# TYPE 24 - 26

IBM
TRADE MARK

## Customer Engineering Reference Manual
## Preventive Maintenance and Adjustments

# CARD PUNCH, Type 24
# PRINTING CARD PUNCH, Type 26

## CONTENTS






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# CARD PUNCHES
# Type 24, 26

THIS reference manual revises and condenses Type 24 and 26 adjustments previously published. Preventive servicing hints are included with each machine unit subdivision. In combining the pertinent C.E.I's with the current material from the 24-26 C. E. Manual of Instruction, new emphasis is established on servicing requirements.

## Safety and Appearance

Clean machines command the most respect from those who use them. Card chips should be cleaned off reading boards and out of the tables. Keep the wiring diagram inside the left leg where oil cannot soil it.

Broken or chipped plastic guides should be either rounded off to a 1/8" radius or replaced. The escape gearing cover should remain installed at all times when the machine is running. Be sure the belt guard is in place. Although the belts are covered from the front, one who follows dangerous practices can still place his fingers between the belts and pulleys from the rear. It is a safe practice to turn off the power when tilting the base. The escapement adjustment procedure using a meter is preferred to holding the escape wheel by hand, because some friction drives may develop exceedingly high torque.

## Preventive Maintenance

Included in preventive maintenance is all of the work performed that will increase the usefulness of IBM equipment to our customers. Items falling into this category are: reduced calls, improved appearance, and increased machine life.

Pressed metal gears are being used on machines utilizing the Type 24 base. These parts, which are made from powdered iron with a bronze binder or from powdered bronze, are impregnated with lubricant. They can be identified by their dull finish and should not be stored in paper containers. With few exceptions under normal usage, they should not require additional lubricant for four years.

## Noisy Machine

1. If the punch clutch is not lubricated according to schedule, it generates a metallic noise.
2. Nipping punch clutches can be determined by visual inspection. During auto-duplication, if the numbers on the punch index can be read, the clutch is nipping. A possible cause is excessive torque on the friction drive. If the escapement armature takes too long to pull out, the clutch is not impulsed early enough and will latch up. Dry punch clutches may produce a shrill squeal.
3. Relay cover rattles can be reduced by slightly curving the panel out at the center.
4. The belt guard becomes noisy if not properly installed. A loose drive belt may slap against the guard. Plastic guards cannot be formed. File away material above the mounting holes to bring the bottom out.
5. Excessive punch penetration or punches in need of oil may produce noise. See lubrication schedule.
6. Improper adjustment of the stacker bumpers may contribute to the noise level being high.
7. On the Type 26, excessive printing pressure is noise producing. With the phenolic platen there is very little embossing to indicate excessive pressure.
8. Old style friction drives may chatter and should be replaced with the new style drive with dry graphite alloy discs.
9. Loose program drums or loose screws in the forked arm should be eliminated.
10. On the Type 26, insufficient clearance (minimum .003") between the washer in the end of the punch shaft and the eccentric drive link will cause the eccentric bearing to turn and throw out the suppression adjustment.

## Polarity Trap Selenium Rectifiers

The rectifiers used have a current rating of only 5 ma. The meter should be used in place of the test light because the light draws upwards of 70 ma. In case the light

must be used, short out the rectifiers first.

To check rectifier 2 (post 92 to 98) short across the program contact terminals 11 and 0. Upon depression of the release key, the card should release, but the punch clutch magnet should not energize until the 80th column.

# BASE PREVENTIVE MAINTENANCE

## Power Supply

*Drive Motors.* Motors of 1/12 HP have an external starting relay which picks up on 5.1 amperes and drops out on 4.35 amperes. The relay cover can be removed for inspection. The motor was oiled at the factory for a one year period based on normal usage of 40 hours per week. Motors of 1/20 HP have centrifugal starting switches.

