 through 12 above.

3. Remove the contact drum shaft and lift out the contact roll.

4. Complete step 14 for re-assembly.

PRINT UNIT

Preventive Maintenance

Before removing the type unit from the machine, remove the link belt and operate the machine manually under power without cards and observe the movement of the type bars. Check the releasing time and the restoring of the bars. There will be a tendency for any bar in which the friction slide spring tension is insufficient to fall down during the restoring portion of the cycle. Note the position of any bars not operating correctly and remedy when the unit is removed.

With the unit removed, inspect

a. Type bars for bent or broken type tails, broken return springs, and freedom of operation of type bars in their guides.

b. Printing pressure bar assembly for wear.

Dirt and dried ink should be removed from the print unit by rinsing the unit in cleaning fluid. Plastic type cleaner, part 450528, may be used as an alternate method to clean type faces.

LUBRICATION

IBM 6

1. Selection pawls and zone pawls
2. Type bar stop pawls

IBM 9

1. Ribbon feeding mechanism
2. Zoning bail pivot points

IBM 17

1. Internal cuts in zoning pawl restoring lever cams.
2. Zone carrier lever arms at ends that fit into type unit.
3. Type bar friction springs.

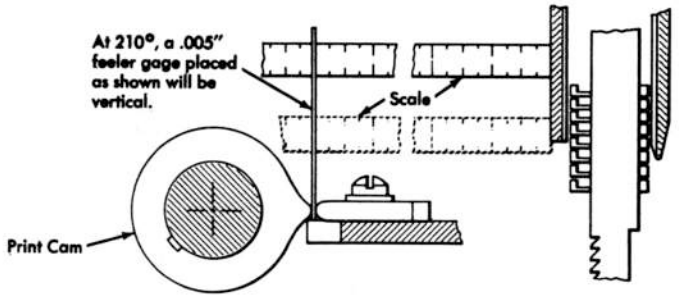


Figure 4. Checking the Printing Cam Shaft

IBM 20

1. Cam rollers for zoning carrier lever, zoning bail cam roller and pin bail cam roller.

Adjustments

PRINTING CAM SHAFT (FIGURE 4)

The printing cam shaft is the starting point for all machine timings. The index has been pinned to the printing cam shaft at the factory. All the cams on the print cam shaft are held in place with woodruff keys so the print cams cannot be adjusted.

To check the timing of the print cam shaft, insert a .005'' feeler gage between the follower and the cam. Turn the machine by hand until the feeler gage assumes an absolute vertical position. Check this position by measuring from the feeler gage to the print unit. At this point the index should read 210°.

CAM SHAFT ASSEMBLY (FIGURE 5)

A timing gage, IBM 450428, is available as an office tool to facilitate retiming the main cam shaft if its timing is lost. The tool consists of a small bar with two studs. When one of the studs is placed in the locating hole in the restoring bail cam, and the other stud is placed in the magnet unit locating pin hole, the tool locates the main cam shaft in position at 108° of the index.

If the timing gage is not available, the main cam shaft may be timed by the following method:

1. Remove the top of the print unit.
2. Turn the machine index to 341°.

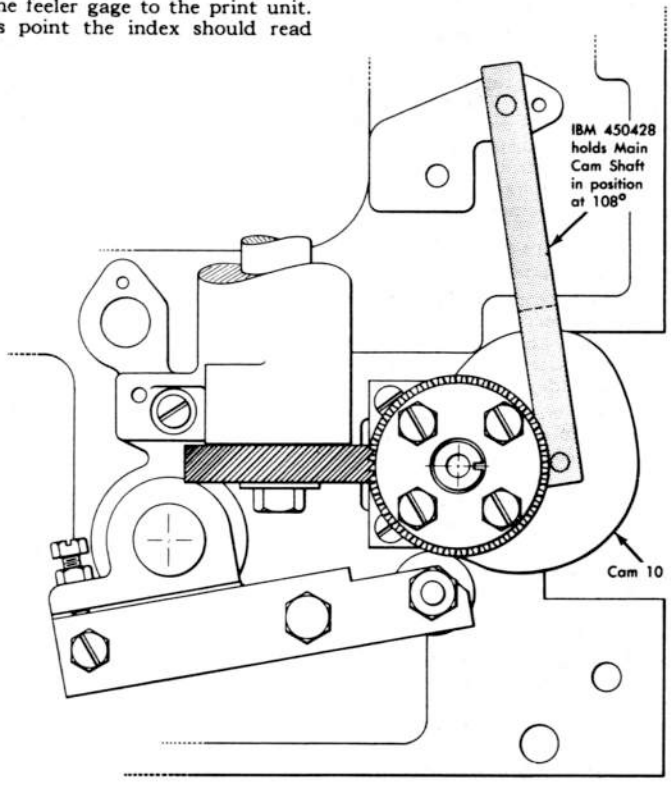


Figure 5. Timing the Main Cam Shaft

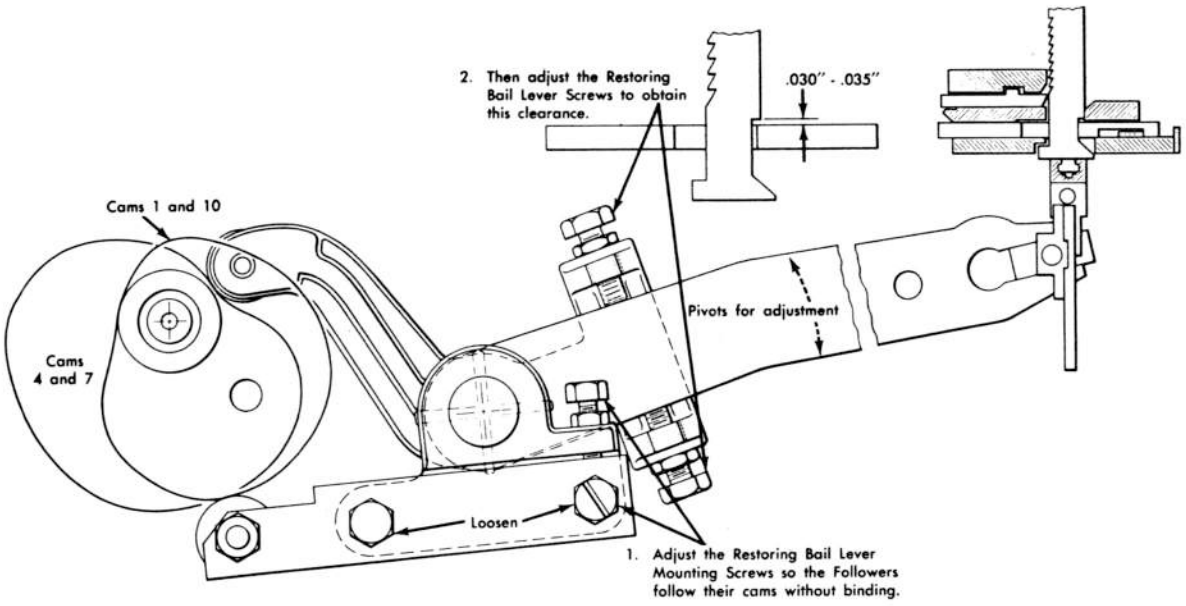


Figure 6. Zone Pawl Latching Clearance

3. With the type bar restoring cam followers on the high dwells of the cams, the type bars should be .010" below the print unit side frames.

The drive gear on the rear end of the shaft can be adjusted for a portion of a tooth in relation to the shaft by means of the four screws on the gear.

The ball bearing housings of this shaft are similar in appearance but differ in construction. The bearing on the front end of the shaft is a thrust bearing; the rear bearing has no thrust provision. If the bearings are removed, they should be marked to facilitate their correct replacement.

Alternate Procedure for Timing the Main Cam Shaft

Line up the hole in cam No. 10 and the magnet unit locating pin hole as in figure 5. When a distance of exactly 4 inches exists between the lower side of each hole, the index should read 108°.

The ten cams on the main cam shaft furnish power to the type unit. Reading from front to rear the cams are as follows:

1 and 10. *Restoring Bail Cams.* These cams raise the type bars to their highest position.

2 and 9. *Zone Carrier Cams.* These cams control the type bar travel during selection time through control of the zoning bail carriage.

3 and 8. *Magnet Unit Restoring Cams.* These and the adjacent zone carrier cams are one piece. These cams relatch the magnet unit drive rod levers after zoning and after selecting.

4 and 7. *Restoring Bail Complementary Cams.* These govern the travel of the print unit restoring bail on the down stroke.

