

COLLATOR
TYPE 77

CONTENTS

	<i>Page</i>
ADJUSTMENTS	2-11
Feed Hoppers	2
Feed Knives	2
Feed Knife Guides	2
Card Guides	2
Feed Rolls	2
Brushes	2
Chute Blades	2
Pocket Selection Magnets	3
Primary and Secondary Clutches	3
Eject Clutch Assembly	5
Selector and Sequence Unit	6
Circuit Breakers	11
LUBRICATION	11-12

Copyright 1947, 1951

INTERNATIONAL BUSINESS MACHINES CORPORATION
New York, New York
Printed in U.S.A.
Form 22-3780-2

COLLATOR, TYPE 77

ADJUSTMENTS

Feed Hoppers

Position the front and rear hopper side plates so the holes in the card are aligned with the brushes and there is a .005" to .008" clearance over the length of the cards.

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

Feed Knives

The feed knife pivot screws should be adjusted so the feed knives travel .020" to .040" beyond the right or "12" edge of the card. Be sure the feed knives are square with the first set of feed rolls.

Feed Knife Guides

Adjust the feed knife guides for minimum sideplay without causing any binds.

Card Guides

Card guides are set for .020" clearance between the guides. The ends of the guides should clear the contact rolls by not less than .005".

• Feed Rolls

Adjust all floating feed rolls for even tension over the entire length. Primary and secondary rolls are equipped with adjustable plungers; remaining rolls are equipped with pull springs.

Brushes

The brush unit assemblies should be checked for a minimum end-shake between the side frames at the pivot rod.

Use brush setting jig 454090 to set the brushes for a $1\frac{1}{8}$ " projection from the brush block to the toe of the brush; this should provide a $\frac{1}{8}$ " projection above the card line. If necessary, holes for the brush holder locating block may be elongated to secure a $\frac{1}{8}$ " projection. Use brush adjusting glass 450388 to position the brushes using scribed line farthest from the 90° bend.

Position the brush separator rolls so the distance from the inside of the front side frame to the front edge of the #1 brush groove in the separator roll is $\frac{5}{8}$ ". This may be obtained by driving the bronze bearings in the separator roll bearing brackets in or out. Align the brushes to the middle of the brush separator roll slots by adjusting the brush block lateral aligning screws.

For the earlier machines not equipped with aligning screws, the adjustment is obtained by filing one end of the brush block and placing shims between the other end of the brush block and the side frame. In either case, it will be necessary to align individual brushes with the three-group brush bending tool.

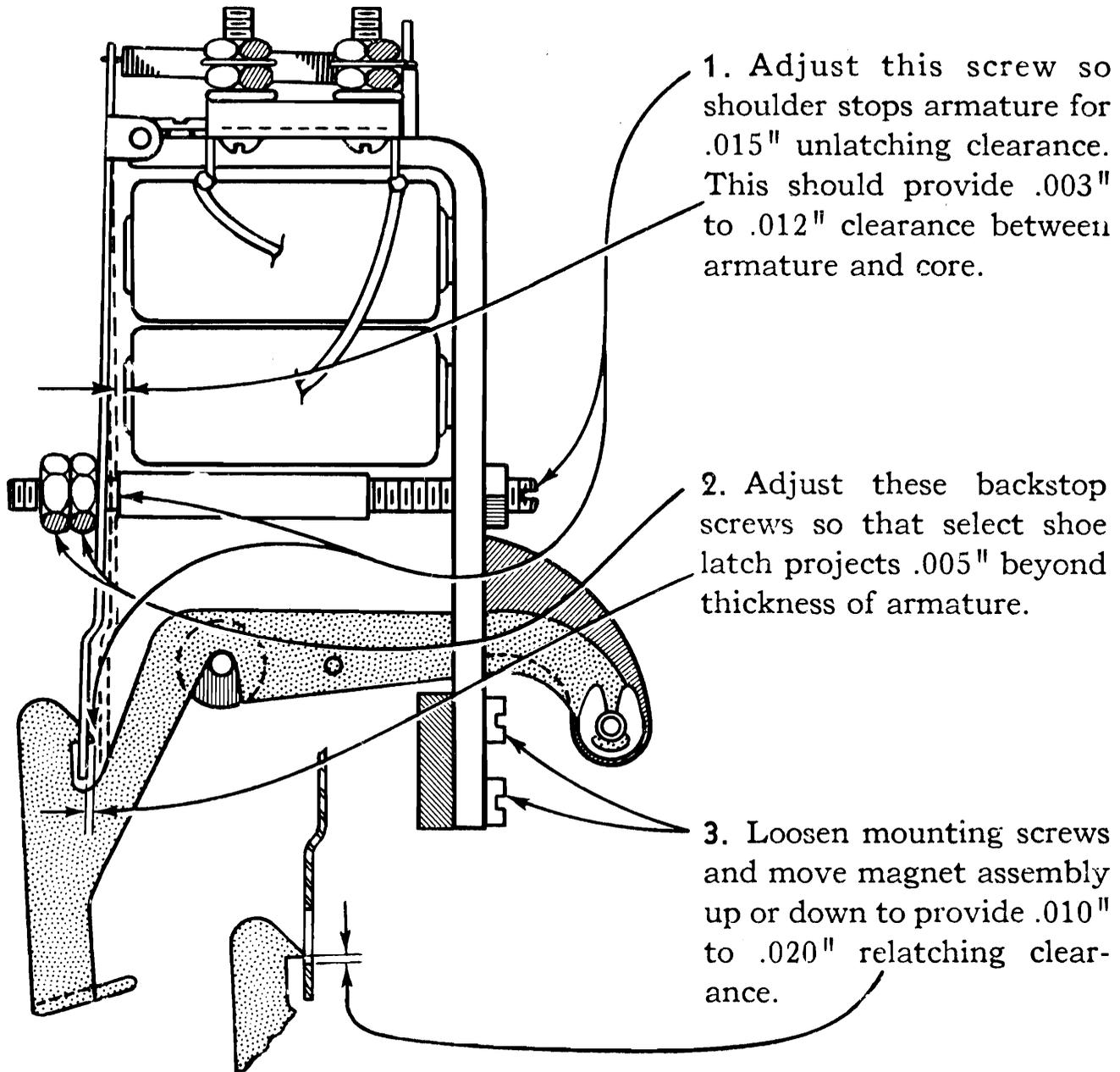
Shift the hopper side plates so that one set of brushes tracks through the center of the hole in card. If necessary to re-align other set of brushes, be sure the brush separator roll is adjusted along with the brush block assembly.

Rotate the picker knife cam on its shaft to cause the primary brushes to make through the hole in the card not later than 3° before the corresponding line of the index and break not earlier than 12° after the line of index. Repeat for secondary brushes. To obtain the correct timing for primary sequence brushes, adjust the brush block assembly. It is suggested that a dynamic timer be used when timing the brushes to obtain the best possible condition. Check columns at both ends of card using 1, 5 and 9 time.

Chute Blades

Chute blades should be shaped to provide sufficient tension to cause the blade to follow the select shoe. Form the blades so the tips of the secondary blades are $\frac{1}{16}$ " above the card line and the tip of the primary blade is $\frac{1}{16}$ " below the card line when the select shoe is latched in normal position. When the select shoe is unlatched, tips of the secondary blades should be $\frac{1}{16}$ " below the card line and the primary blade $\frac{1}{16}$ " above the card line.