*Dynamotors.* DC machines use dynamotors to convert DC to AC. The dynamotor output should be connected to the AC terminals. The DC line voltage should not be below 105 volts. The rectifier output (post 76 to 80) should show a voltage rise of about 25% above line input voltage. No figure for the dynamotor AC output is given; it cannot be measured accurately because of its harmonic content.

*Rectifiers.* A shorted selenium rectifier will produce a strong objectionable odor. A large variation in the voltages (AC) across the 4 sections of the rectifier usually indicates an open circuit in one section. Good rectifiers may have 20% variation in voltage among the legs.

*Pulleys and Belts.* Type 24 and 26 motors operate at the same speed. The Type 24 punch cam shaft pulley (p/n 227812) has an outside diameter of 2-7/32" and rotates at 1200 rpm. The Type 26 punch pulley (p/n 228494) has an outside diameter of 2-3/8" and rotates at 1080 rpm. Both belts and all other pulleys are identical for both machines.

Elongated motor mounting holes are used to adjust the motor belt tension for 1/4" belt deflection midway between pulleys. The adjustable drive housing pulley is used to obtain the same tension on the punch drive belt. A tight belt throws extra load on the clutch and has caused noisy operation and failure of the clutch to latch up.

## Tube Checking

Select the filament transformer tap for 22 to 25 volts across posts 6 and 9. Higher filament voltage shortens tube life. The plate voltage usually ranges between 130 and 160 volts. The negative bias supply should not be less than 40 volts. Exchanging tubes usually detects defective ones. Use a voltmeter test to locate defective tubes during inspection. With R3 de-energized and all tubes biased to cut-off, measure the voltage drop across each load. Connect one meter lead to post 80. The other lead can be touched successively to the P terminals on the tube chassis for the readings. Up to 5 volts drop is permissable. Replace any tubes whose leak current causes more than 5 volts drop across the load. Use only glass tubes because they have a longer filament life. Use caution when removing wires from the tube panel to prevent opening the moulded common on the chassis. Remove or insert wires with a slow rotating motion.

## Die and Stripper

*Type 24 Throat Clearance.* When trouble occurs with cards having a tendency to bind in the throat, e.g., heavily handled original document cards, the clearance can be increased to .020" to .026". B/M 270617 provides for the change.

*Cleaning and Oiling.* A crayon or pencil deposit sometimes forms on the underside of the die and can cause a drag on the card resulting in off-registration punching. These deposits can be removed with a feeler gage.

A convenient method of lubricating the porous bronze punch guides is to multiple punch several columns of an oiled IBM card.

*Punches.* It is desirable to replace all punches in the same positions if they are removed. Avoid separating the die and stripper unnecessarily as this can cause sticking punches. Excessive punch penetration or sticking punches can cause off-registration punching.

## Chip Tubes and Flexible Shafts

*Flexible Shafts.* These shafts should be kept lightly greased. Avoid sharp kinks in the shaft.

*Chip Tube Bearing.* The chip agitator may bind if it has no end play at the rear bearing. If this condition exists, grind the face of the coupling on the flexible shaft for clearance. The agitator shaft shoulder should seat on the hub.

*Chip Tubes.* Clean all chips away before replacing the chip tube. The pressure roll bushing is porous bronze and oil impregnated. It should not require attention. The loose fit on its stud is intentional. A new assembly contains a horizontal adjustment for the pressure roll lever to make the pressure roll track properly and give correct punching registration.

## Pressure Rails

It should not be necessary to put other than standard tensions on these rails. A bind on the card or incorrect pressure roll alignment may make it appear the rails are out of adjustment. The rails cannot be correctly adjusted without using a gram gage.

## Pin Sensing Unit

*Pin Bail Bearings.* These bearings are lubricated by felt wicks which whiten as the oil is used up. Two holes to the wicks are accessible through the top of the pin sensing frame when the eject unit is removed.

*Pin Bail Drive Link.* The guide stud in the rear frame will wear rapidly unless it is kept lubricated. It may become necessary to readjust the link to compensate for wear.