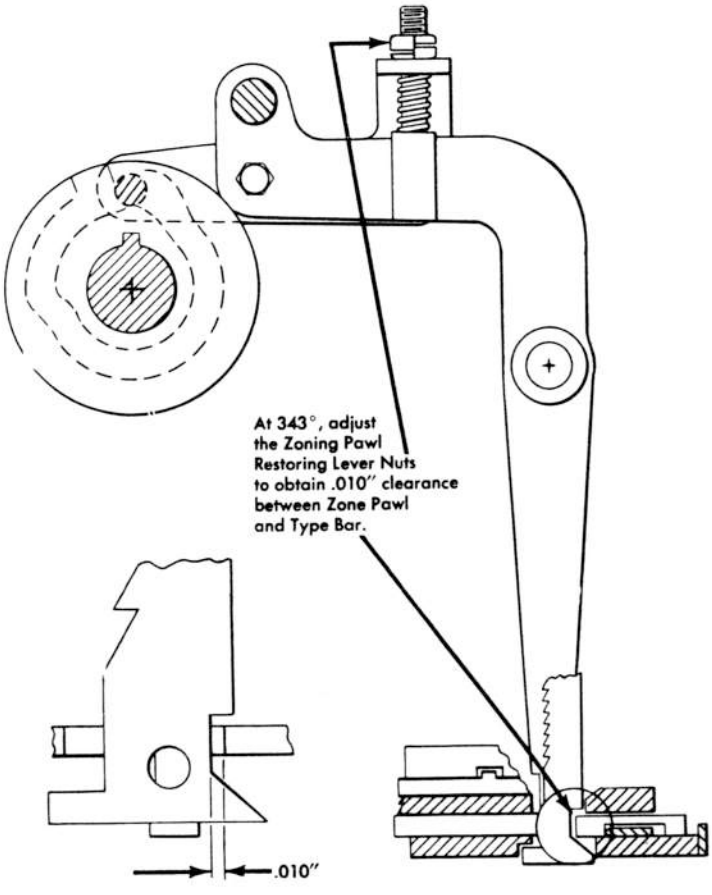


Figure 7. Zone Pawl Clearance

5. *Zone Bail Cam.* This cam holds the zoning bails clear of the type bars during zoning time and moves them under the type bars just before select time.

6. *Pin Bail Operating Cam.* This operates the pin bail, placing the drive rods in either the zoning or selecting position.

Restoring Bail Cam Followers (Figure 6)

The restoring bail lever mounting screws should be adjusted so that the restoring bail arms are at all times under the control of the restoring bail cams (1 and 10) or the restoring bail complementary cams (4 and 7). The cam followers should follow their respective cams without binding.

Zone Pawl Latching Clearance (Figure 6)

The purpose of this adjustment is to insure that the type bars rise high enough when restored to provide a .030" to .035" clearance for the zone pawls to latch.

1. Remove the top plate from the type bar housing.

2. Turn the machine to the point where the type bars are at their highest point of travel. Press the type bars down against the restoring bail. Measure the distance from the top of the side plates to the type bars.

3. Turn the machine until the type bars come to rest on the zone pawls. They should have moved downward .030"-.035" from their former position. Check at both ends of the unit.

4. Adjust the restoring bail lever adjusting screws to attain this clearance.

Alternate Method for Steps 1 and 2

1. While cranking up the type bars, press the type bars against the restoring bail (through the holes in the side frames front and rear).

2 Crank the type bars to their highest point of travel and note the position of the type bar toes.

3. Complete steps 3 and 4 above.

Zone Pawl Clearance (Figure 7)

With the machine set at 343°, a .010" clearance should exist between the zone pawls and the type bars. This clearance, which prevents the zone pawls from binding the type bars, can be observed by looking through the hole in the side of the type unit. To obtain this clearance, back off the zoning pawl restoring lever nuts until the zone pawl is against the type bar. Then turn the nut clockwise one revolution to obtain the .010" clearance. Crank the machine to the point where all the zone pawls are released approximately 96°. All the type bars should move downward at the same time and a minmum clearance of .010" to .015" should exist between the zone pawls and the type bars during their downward travel.

Zoning Bail Link (Figure 8)

Turn the machine to the point where the type bars just start to rise. Adjust the zoning bail link (turnbuckle adjustment on the cam 5 follower) for 1/16" overlap of the toe of the type bar on the zone bail.

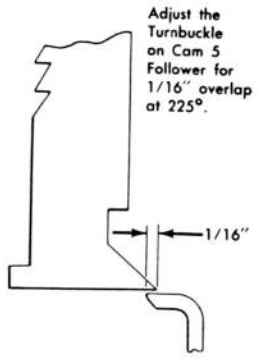


Figure 8. Zoning Bail Link Adjustment

Zero Printing Alignment (Figure 9)

With the type bars resting on the zero zone bail and the index at 204°, adjust the zone unit locating bar screws so the zero type bar tooth is in line with the selecting pawl. This adjustment results in the proper zero printing alignment. A card punched with zero and 8's in alternate columns should be run through the feed to check the alignment.

List Lap Adjustment (Figure 9)

Turn the machine to 115½° (2 select time). Push in the end select pawls. The pawls should overlap the first tooth on their respective bars by 1/64". Adjust the zoning carrier lever eccentric to obtain this condition.

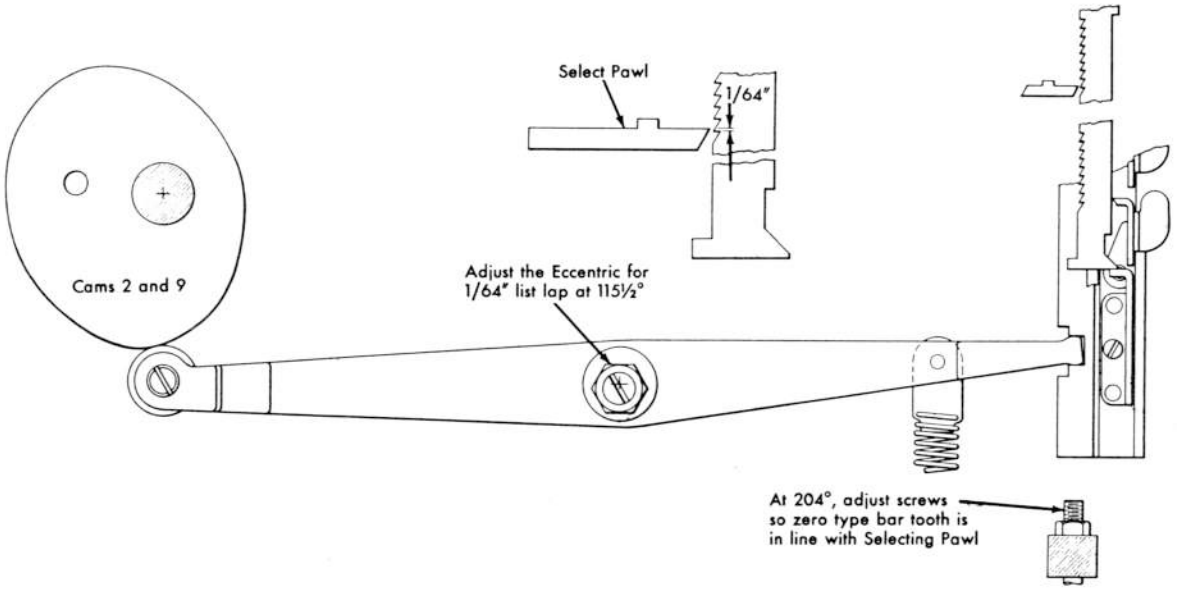


Figure 9. Zero Printing Alignment and List Lap Adjustment

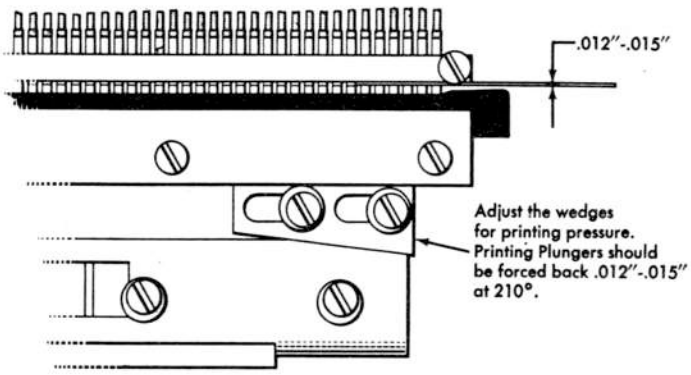


Figure 10. Printing Pressure Bar

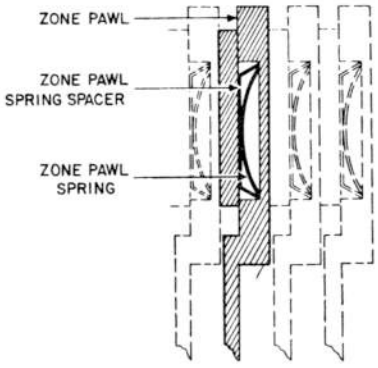


Figure 10A. Zone Pawl Springs

PRINTING REGISTRATION

The lateral printing registration is obtained by adjusting the magazine side plates as described in the card feed adjustment section.

The vertical printing registration is obtained by adjusting the timing of the feed knives, as described under Card Feed Adjustments.

The vertical printing registration of the lower line is obtained by adjusting the screw on the contact drum sliding cam assembly. This adjustment should be made after the upper line has been registered, because any change of feed knife timing will alter both adjustments.

PRINTING PRESSURE BAR (FIGURE 10)

Manually trip off all the armatures and turn the machine to 210°. There should be a .012"-.015" clearance between the printing plunger tails and the locating comb with a card in position to be printed. Loosen the eight clamping screws and adjust the wedges to obtain this adjustment. Check the clearance at both ends of the comb.

Removals

PRINT UNIT

1. Raise the brushes.

2. Turn the machine by hand until the openings in the zoning pawl restoring lever cams are above the rollers of the cam followers.