Pocket Selection Magnets

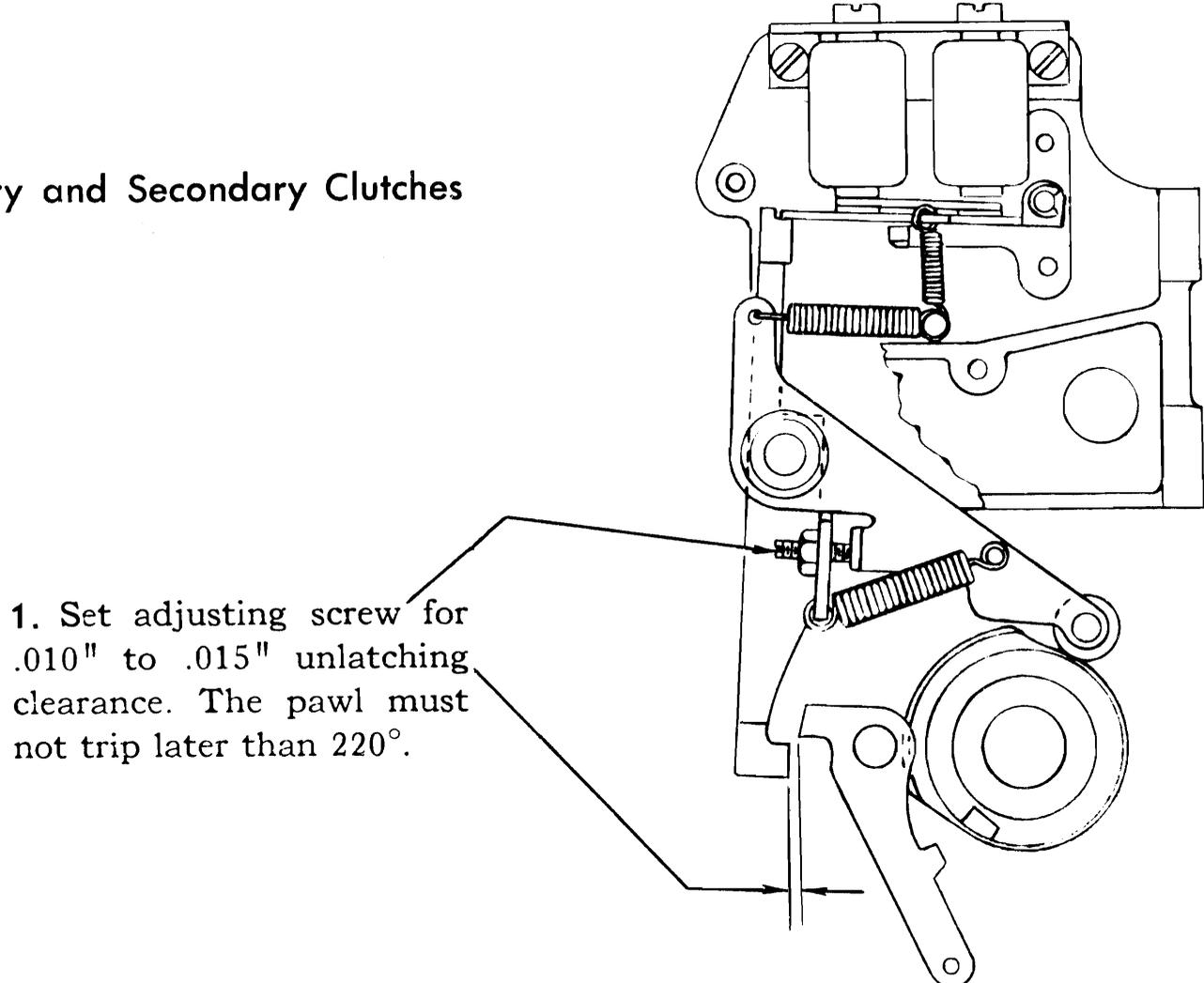


1. Adjust this screw so shoulder stops armature for .015" unlatching clearance. This should provide .003" to .012" clearance between armature and core.

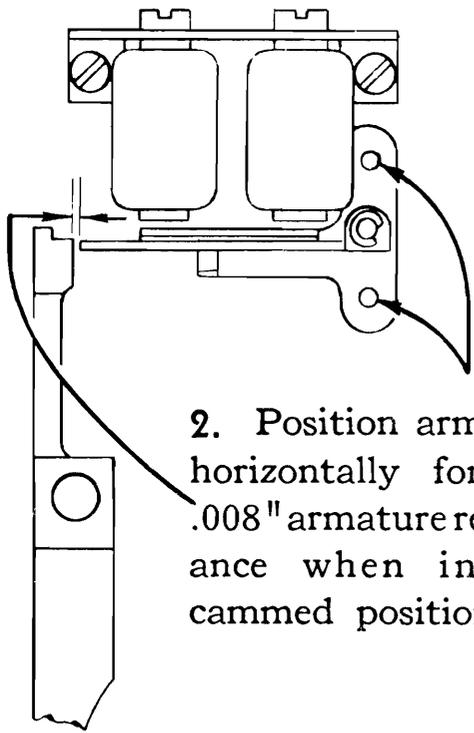
2. Adjust these backstop screws so that select shoe latch projects .005" beyond thickness of armature.