*Sensing Pin Contacts.* Inspect the contacts for burning and clean out card particles and lint. One broken contact in a pair will cause erratic failure to read.

*Sensing Pins.* Check to make sure the pins operate separately. Pins sticking together cause reading failures by making it necessary for both pins to enter the hole. Clean out the accumulation of card dust around the card lever.

## Eject Unit

Glaze on the continuously-running feed roll can be removed with carbon tetrachloride or a pencil eraser. Improper pressure roll arm tension will cause failure to register master cards.

## Program Unit

*Program Card Life.* The program card should last for 10,000 or more card operations. The star wheels should form a glaze on the program card. Rough or worn star wheels should be replaced. Improper tension on the sensing arm shortens program card life.

*Star Wheel Pivots.* The star wheels must pivot freely. Check for oxide deposit on the pivots and for proper lubrication. The sensing arm lever must be free on its pivot shaft.

*Program Drums.* All drums should be interchangeable. Worn gripper cam shafts should be replaced.

*Sensing Contacts.* Service time on these contacts will be greatly reduced if the positive method for measuring their duration is followed as outlined in the adjustment section. Be sure the plastic safety cover is installed over the terminals.

*Phenolic Mouldings.* Avoid lubricating phenolic mouldings used for a bearing surface (release bail). Lubrication may cause them to freeze up.

## Friction Drive and Escapement Gearing

*Graphite Alloy Discs.* These discs, which may be recognized by their adjustable spider springs, must be kept free of lubricants or they will lose their torque. The escapement gears should be kept almost dry. The alloy rings are pressed into the sides of the gear, and it is impractical to extract them. Keep card chips and other foreign matter out of the escapement gears and friction drive, as they may cause binds or increased torque that can result in escapement failures.

*Gear Shaft Collars.* All the gear shafts protruding through the gearing bracket must be pulled to their extreme forward position before tightening their collars. Be sure the unsealed bearings are capped.

*Gearing Bracket.* When removing the escape gearing bracket on machines after the DN suffix, it may be necessary to drive the locating pins through the base because of the close tolerance between the pins and the bracket.