3. Remove the two locating pins from the side frames.

4. Remove the restoring bail hinge rod from the bottom of the printing unit. This releases the friction slide carrier from the restoring bail.

5. Grasp the typebar frame spacer and the zoning pawl locking rod in one hand, and lift the unit out of the machine.

6. To replace the unit proceed as follows:

a. Turn the machine by hand until the openings in the zone pawl restoring lever cams are in the UP position to allow the cam followers to pass through the openings.

b. Make sure that all print magnet drive rods are in the restored position. Failure to do so may result in damaged drive rods.

c. Grasp the typebar frame spacer and the zoning pawl locking rod in one hand and replace the unit in the machine.

d. Replace the locating pins in the side frames.

e. Replace the restoring bail hinge rod. Make certain that the hinge rod is centrally located and clears the side frames.

RIBBON

To change the ribbon,

1. Remove the print unit.

2. Trip the ribbon feed mechanism and wind the ribbon on the upper spool.

3. The ends of the ribbon are equipped with locking bars that fit in the splines in the spools and are held by ribbon retainer rings. Depress the bar on the lower spool near one end, and the other end can be removed from its retainer ring. The used ribbon may now be unwound from the upper spool and discarded.

4. Wipe off any dirt and ink from the ribbon shields and spools before installing the new ribbon.

5. Fit the locking bar of the new ribbon on the lower spool, and carefully wind it on, making certain that the ribbon is wound evenly. The upper spool may be used as a guide to center the ribbon. Attach the other locking bar under the upper spool retaining rings. Wind the ribbon to the top spool, checking for even feeding and freedom from wrinkling. Check the reversing mechanism to make certain that the reversing bars in the ribbon properly engage the reversing levers.

6. Wipe the print unit clean of any dirt and ink, and replace.

TYPEBARS

The following is a revised procedure for removing a typebar without removing the zoning pawl retainer plate, thus eliminating the hazard of zoning pawl friction springs falling out and being lost.

1. Remove print unit from machine.

2. Remove printing pressure bar and place unit with type faces up.

3. Remove typebar guide comb by removing four screws that pass through the side frames.

4. Remove friction slide carrier.

5. Remove the typebar by pressing up on type slug No. 1 from the bottom and hold up by placing blade of small 4" screw driver under type face to keep it from binding typebar.

6. Pull bottom of typebar until it stops *and continue to pull while doing the following*:

a. Spread zone pawls with screwdriver.

b. Press type slug No. 2, 3 and 4 up from the bottom to allow typebar to move through zone pawls.

c. The top end of the typebar will now be free.

d. Keep typebar up between spread zone pawls and pull on top of typebar until completely removed.

TO REPLACE TYPEBAR

1. Place bottom of typebar between zone pawls. Keep typebar up between spread zone pawls until top of typebar is free to go into upper guide.

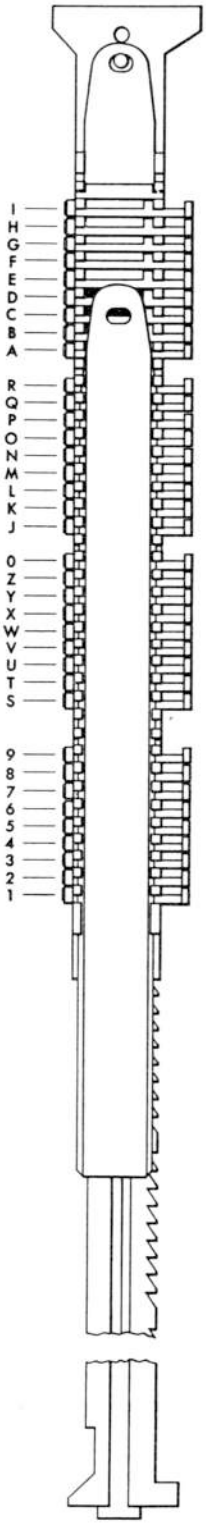


Figure 11. Type Bar

2. Slightly twist typebar until it goes into upper guide and push until typebar drops from spread zone pawls.

3. Replace friction slide guide bar and friction slide carrier, locking friction slide guide bar in place with a piece of paper clip.

4. Install guide comb.

To make it easy for typebars to go into guide, turn print unit over and run fingers over the typebars.

Caution: Anytime the zone pawl retainer plate and zone pawl restoring lever bar are removed from the print unit, use care to avoid raising the zone pawls because the zoning pawl friction springs may fall out of position. (FIG. 10A)

ZONE PAWL RESTORING BAR

The rear edges of zone pawl restoring bar are rounded to reduce the point of contact with the zone pawls. This minimizes the possibility of the zone pawls following the restoring bar and releasing the type bars after restoration. Anytime this is removed, be sure to replace with rounded edges toward the typebars.

To remove type,

1. Lift the end of the cover plate from the stud in the typebar (Figure 11), and the plate may be slid down to expose the type and type springs. Another cover plate should be inserted in the slides to act as a follower to retain the springs and type pieces.

2. There are several styles of typebars used on this machine; however, only the type shown in the figure (IBM 155061) is available for replacement parts. If parts of the older style bars must be replaced, the entire bar should be replaced.

MAGNET UNIT

Preventive Maintenance

With the unit removed from the machine, check

a. Drive rod bail for freedom of movement.

b. Armatures for wear at point where drive rod lever contacts it.

c. Terminal wires for loose or broken connections.

d. Ribbon feed assembly for wear and freedom of operation.

LUBRICATION

IBM 6

1. Print magnet armature pivot points.

IBM 9

1. Operating slides for restoring bars.
2. Restoring bail cam follower pivots.

IBM 17

1. Magnet armatures at point where drive rod levers rest.
2. Top of magnet unit restoring levers where they fit into the slots in the sides of the magnet unit.

IBM 20

1. Cam rollers for magnet restoring cams.

Adjustments

The following adjustments are best performed with the magnet unit removed from the machine.

ARMATURE STOP

With the armature in its de-energized position, adjust the armature stop so the inside edge of the armature is in line with the drive rod lever. The armature stop is adjusted to the two end armatures, and the remaining armatures if not in correct adjustment, must be formed individually to meet this condition.

ARMATURE

1. The clearance between the lower magnet core and the armature should be .015" when the armature is latched on its drive rod lever. When an adjacent armature is removed, this clearance may be easily checked. Adjust by forming the armature (Figure 12).

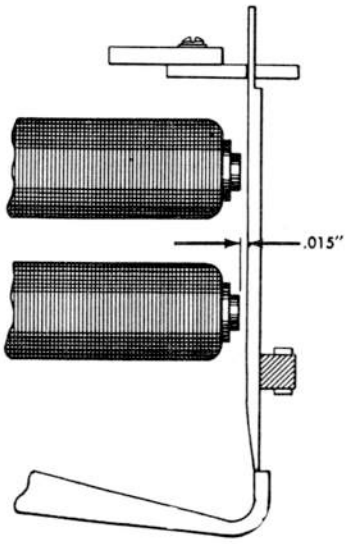


Figure 12. Armature-to-Core Clearance (De-energized)

2. A .002" clearance should exist between the armature and the upper core when the armature is held against the lower core. (Figure 13).

3. With a .003" feeler gage between the lower core and the armature, the drive rod lever should trip off the end of the armature when the armature is attracted. (Figure 14).

4. With a .005" feeler gage between the lower core and the armature, the drive rod lever should remain latched on the tip of the armature.

Be sure to check for freedom of movement after obtaining adjustments by forming.

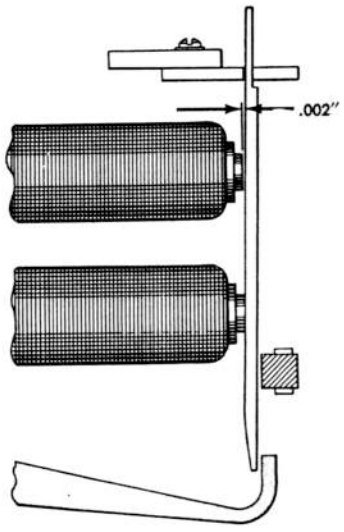


Figure 13. Armature-to-Core Clearance (Energized)

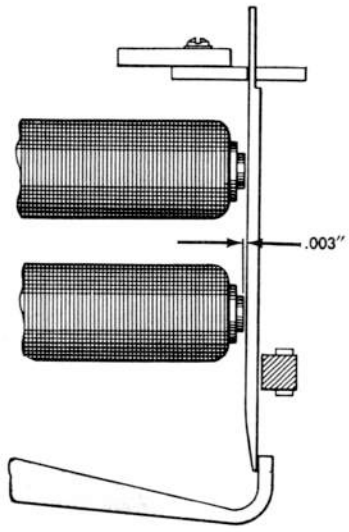


Figure 14. Unlatching Clearance

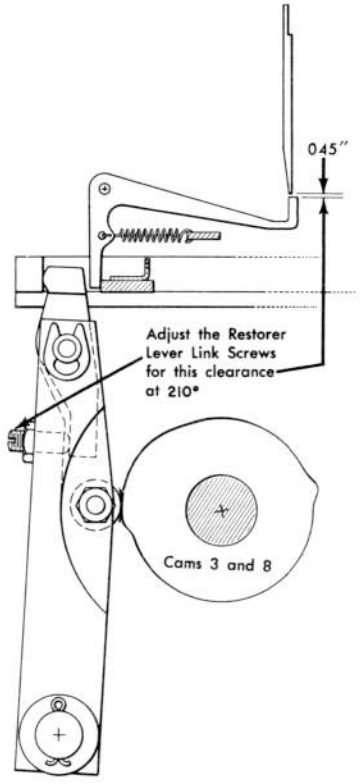


Figure 16. Restorer Lever Links

ARMATURE KNOCKOFF (FIGURE 15)

With the restoring bar held so that .045" exists between the drive rod levers and the armatures, adjust the armature knockoff adjusting screws until the armature knockoff bail returns the armatures fully against the armature stop.