3. Loosen mounting screws and move magnet assembly up or down to provide .010" to .020" relatching clearance.

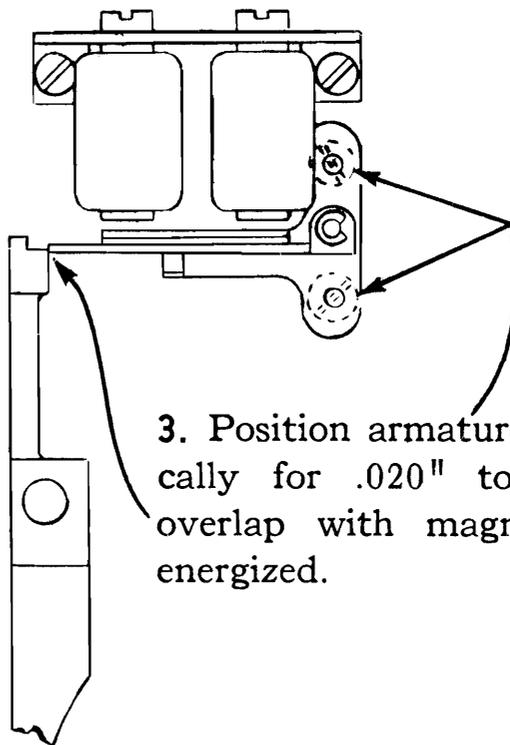
Primary and Secondary Clutches



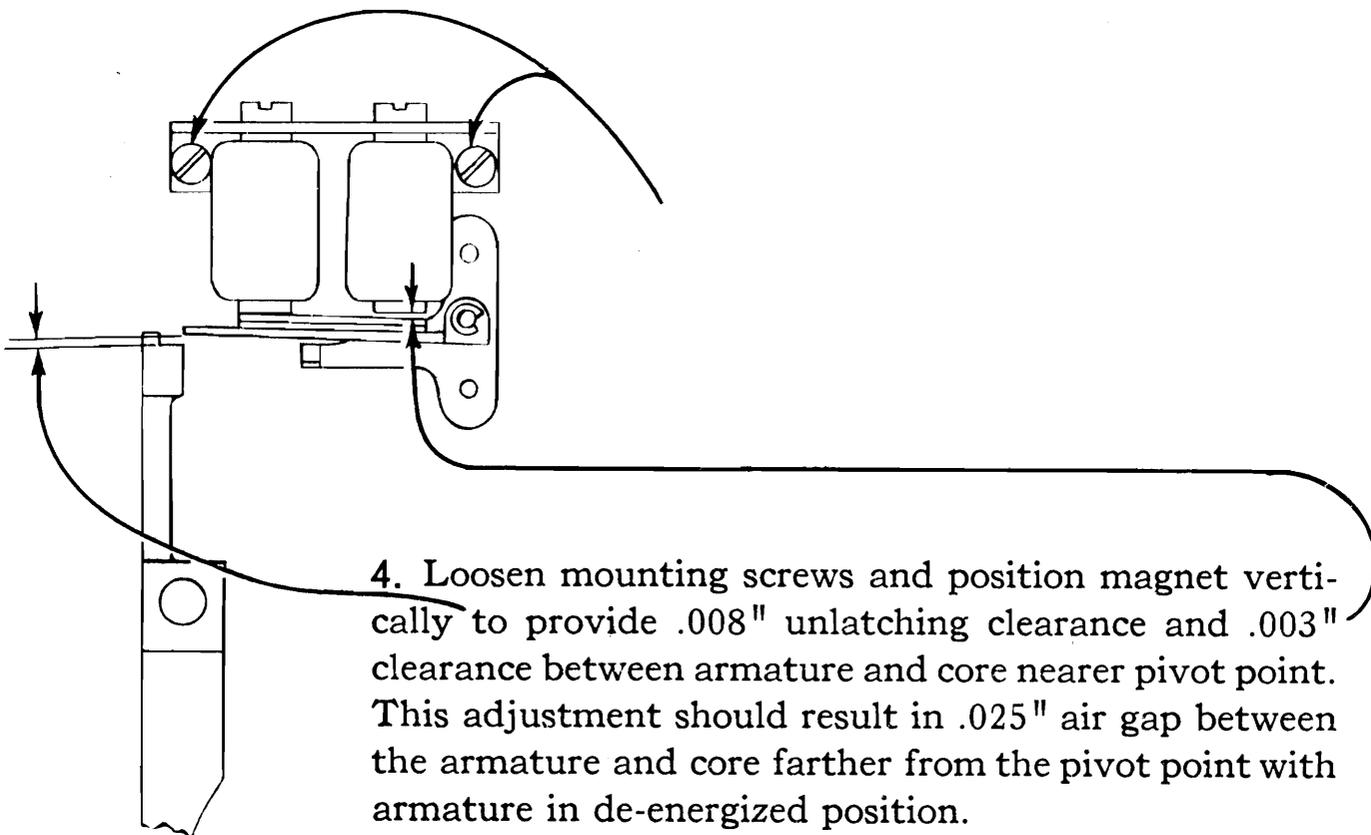
1. Set adjusting screw for .010" to .015" unlatching clearance. The pawl must not trip later than 220°.



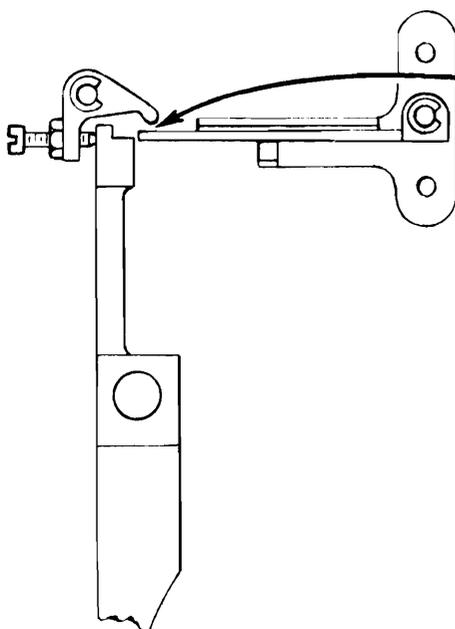
2. Position armature horizontally for .005" to .008" armature relatch clearance when in extreme cammed position.



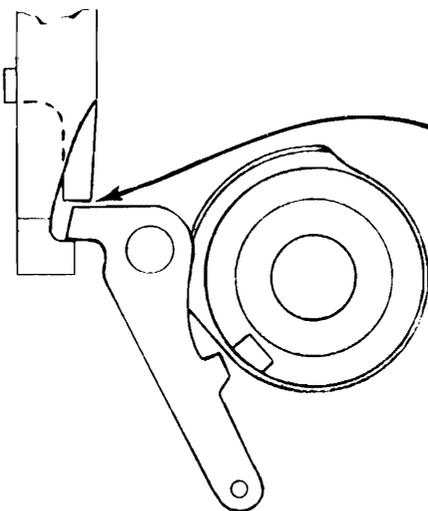
3. Position armature vertically for .020" to .025" overlap with magnet de-energized.



4. Loosen mounting screws and position magnet vertically to provide .008" unlatching clearance and .003" clearance between armature and core nearer pivot point. This adjustment should result in .025" air gap between the armature and core farther from the pivot point with armature in de-energized position.



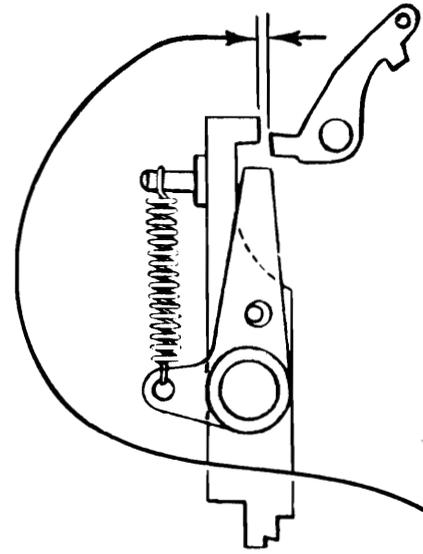
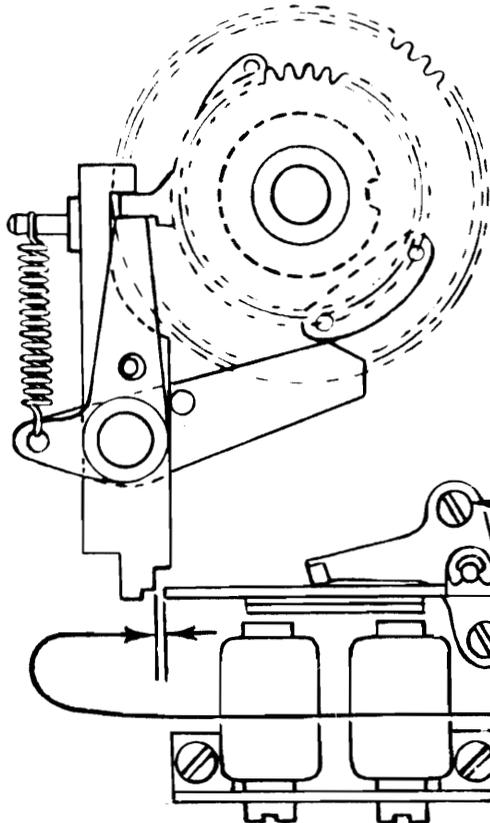
5. Adjust knockoff screw for .010" to .012" clearance with armature in extreme cammed position.



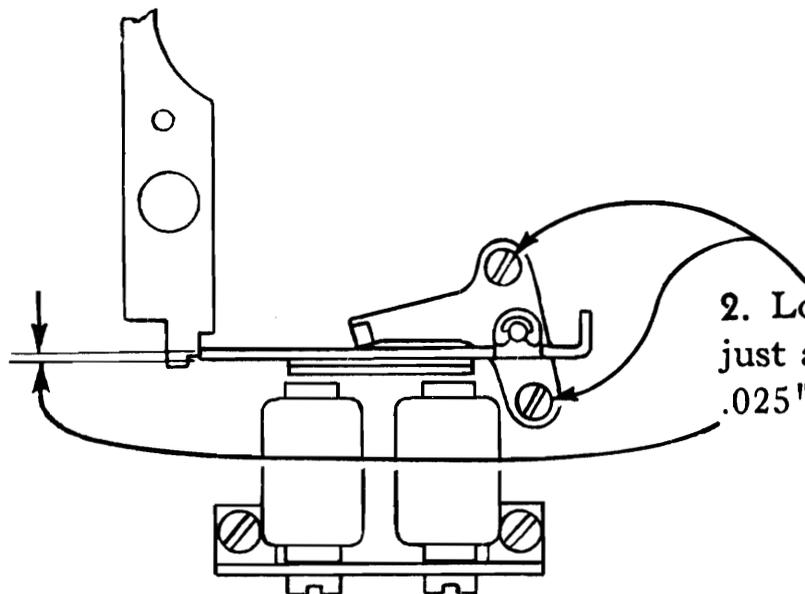
6. Peen or stone keeper for .003" clearance.