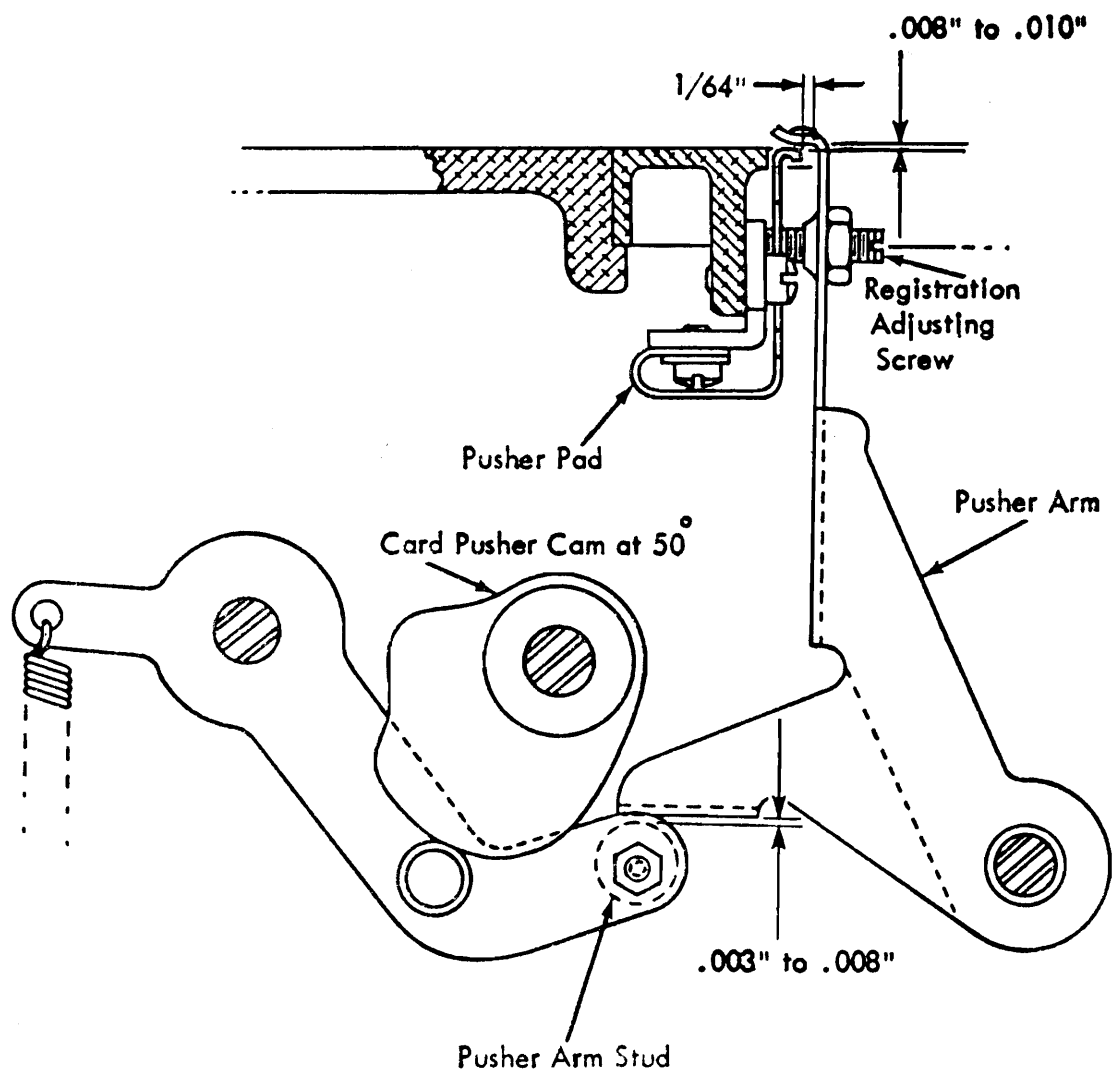



*Figure 1. Card Registration Adjustment*

## Escapement Unit

Check the residual on the left-hand yoke end for wear. Incorrect torque on the friction drive may make the escapement armature slow to pull out. The escapement wheel must be kept free of lubricants. If the program drum is out of adjustment, it may cause the machine to space too far on a skip. Incorrect tension on the auxiliary armature spring may result in double spacing while punching. Care should be taken not to put sharp bends in this spring while forming.

# BASE ADJUSTMENTS

## Aluminum Base

Avoid tightening screws excessively in aluminum. Steel screws will strip aluminum threads easily.

## Card Registration Adjustment (Figure 1)

1. Adjust the pusher pad for .008" to .010" clearance from the top of the pad to the pusher arm in the registering position (against its adjusting screw). Maintain 1/64" clearance from the side of the pad to the arm.

2. Back away the pusher arm stud to be sure it does not interfere with registration, then adjust the registration screw for correct registration.

3. With the card feed index standing at 50°, adjust the pusher arm stud for .003" to .008" clearance to the pusher arm.

## Card Lever and Switch Adjustment (Figure 2)

1. The maximum load required to operate the switch should be 6 to 9 grams when measured at the center of the button. The newer style switch (stamped AC) should