This may be done by placing feeler gages equaling .045" between an armature and drive rod lever. Operate the restoring bail on one side only until the restoring bail just touches the drive rod levers. This will provide .045" relatching clearance. Now adjust the armature knockoff screw up to within .005" of the restoring bail. *Caution:* **With more than .005" clearance the armature knockoff bail may bend the armatures. The other side is adjusted in the same manner.**

The following adjustments are made with the unit in the machine.

RESTORER LEVER LINKS (FIGURE 16)

Adjust the restorer lever link screws for a .045" clearance between the armatures and the drive rod levers when the levers are in the maximum retoring position (210°).

DRIVE ROD CLEARANCE (FIGURE 17)

Check for .015" to .030" clearance between the ends of the drive rods and the zoning and selecting pawls. If the clearance is not sufficient, remove the unit and lightly stone the ends of the rods.

PIN BAIL (FIGURE 17)

Set the index between 108° and 168°. Adjust the pin bail adjusting screw to center the drive rods vertically on the selecting pawls.

Removal

MAGNET UNIT

1. Remove the belt guard, drive belt, and drive pulley.
2. Turn the machine to approximately 290°.
3. Remove the four locking pins which position the unit.
4. Slide the magnet unit to the left, allowing the restorer lever links to disengage.
5. To replace the unit, reverse the procedure. In replacing the drive pulley make certain that the reverse lock is properly positioned to engage the ratchet if reverse rotation occurs.

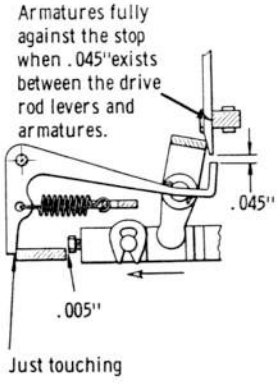


Figure 15. Armature Knockoff Adjustment

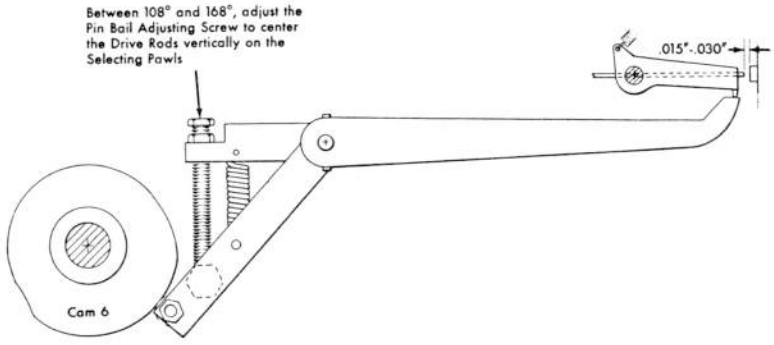


Figure 17. Drive Rod Clearance and Pin Bail Adjustment

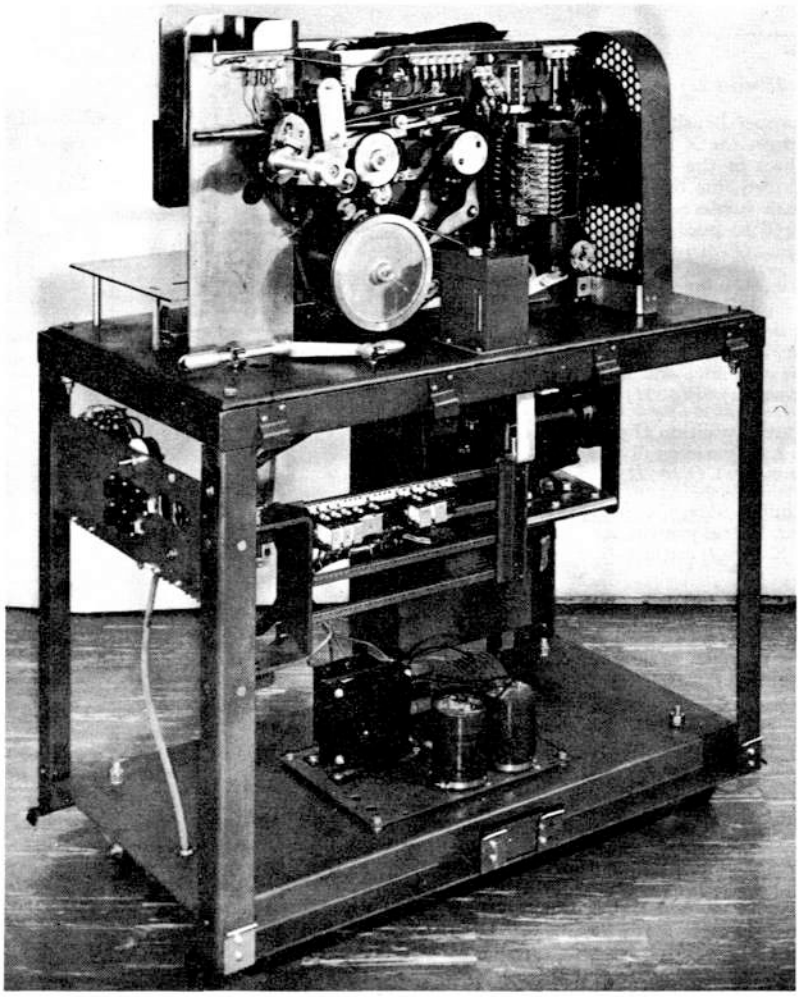


Figure 18. IBM 548

ALPHABETICAL INTERPRETER

IBM 548

GENERAL—Only the items that differ from the 552 will be mentioned in this section. All other adjustments and preventive maintenance procedures will be the same as the 552.

The changes are:

1. New Covers.
2. A self-contacting type control panel.
3. Wire contact relays.
4. Improved ribbon replacement procedure.
5. Improved ribbon reverse mechanism.
6. New ribbon—supplied complete with upper spool.
7. Five X-brushes are installed ahead of the regular read brushes as standard equipment.
8. Two five-position class-selectors are standard equipment.
9. The motor drive belt is a standard V belt, replacing the former link belt.
10. Unitized rocker CB's.

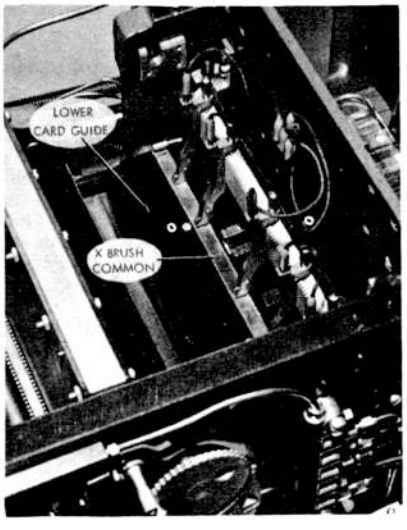


Figure 19. Card Feed

DRIVE

The motor is mounted on a movable base to facilitate belt tension adjustment. Adjust belt tension by moving the motor base up or down for $\frac{1}{2}''$ to $\frac{3}{4}''$ belt deflection midway between the pulleys.

Caution—An excessive amount of belt tension will result in excessive wear on the horizontal shaft thrust bearing.

An adjustable pulley is provided to obtain the 60+10-00 cards per minute.

CARD FEED

The five X brushes are installed on the 548 to give the customer, through use of selectors, more control over printing.

X Brush Adjustments:

(Figure 19, 20, 21 and 22)

1. To obtain the proper brush projection and tension, insert the X brush in its holder so the heel of the brush coincides with the scribed line on the bottom of the X brush holder. Form the X brush as required to position it centrally in the holder. *(Figure 20)*

2. Position the X brush mounting bar vertically for a clearance of .012" to .018" between the X brush holder and the X brush common. (The mounting screw holes have some clearance and if necessary may be enlarged.) *(Fig. 21)*

3. For correct tracking, position the X brush mounting bar horizontally (holding screw hole clearance). *(Fig. 22)*

Caution: Be sure hopper side plates are adjusted for correct lateral printing before making this X brush adjustment.

4. To time the X brush, move the brush back or forward in its holder (off the scribed line) so the brush makes at 179° and breaks at 202°.