Eject Clutch Assembly

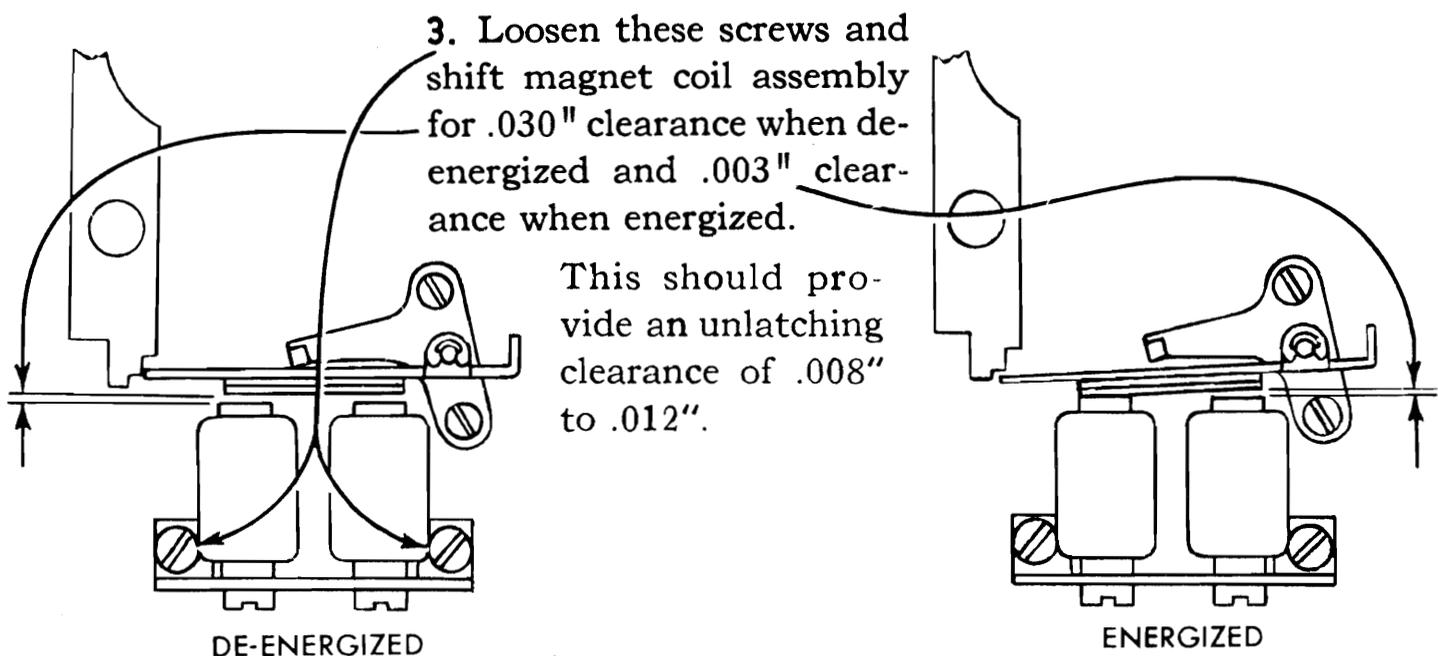
The eject clutch one-tooth ratchet is timed to engage the pawl at $235^\circ \pm 2^\circ$. The adjustments are as follows:



1. Loosen these screws and adjust armature horizontally for .010" clearance between latch and armature when the eject clutch gear knockoff block fully operates against the clutch arm knockoff. This should result in .015" to .025" pawl unlatching clearance when the magnet is energized.



2. Loosen screws and adjust armature vertically for .025" overlap.

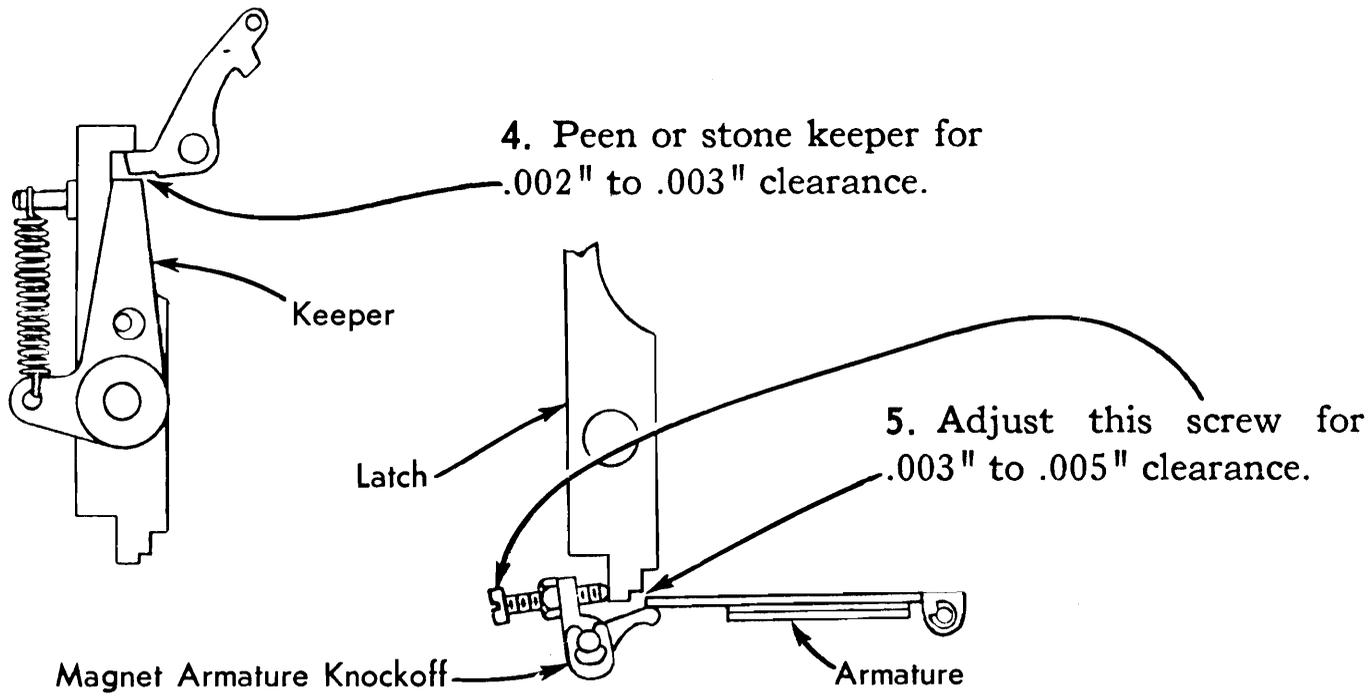


3. Loosen these screws and shift magnet coil assembly for .030" clearance when de-energized and .003" clearance when energized.