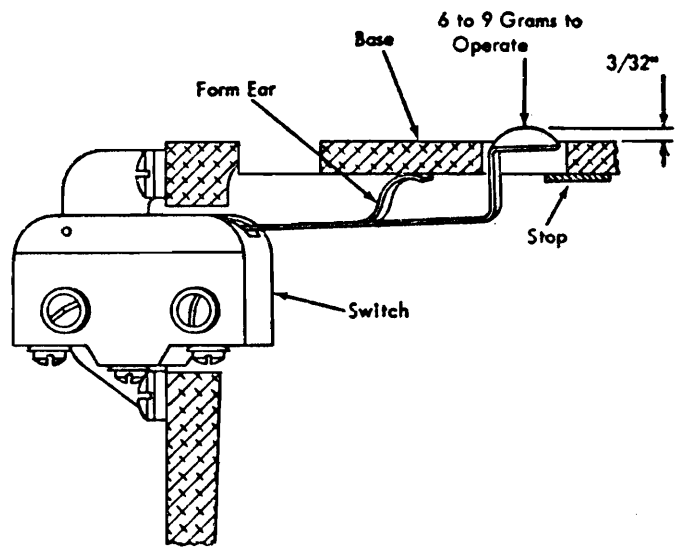



*Figure 2. Card Lever Adjustment*

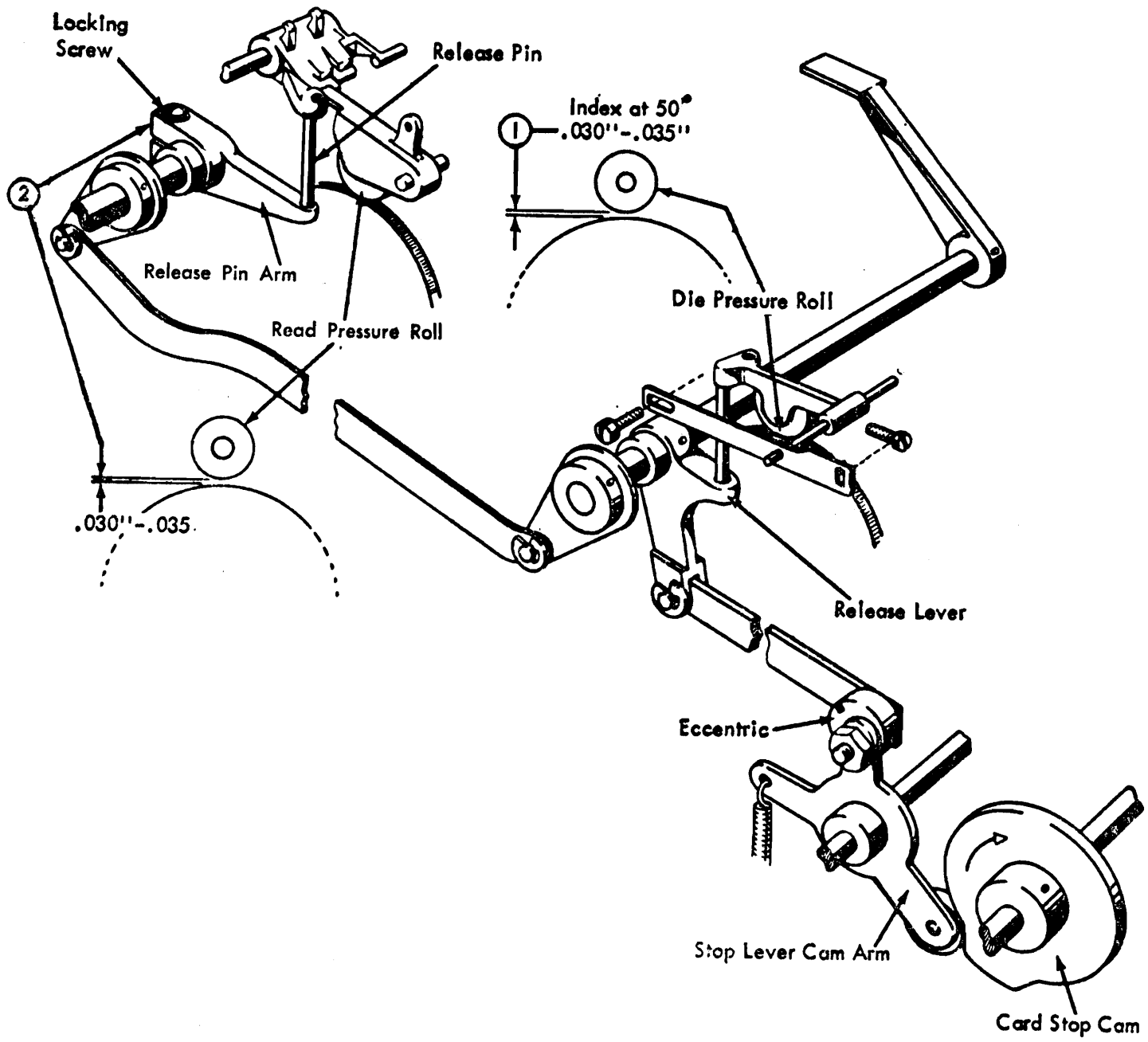



*Figure 3. Pressure Roll Adjustments*

make and break within a range of .030". The older style switch (stamped DC) should make and break within a range of .070".

2. Form the ear on the card lever to extend the button 3/32" above the base. The button must not bind on the base, and it must be impossible to slip a card under the button.

3. Position the switch to break on the upward motion of the button with .010" to .030" travel remaining.

## Card Lever Pressure Finger Adjustment

1. Adjust the screw for .015" to .020" clearance from the bottom of the finger to the bed. If the bottom edge is not smooth, stone it.

2. Form the finger spring to obtain 45 to 55 grams tension toward the bed. Measure at the point over the card lever button with the adjusting screw against its stop.

## Card Pusher Hood Plate Adjustment

The plate holds the second card in the detail bed and keeps it from interfering with the first card. It is formed for .015" to .020" clearance to the bed. Check with the pusher hood installed.

## Pressure Roll Adjustment (Figure 3)

1. With the stop lever cam arm on the high dwell of the card stop cam, adjust the eccentric in the arm for an opening of .030" to .035" between the die pressure roll and the larger feed roll.

2. With the stop lever cam arm still on the high dwell, turn in on the screw until the read pressure roll is .030" to .035" off the larger feed roll. Loosen the locking screw in the release arm and take up the vertical play in the release pin. Remove the 5-40 screw.