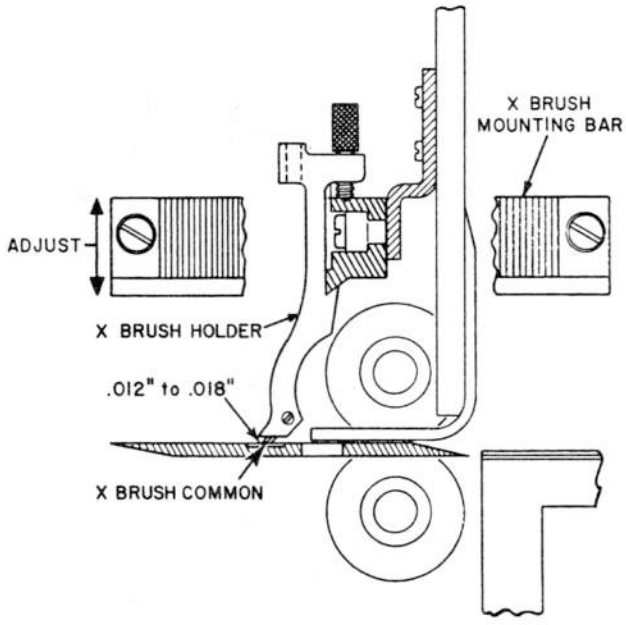


Figure 21. X Brush Holder Adjustment

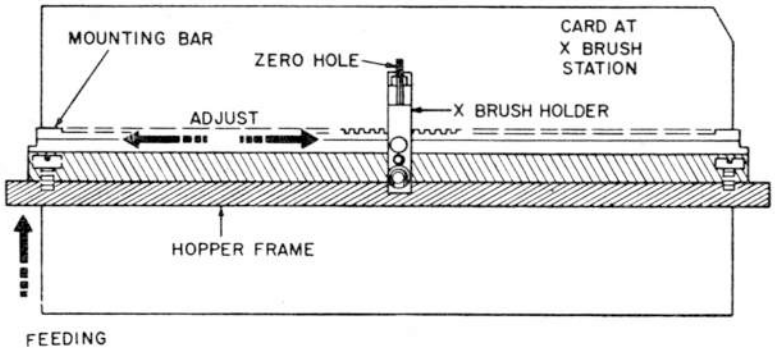


Figure 22. X Brush Lateral Alignment

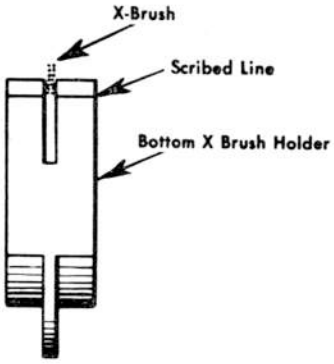


Figure 20. X Brush Projection

CARD LEVER CONTACT ADJUSTMENT

To time the card lever micro switch move the switch on its mounting plate to make at 50° and break at 85°. The end of the switch actuator should move a minimum of 3/32" before closing the contact.

CARD GUIDES

The lower card guide mounting bracket is not pinned at the factory due to the manufacturing tolerances of the card guide. Therefore, if it is removed, it may be repositioned on the card line in the following manner:

1. Remove all X brushes.

2. Replace lower card guide and mounting bracket.

3. Place both the long .012" and .018" gages between the first set of feed rolls and the contact roll. Lift the upper feed roll by hand to avoid nicking the feed rolls.

4. Raise the lower card guide plate up to the gages by moving the mounting bracket.

5. Check card line level at both ends.

6. Check the upper card guide adjustment. A clearance of .012" to .018" should exist between the upper card guides and the lower card guide plate.

RIBBON MECHANISM

The 548 ribbon, ribbon feed and ribbon feed reversing mechanism is designed to save the customer time by enabling him to change his own ribbons as needed.

Ribbon Replacement Procedure

The following procedure is recommended for ribbon changing by the customer. (*See Figure 23*)

Ribbon Reverse Mechanism Adjustments (*Figure 24*)

The ribbon reverse mechanism consists of a ribbon pressure plate, a reversing bar and an upper and lower pawl. The pressure plate is pinned to a shaft. The reversing pawl is attached to the end of this shaft. The reversing pawl is adjustable by means of an elongated slot in the pawl. As the ribbon is removed from the spool, the bail is moved closer to the center of the spool and the reversing pawl is moved closer to the reversing bar. When the upper spool has 2-½ to 3-½ turns of ribbon remaining, adjust the upper reversing pawl to overlap the step on the reversing bar by .010" to .015".

The lower ribbon reverse mechanism is the same as the upper. As the lower ribbon spool is not visible, the lower reversing pawl is adjusted in the following manner:

Turn the upper ratchet until the ribbon leader is visible. Now adjust the reversing pawl to overlap the step on the reversing bar by .020" to .030".

When the lower spool is reversed, it should require about six more revolutions of the upper spool to make the leader visible on top of the upper spool.

Caution: The ribbon pressure plate must have even tension over entire width of ribbon. Uneven tension near the ends causes wrinkling and uneven winding.