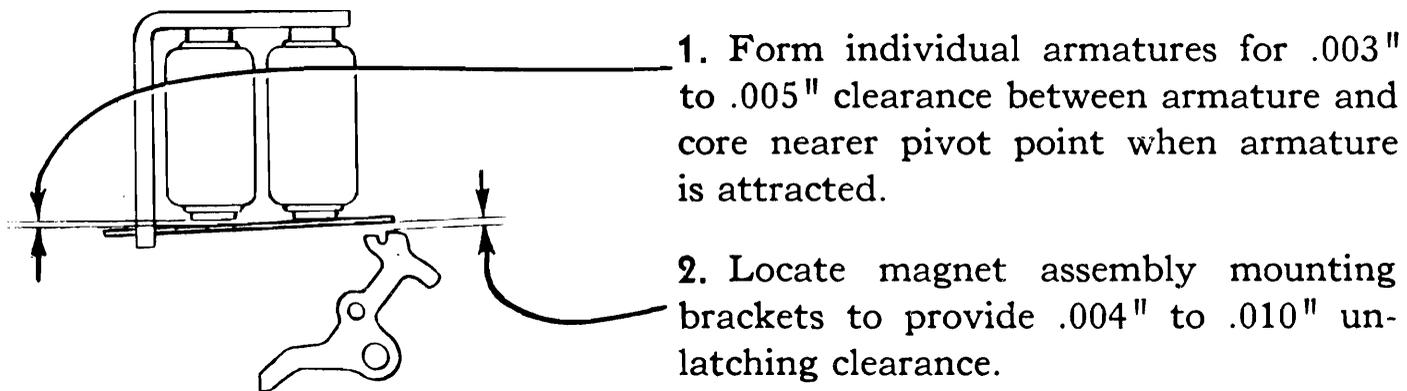
This should provide an unlatching clearance of .008" to .012".

DE-ENERGIZED

ENERGIZED

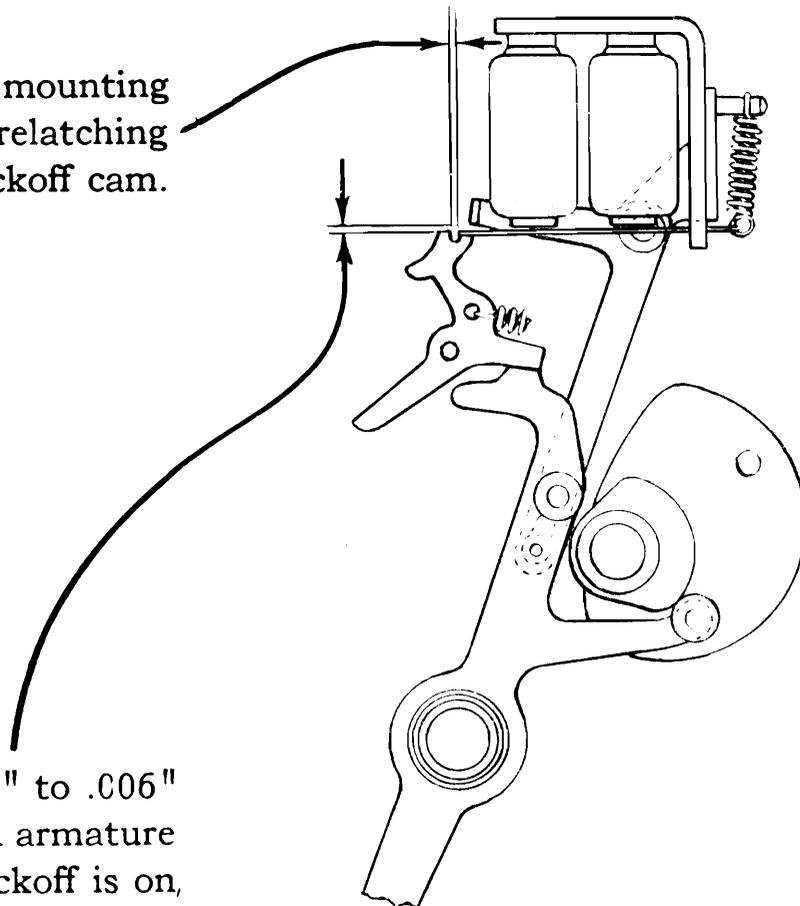


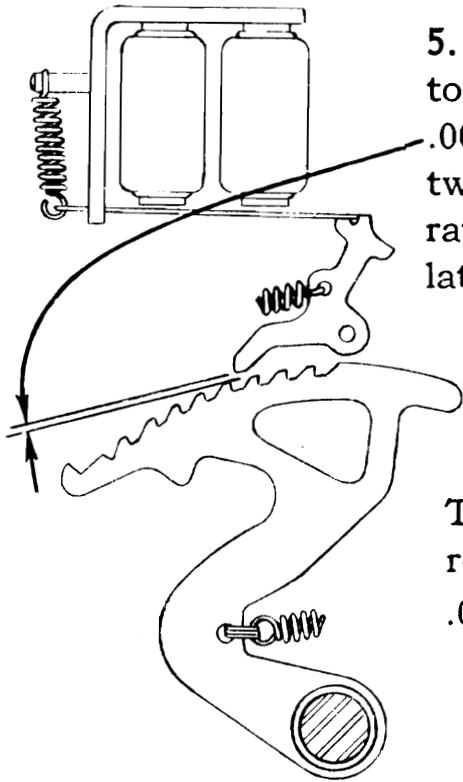
Selector and Sequence Unit



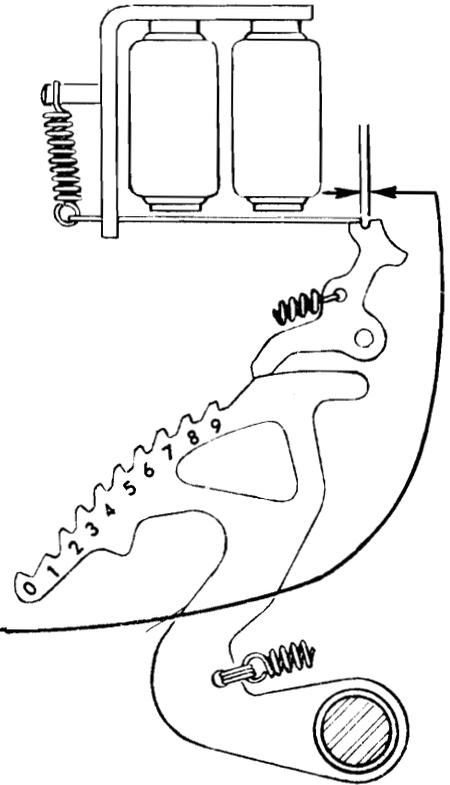
3. Adjust restoring magnet mounting bracket for .005" to .010" relatching clearance on high dwell of knockoff cam.

4. Form knockoff arm for .002" to .006" clearance between knockoff and armature on restoring magnet when knockoff is on, high dwell of knockoff cam.