Lubrication of Ribbon Reverse Mechanism

1. Lubricate ribbon shaft bearing and ratchet hub (2 places) with **IBM No. 9.**

2. Lubricate ratchet teeth with **IBM No 17.**

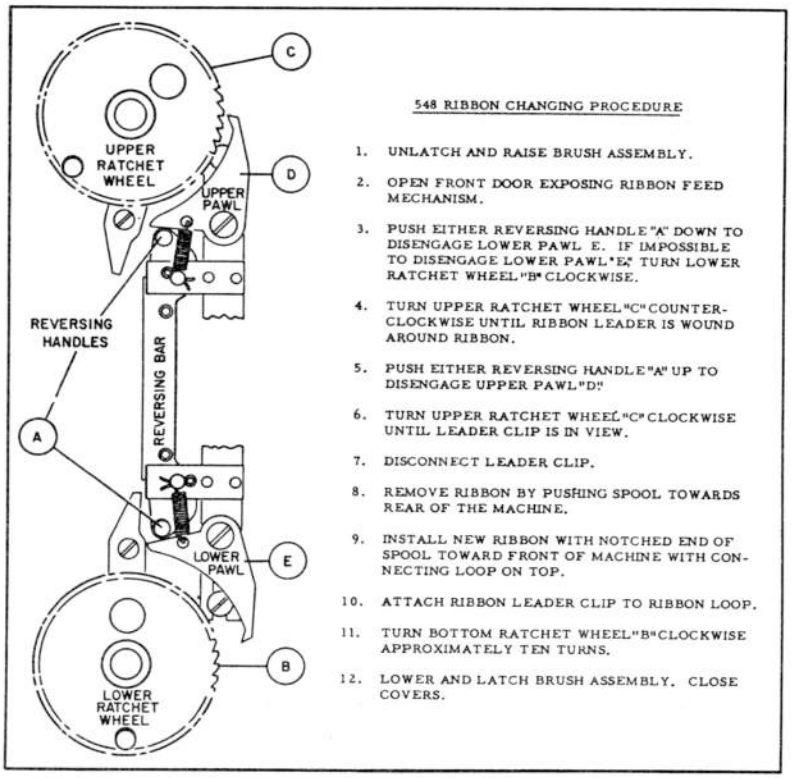


Figure 23. Ribbon Changing Procedure

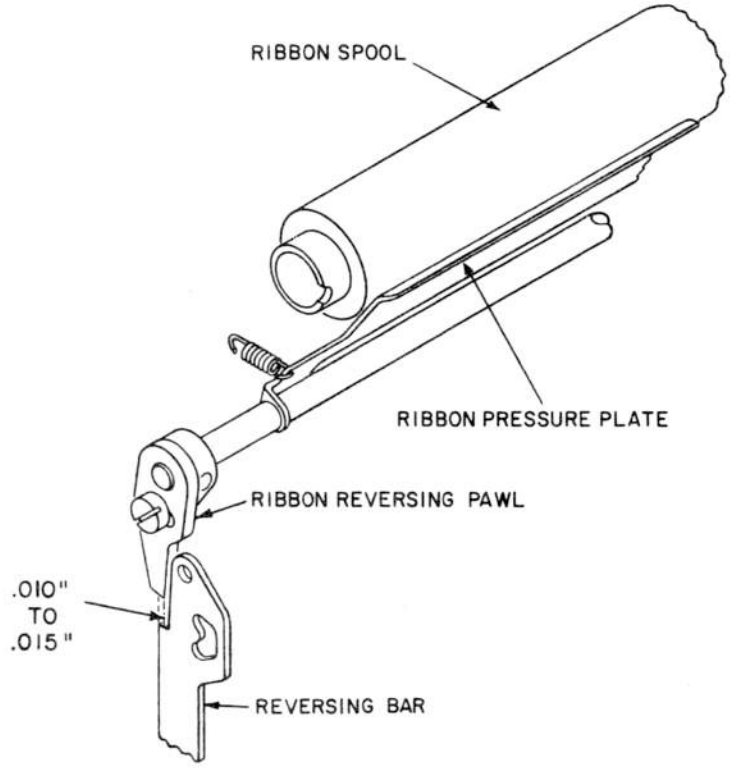


Figure 24. Ribbon Reverse Mechanism

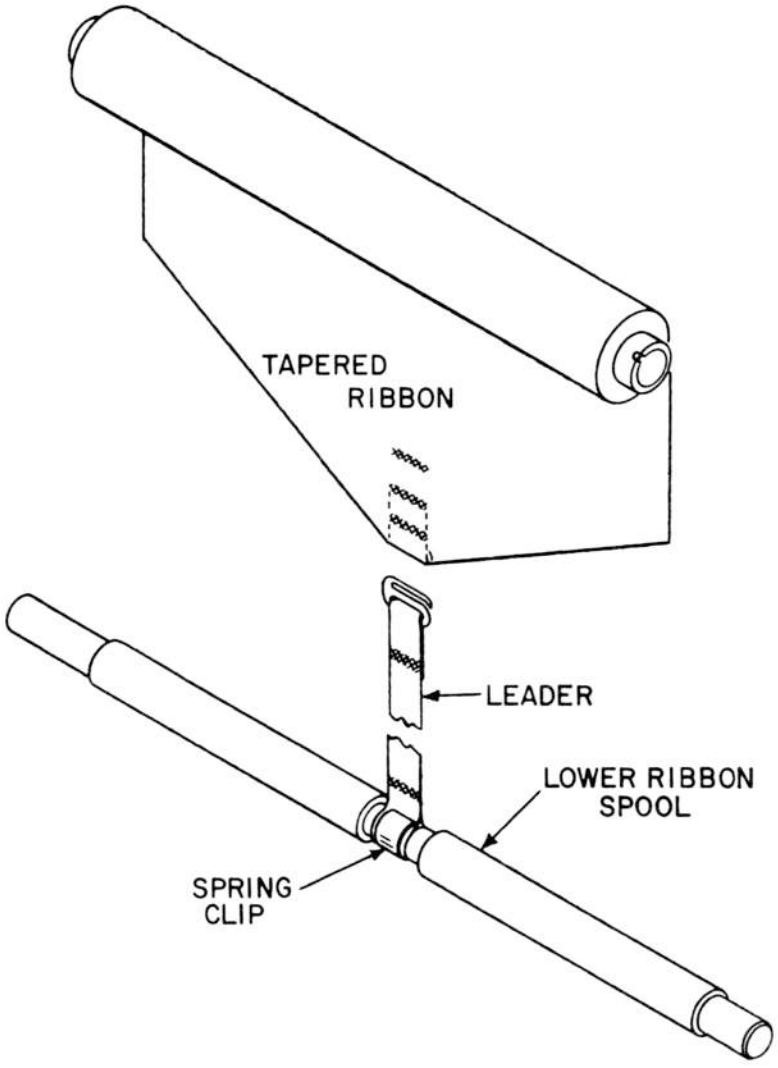


Figure 25. Ribbon and Ribbon Leader Assembly

RIBBON LEADER REPLACEMENT PROCEDURE (*Figure 25*)

1. Disconnect leader from ribbon.

2. Wind all of *leader* around lower spool.

3. Remove lower ribbon-spool-bushing holding-screw, accessible through hole in lower ratchet wheel.

4. Pull lower ratchet and ribbon spool out.

5. Remove spring clip which holds leader on lower spool.

6. Slip old leader off and new leader on.

7. Reverse procedure to reassemble.

CONTROL PANEL ADJUSTMENTS

(*Figure 26*)

The following adjustments (one through four) are made to obtain 1/8" rise of the manual control panel.

1. Remove the control panel door cover.

2. Remove the two roller block assemblies, one from each side of the stationary panel frame.

3. With the control panel retainer in its closed position against the stationary panel frame, adjust the two eccentric studs, for a dimension of 3-5/8 inches between the bottom retaining bar of the control panel retainer and the bottom row of stationary panel contacts. The eccentric studs should be adjusted evenly.

4. Re-install the roller block assemblies. With the roller blocks in place, hold or block the closing bracket assembly in a position perpendicular to the control panel retainer rails. Adjust the roller blocks up or down by means of the two adjusting screws for a dimension of 3½ inches between the bottom retaining bar and the bottom row of stationary control panel contacts. Adjust the screws evenly for uniform contact lift across the entire panel.

5. A control panel interlock in the form of a centralizing bracket and a safety catch is mounted at the bottom of the control panel cradle. This interlock insures vertical alignment of the removable and permanent panels; it also prevents the control panel mechanism from closing if the panel is not fully seated in its cradle.

(See Figure 26A and 26B)

To check the interlock adjustment, place a control panel in the retainer and slowly close the mechanism toward the contacting position. As the mechanism is closed and the safety catch and closing brackets coincide, a clearance of approximately 1/16" should exist between these two parts; the centralizing bracket should also enter its slot in the permanent panel.

To adjust, loosen the bracket holding screw, and move the bracket in the holding screw slot to obtain the specified 1/16" clearance. (See Figure 26A)

6. STATIONARY CONTROL PANEL CONTACTS

A correctly adjusted stationary control panel should allow the sliding portion of the control panel gage to slide freely under the spring contacts with no clearance. The contacts may be adjusted individually or if the whole panel is incorrect, it should be moved up or down as a unit by adding or removing shims at the top and bottom of the panel.

Individual contacts are adjusted in the following manner.

(a) Form the contact at least .045" below the top surface of the sliding bar and then forming up to the desired position. This prestresses the contact to stabilize the tension and retain the adjustment.

(b) The final forming of the contact must always be in the upward direction.

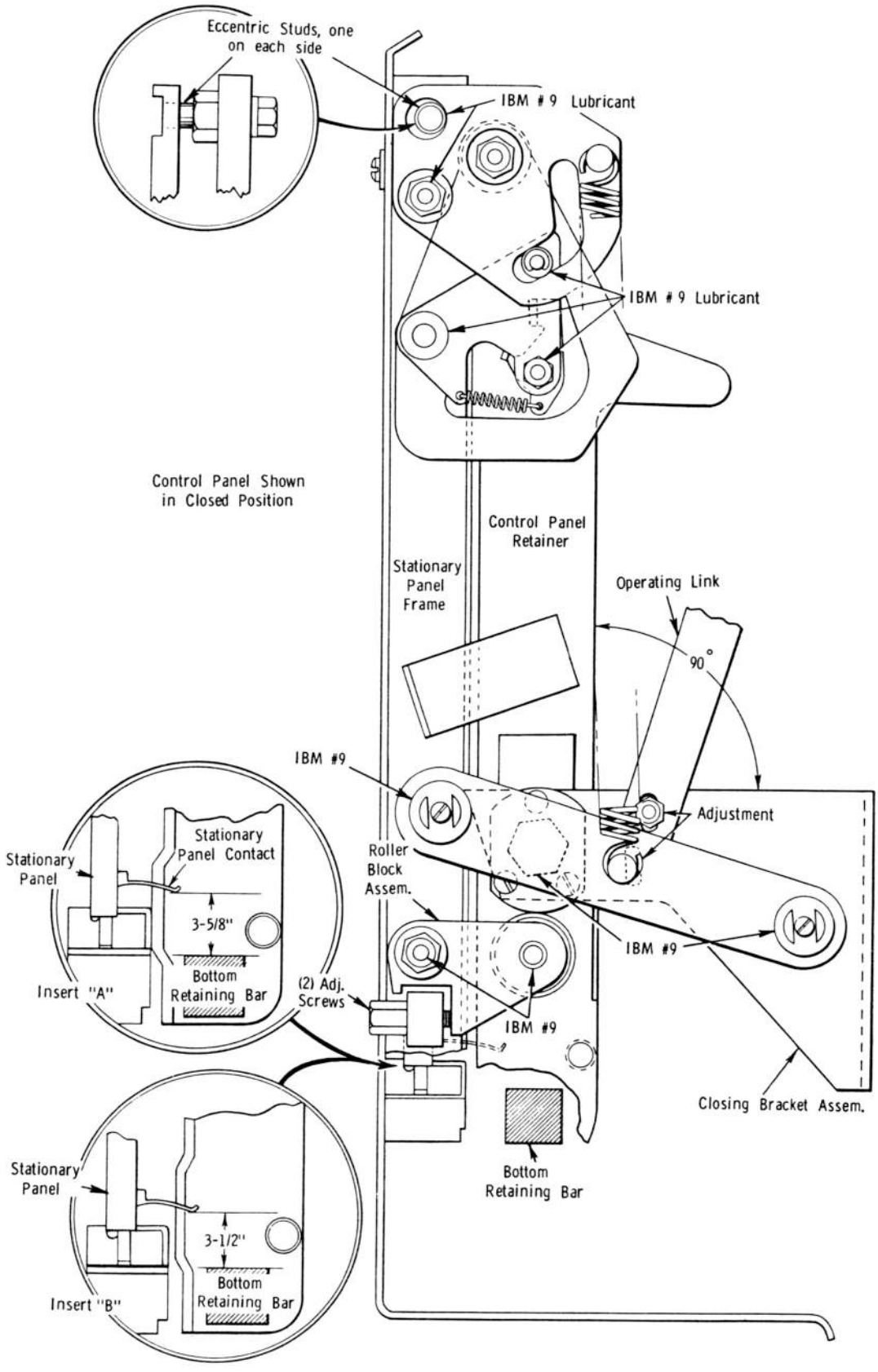


Figure 26. Control Panel Closure Mechanism

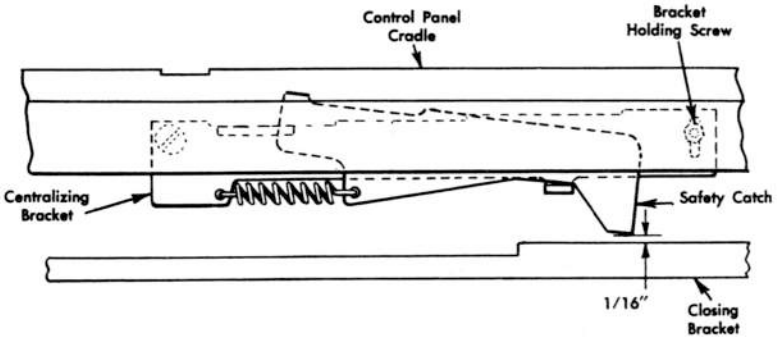


Figure 26A

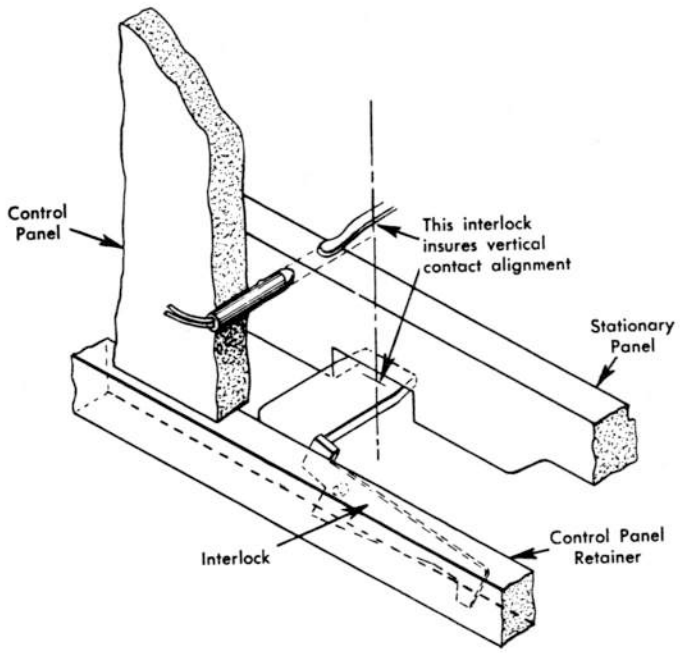


Figure 26B

Control Panel (*Figure 27*)

The IBM 548 control panel layout is included for the Customer Engineers convenience.

Circuit Breakers (*Figure 28*)

Adjustments—Unitized C.B.

Adjust the air gap for .030" and a nominal contact pressure of 400 grams.

Circuit Description 548

All circuits for the 548 and 552 are the same except the running circuit—the difference being the use of an additional relay. Relay No. 2 is held through the action of the card jam contact. Relay No. 2 holds relay No. 1 which holds the motor.

Class Selectors

By wiring an X brush to a class-selector pick-up-hub, the five points of the selector will be transferred when an X is read. The selector will pick before zone-time and hold through selection-time, dropping out in time for the next card to read normally.

SERVICE AIDS AND INFORMATION

1. Brushes

A. The brushes should be held to 1/8" projection below the upper card guide plate. Excessive projection causes the strands to pile up and consequently lift out of the card hole simultaneously instead of by individual groups. This may result in brush burning. Insufficient tension will cause poor reading and bouncing.

B. The actual card speed at reading time is quite fast. Therefore in order to determine the actual make and break time of the brush the machine should be turned very slowly.

2. Armatures

A. Wear and extreme glazing of the armature or latch will result in extraneous tripping and may appear to be magnetic interaction.

B. Excessive armature to core clearance may result in failure to trip.

C. The armature to latch adjustment should be held as close as possible to obtain the best operation.

3. Type Bar Rise

Due to the small space between type bar teeth it is essential that the list lap be uniform from 0 through 9. Failure with respect to uniform list lap may be due to erroneous timing of the cam shaft. Proper cam shaft timing will give 3/32" downward movement of the type bars between 100° and 115½°. After this condition has been obtained list lap should be checked for all digits.

4. VOLTAGE

Many intermittent errors may be avoided by maintaining the recommended no load voltage of 46V±2.

5. PRINT UNIT

Care should be exercised to insure that all print magnet drive rods are in the restored position before inserting the type bar assembly. Failure to do so may result in bent or damaged drive rods.

A simple method of removing the print unit when the machine is locked up because of bent type bars and friction springs is as follows:

a. Remove restoring bail cam follower levers, front and rear.

b. Remove print unit using normal removal procedure.

6. TYPE BAR BUMPER ASSEMBLY

Printing failures from one or more type bars may be caused by the type bars adhering to the Neoprene Bumper.

For best operation, the type bar bumper should be kept free from oil and ink.

7. CONTACT DRUM FINGERS

The Type 552 machine has a felt pad located on card gripper cam for lubricating the gripper fingers and cam. This felt should be kept lubricated with IBM No. 6 oil to prevent wear on the cam and binds on the finger pivots.

8. STACKER JAM CONTACT

If wires to the operating contact and normally closed contact of the Stacker Jam Contact are reversed, the machine will feed cards continuously but will not stop if a card jam occurs which holds the operating contact transferred to the normally open side. A check for correct wiring of this contact is to hold the operating strap transferred while feeding cards. If the machine continues to run, the Stacker Jam Contact is not wired according to the wiring diagram and should be corrected.

9. ARC SUPPRESSION CAPACITORS

If circuit breaker or reading difficulty is experienced, check the capacitors in the impulse CB circuit for conformance to the machine wiring diagram.

10. GROUND ON CONTACT DRUM

There are four (3 on some) screws which secure each bakelite end section of the contact drum. If one of these screws becomes loose and backs out against the grippers, it may cause the contact drum to become grounded.

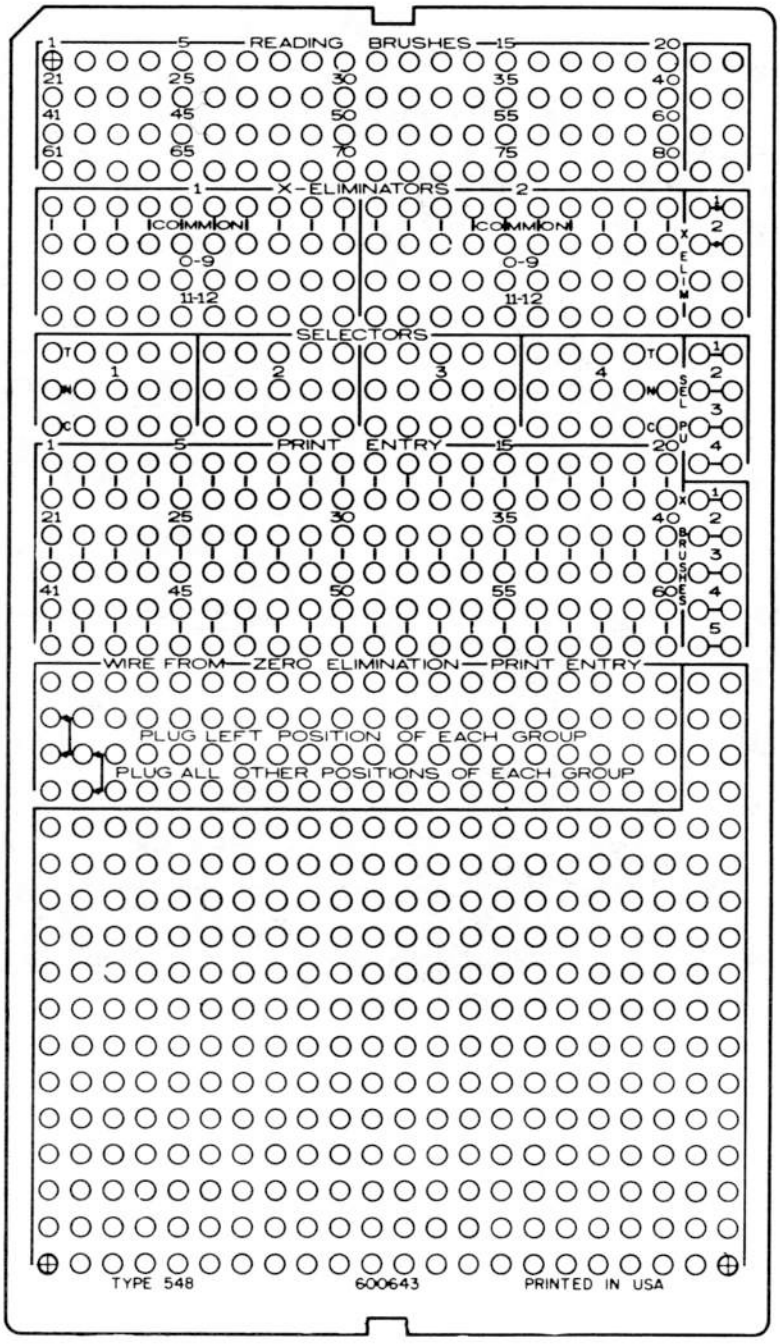


Figure 27. IBM 548 Control Panel

11. ZONE AND SELECTOR PAWL TENSION

With the print unit removed from the machine, the zone and selector pawl friction springs (Fig. 10A) should exert sufficient tension on the pawls to prevent them from falling of their own weight. It should not require more than 55 grams force to operate a pawl to its limit of travel.

12. MAGNET RESTORING PIVOTS

Intermittent printing failures may be caused by lack of lubrication on the restoring bail cam follower pivots. Lubricate with IBM 9 oil.