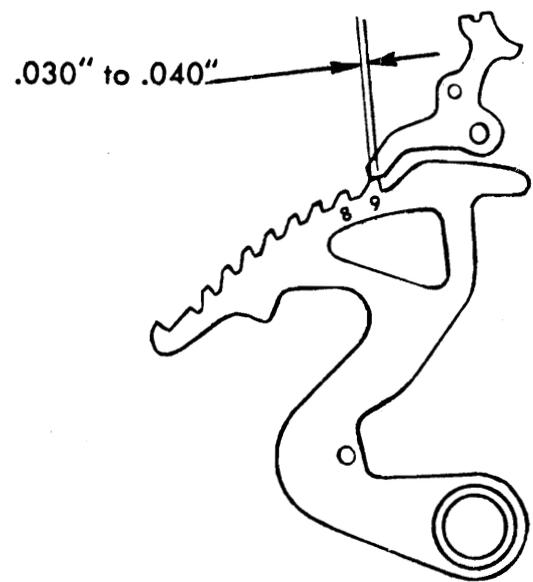
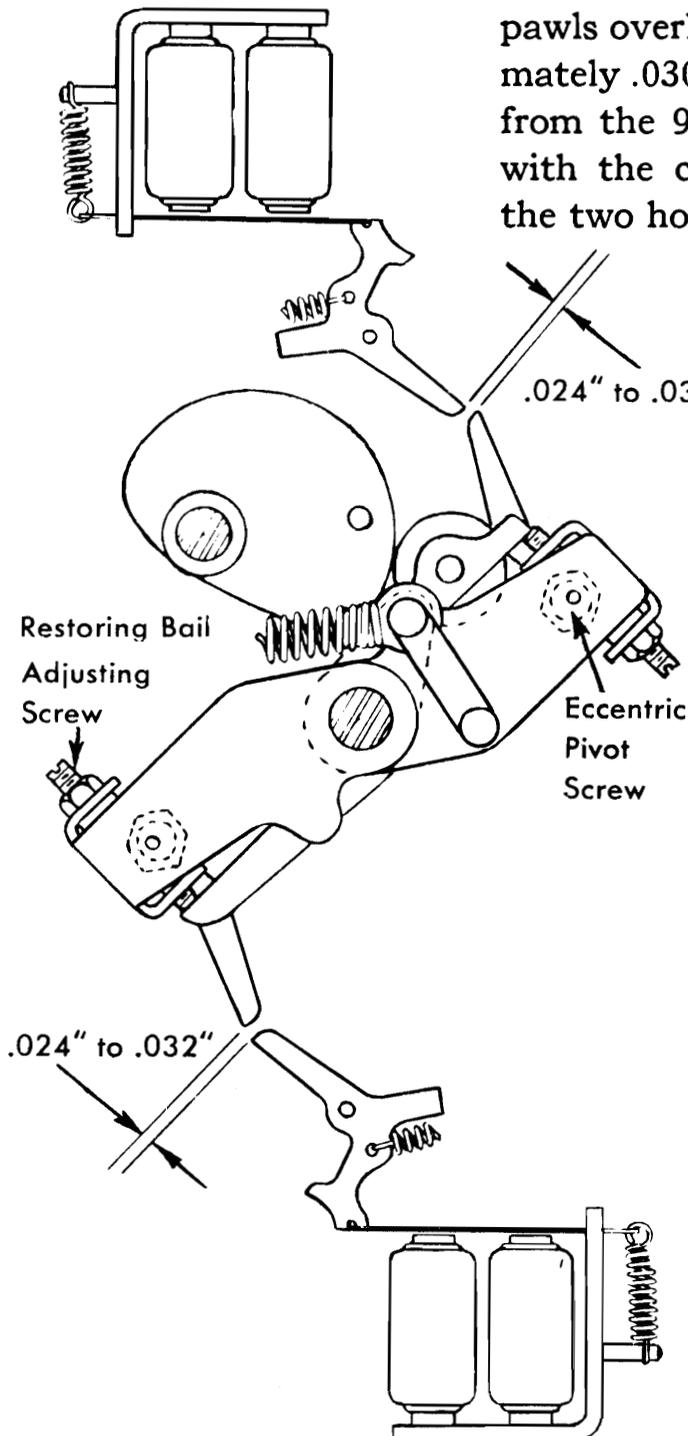


5. Move individual magnets to front or rear to provide .008" to .012" clearance between stop pawls and setup ratchet teeth with stop pawls latched on armature.

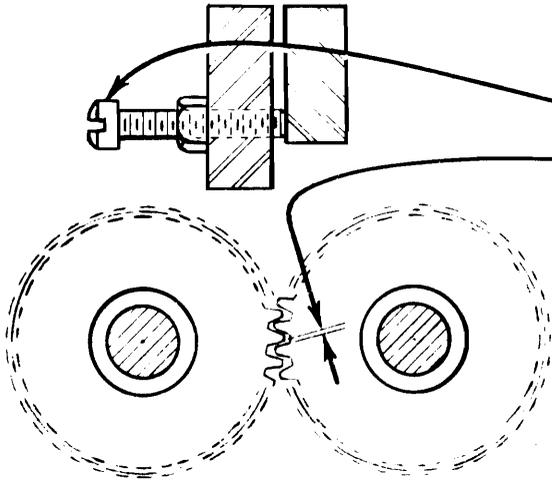


This should result in a relatching clearance of .010" to .014"

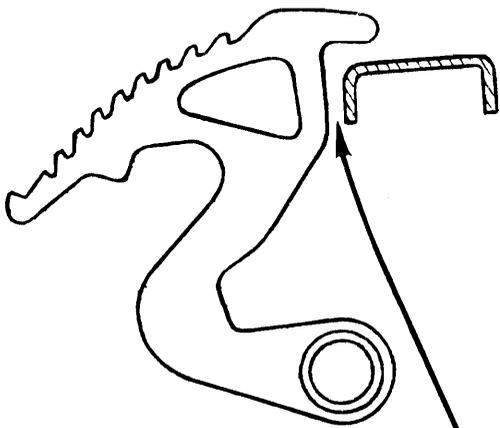
6. To time the unit to the machine: Turn the restoring bail adjusting screws so they project through the bail approximately $\frac{5}{64}$ " at the point where the screw bears against the cam follower. Set unit on support bars. Install holding screws and turn them in just far enough to hold unit without meshing gears. Set the machine at 8 (18°) on the index. Trip the restoring magnet armature and turn the unit drive gear clockwise until the stop pawls overlap the 9 tooth of the setup ratchets approximately .030" to .040". Be sure the ratchets are travelling from the 9 toward the 0 position. Mesh the unit gear with the continuously running shaft gear and install the two holding screws.



7. The outer restoring bail adjusting screws are accessible with the unit on the machine and should now be adjusted for an even overlap of .030" to .040" of the stop pawls to the setup ratchet teeth at a line on the index. (Complete adjustments 8 and 9, then perform adjustment 10 on the next page.)

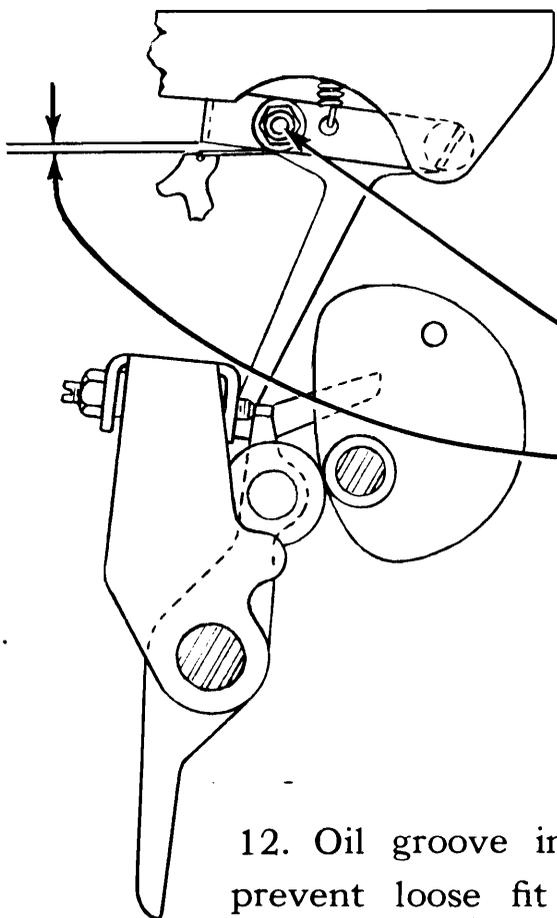


8. Position right-hand unit adjusting screw for .002" lash of the drive gears. Tighten right-hand support screw. Adjust left-hand screw until it just touches support bar and tighten support screw. This is to prevent warping the unit.



9. Remove the unit from the machine and adjust the lower restoring bail adjusting screws as in paragraph 6 above, using the upper half of the unit as a guide. Check by tripping stop pawls 1 and 16, upper and lower, and noting that they drop into the setup ratchet teeth at the same time on the restoring part of the cycle. Reinstall the unit on the machine.