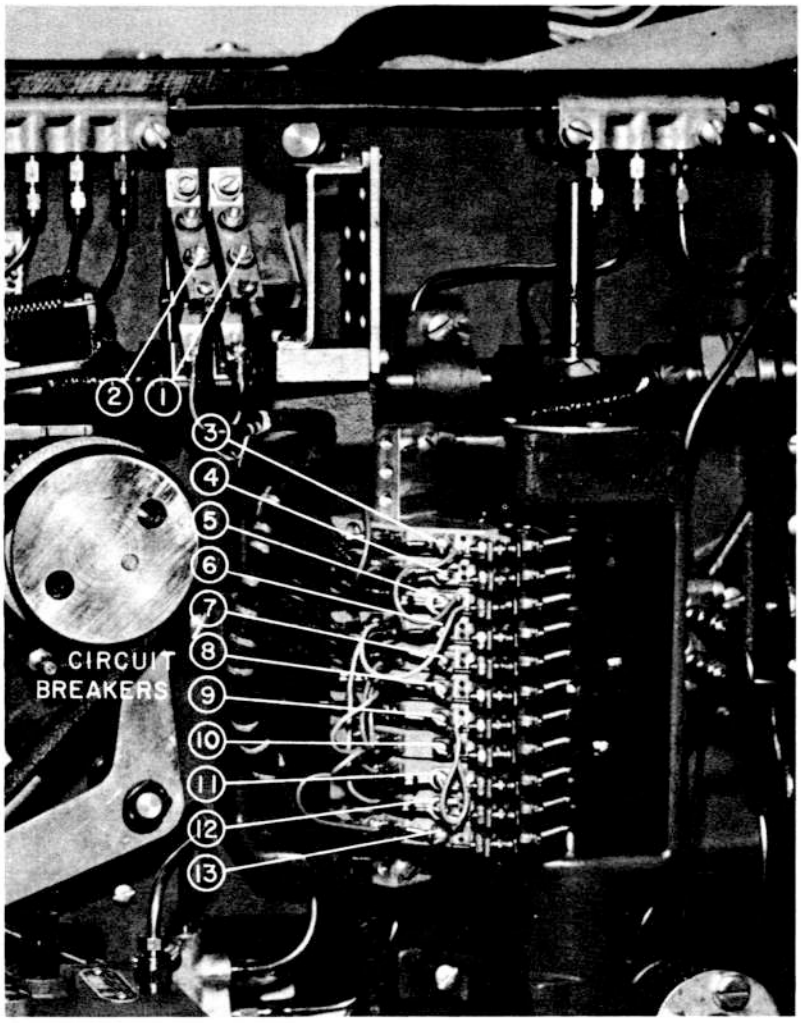


Figure 28. Circuit Breakers

548, 552 CEM's LISTED BY CATEGORY	
550, 551	1, 4, 6, 9, 14, 16, 20, 42
556	4, 6, 7, 8, 9, 10, 13, 14, 18, 19, 20, 22, 42
Base	46, 47, 79
CB's	1, 10, 17
Contact Strip	13
Drive	16, 59
Feed	22
Power Supply	8, 12, 44, 45
Print	3, 4, 9, 55, 56
Relay	11, 43
Ribbon	14, 49, 54
Safety	2, 5, 17, 42, 43, 44, 45, 46, 47, 59, 79
Service Aids	6, 18, 19, 20
Suppress Magnet	19
Zero Check	7

NOTES

NOTES

P. M. ROUTINE

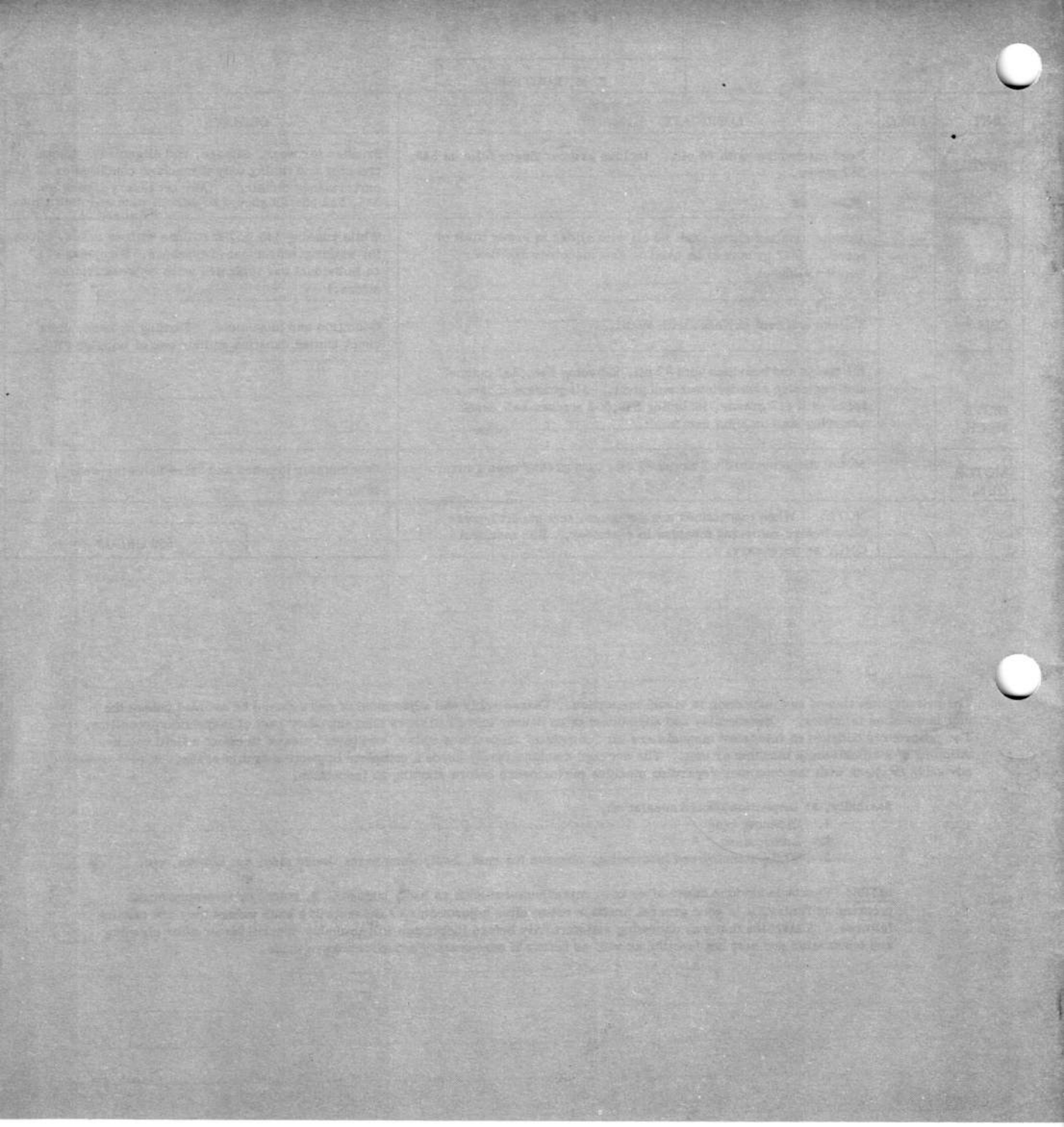
UNIT	FREQ.	LUBRICATE - CLEAN	OBSERVE
FEED	26	Feed mechanism with #6 oil. Include gripper finger felts on 548, 552 platen.	Brushes for wear, damage, and alignment. Check tracking and timing only if machine condition or performance dictates. (Any necessary timing on 548, 552 checks should be at both zone and digit times EX:0 and 5)
PRINT		Atomize friction slides with #6 oil with slides at lower limit of travel. (#17 grease to be used on new machines and new friction slides.)	While running 548,552 machines without cards, check for uniform movement of typebars. (Dropping of an individual bar indicates worn or weak friction slides.)
CB's		Rollers and cam surfaces with #9 Oil.	Condition and movement. Turning by hand, sight check timing duration and air gap of impulse CB's.
DRIVE MECH.		All pivots and bearings with #9 oil, including 548, 552 magnet unit restoring cam follower and pivot. All gears and cam surfaces with #17 grease, including 548,552 stacker bell crank actuating stud on print cam shaft.	
MOTOR GEN.		Motor and generator - 2 drops #9 oil, turn grease caps 1 turn.	Commutator brushes and drive belts for wear. Bijur level.
		NOTE: When inspections are complete, test general operation before returning machine to customer. Run test decks ONLY as necessary.	552 GROUP

The primary function of any inspection is visual inspection. Disassembly and adjustment of units should be avoided unless the unit in question is failing. Disassembly and adjustment often causes more callbacks than any other part of inspection procedure. The procedures outlined in reference manuals are for "complete" inspections where "complete" means in effect a field reconditioning of a troublesome machine or unit. The average machine rarely needs a complete inspection in this sense. It is advisable to check with the customer regarding machine performance before starting an inspection.

Basically, an inspection should consist of:

1. Cleaning
2. Lubrication
3. While cleaning and lubricating, observe for rust, badly worn parts, loose pins, set screws, etc.

NOTE: Except in obvious cases of wear or misadjustment such as badly burned C.B. points or improper brush tracking or timing, it is good general practice not to alter adjustments or disassemble units unless they are causing failures. A machine that was operating satisfactorily before inspection will probably operate better after cleaning and lubrication and may not function as well as before if unnecessary adjustments are made.



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