10. Adjust restoring latch bail pawl eccentric pivot for .024" to .032" clearance to restoring magnet pawl. (see large illustration, page 7). Check for at least .010" clearance of restoring bail to setup ratchets when restoring pawl is against its latch.

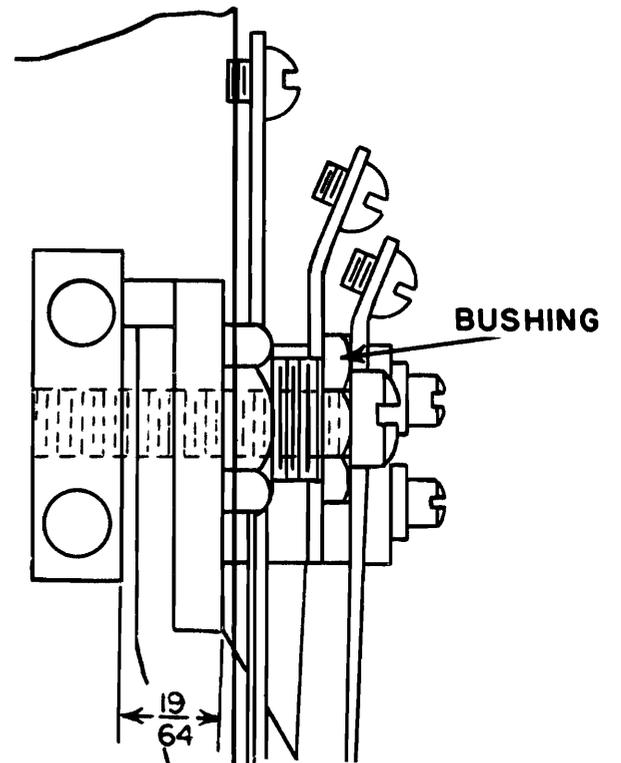


11. When the restoring bails are resting against the cam followers on the low dwell of the cam, adjust the armature knockoff bail eccentric adjusting studs so that the armatures will have .002" to .006" movement. Both sides of the unit should be cleared to zero before starting to check this adjustment. Check one side of the unit at a time by turning the machine by hand and tripping all stop pawls. This provides the greatest load on the restoring bail spring.

12. Oil groove in setup ratchet shaft should be 45° off center to prevent loose fit of differential guide plate on shaft.

Contact Assembly

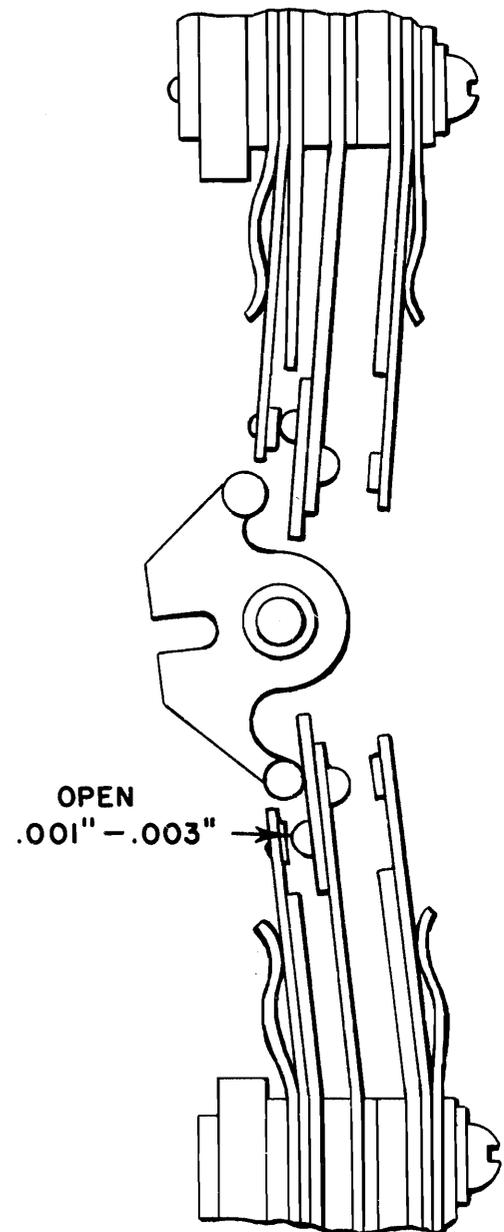
1. Set the adjustment bushings for $\frac{19}{64}$ " clearance between mounting pads on side frames and outer surface of contact mounting bar. Adjust any one bushing to remove any rock.



2. With ones in lower section of unit, and upper section cleared to zero, adjust lower N/C contact support straps until center straps come against cam lobes and N/C contacts open $.001$ " to $.003$ ".

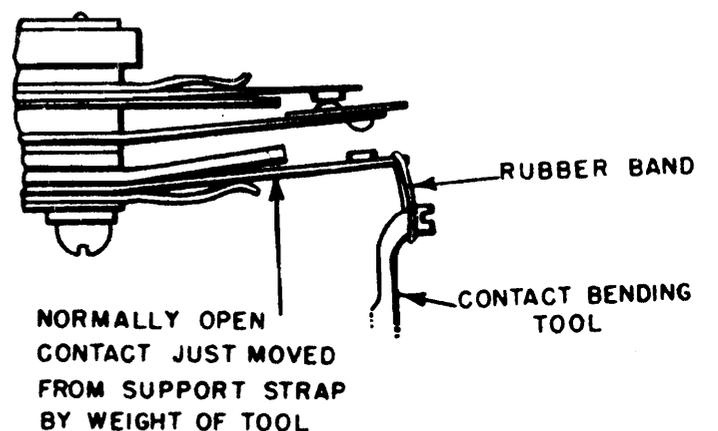
3. Clear lower reading and put ones in upper side of unit. Adjust upper N/C contact support straps until center straps come against cam lobes and N/C contacts open $.001$ " to $.003$ ".

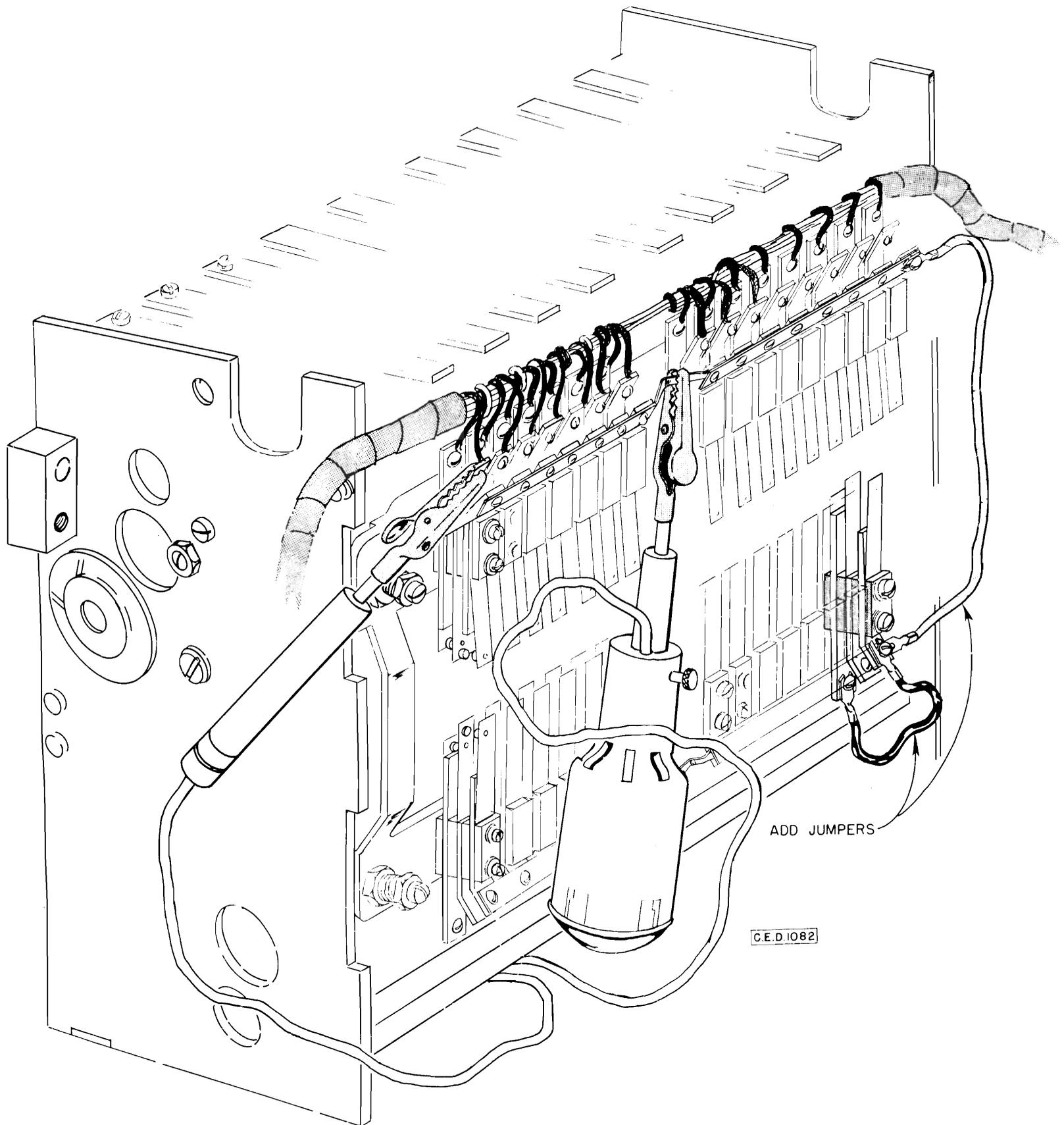
4. With both sides of unit cleared to zero, back out adjustment bushings evenly to bring center straps as close as possible to cam lobes without exerting pressure on the cams.



5. Remove contact unit and place horizontal with N/C straps up. Adjust N/O strap tension for 15 to 25 grams tension against support. Use contact bending tool as a weight to check adjustment. It should just move N/O strap away from its support.

6. With contact unit horizontal and N/C straps up, adjust center strap tension so it just pulls away from N/C contact with weight of contact bending tool. N/C strap should have just a perceptible rise from its support under tension of center strap.

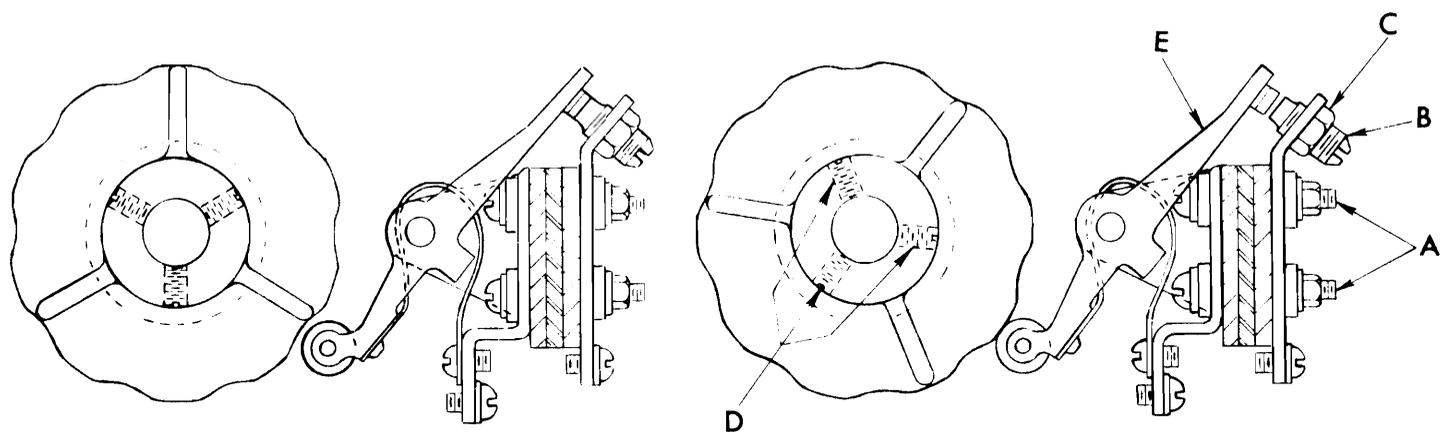




7. Wire test light as shown using a neon bulb. Adjust each contact position by bending N/O support strap until light just blinks out when center strap goes from N/C to N/O strap. Obtain smallest possible center strap motion with light out.

8. Remove jumpers and test light leads and recheck for no strap pressure on cam lobes with unit at zero reading. To check for this condition have machine idle under power and trip one side of each unit at a time. If there is an appreciable movement of the center strap on the side of the unit where the contacts are not transferring, it is a sign of strap pressure on cam lobes at zero reading. When this check indicates an incorrect adjustment, the contacts for that position should be adjusted individually on the machine by bending the N/C support strap until contact pressure is relieved with zero reading in both sides.

9. Check visually for a minimum of .020" air gap between N/C points with zeroes in one side of the unit and ones in the other. Reverse zero, one readings and check other side. If this adjustment cannot be obtained, it is an indication of lost motion due to wear of the linkage. A check should be made of the parts affected in any position where this adjustment cannot be obtained and the worn parts replaced.



Circuit Breakers

1. Clean points.
2. Loosen screws A and align contact points so that full contact area is used.
3. Loosen locknut C and adjust screw B for correct air gap. There are 40 threads per inch on contact screw, giving .025" movement for each turn. Air gap of CB's 1, 2, 3 and 4 is .025". On all others the air gap may vary from .012" to .040" to obtain the correct contact duration.
4. Form at E so that contact surfaces meet squarely.
5. Loosen screws D and turn cam to obtain proper timing as given on electrical timing chart supplied with each machine.

LUBRICATION

The following list indicates the lubricants to be used at various points on the machine.

IBM 6

Feed knife slides	Contact roll oil wells
Select magnet armature pivot	Clutch latch lever pivots
Relay armature pivot	CB cam lever pivots
Selector unit	Pawl pivots
Setup ratchet pivot shaft oil well and felt wick	Clutch knockoff lever pivots
Stop pawl pivots	High speed contact rolls
Studs on differential link and guide plate (follow with No. 17)	
Restoring magnet knockoff cam follower rollers (follow with No. 17)	

IBM 9

Motor and generator bearings
Control panel frame pivot points
All oilite bearings
 Feed roll bearings

IBM 17

All feed roll drive gears and idlers
Variable speed cam
Drive pulley bearing
Feed knife cam follower guide and
 roller
CB cam rollers
Selector unit cams
Selector unit restoring bail spring stud

IBM 21

Thrust bearings on ends of primary and
 secondary feed shafts

Feed roll pressure shoes

Feed roll bearing pivots in brush as-
 sembly side plates

Remove screw in 1st lower CR
(hollow) feed roll and lubricate eject
clutch drive shaft

Clutch knockoff cam follower rollers

Restoring magnet knockoff cam fol-
 lowers

Sentinel switch points

Differential link studs

Thin film on: all linen dilecto cams and
gears; all primary and secondary
commutators; linen dilecto card levers
at the point where they operate
against the contact strap

Clutch magnet armature at latching
point

Repacking matched bearings on feed
rolls