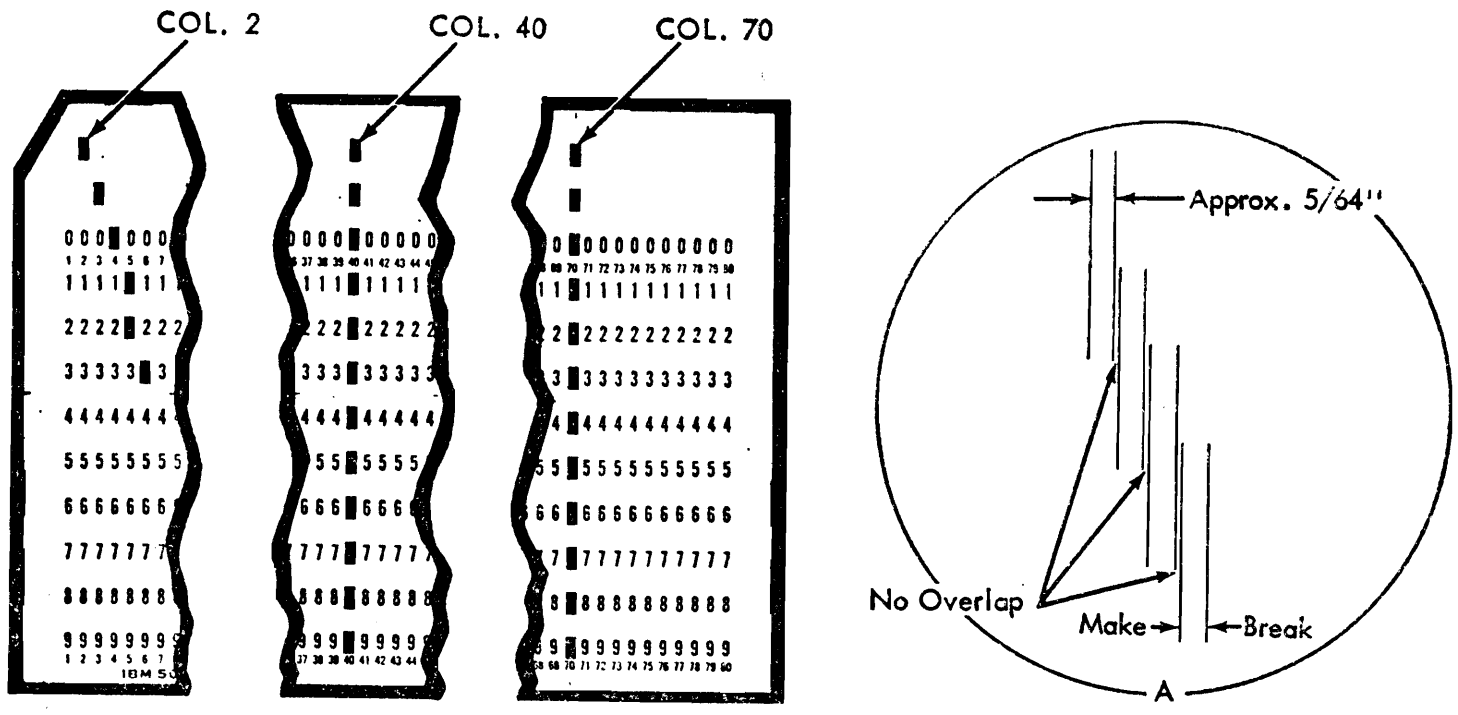



*Figure 4. Program Sensing Adjustment*

3. The die pressure roll lever shaft is adjustable horizontally for registration. If the pressure rails are properly adjusted and a card walks toward or away from the top guide rail, loosen the locking screw and position the shaft for correct feeding of the card.

## Program Sensing Adjustment

1. The common contact plate is adjusted to require 45 to 55 grams to lift each star wheel off the program card when measured at the star wheel hub. Excessive tension on the short arms is relieved by a .022" cut from the common contact plate at those positions.

2. Position the contact moulding so that the sensing arm levers clear the aligner fingers of the program drum and the star wheels approach a column evenly.

3. Prepare a program card as indicated in Figure 4. Adjust each stationary contact for 3/8 turn additional travel after the contact makes while reading a hole. Use a meter to determine the make time accurately.

4. Register a blank card face down in the punch station. With the power off and a meter across the 12 position, mark the make and break time on the blank card progressively for each position as shown in Figure 4A. The duration marks should appear .070" to .085" apart (approximately 5/64"), with no overlap between positions. As much as 5/8 turn rise may be necessary for proper adjustment, but this amount should not be attempted without measuring the duration.

5. With the meter across the 12 position, adjust the forked arm (behind the back space ratchet) until the 12 contact breaks when the escapement armature overlaps 1/3 tooth. The multiple punches in column 40 and 70 are used to check the drum for eccentricity which should not vary more than .003". Gage by the relationship of the star wheel to the hole while standing in columns 1, 39, and 69.

## Program Drum Interlock Arm Adjustment

1. This applies to machines having a split hub on the interlock arm. With the star wheels raised, rotate the arm on the serrated shaft to operate the switches with .015" travel remaining before the plunger bottoms.

2. Position the arm along the serrated shaft for a clearance of .015" to .020" to the back end of the drum when the star wheels are lowered. If the arm is pinned, it must be formed to obtain this adjustment. Avoid bending the release bail shaft.

3. Form the interlock arm toward the spindle to obtain a condition where the star wheels will clear all parts of the drum and clamping strip, with the drum partially removed and the interlock arm against the program card.

## Program Cam Contacts Adjustment

1. The stationary contact straps should have sufficient tension to cause them to follow their support

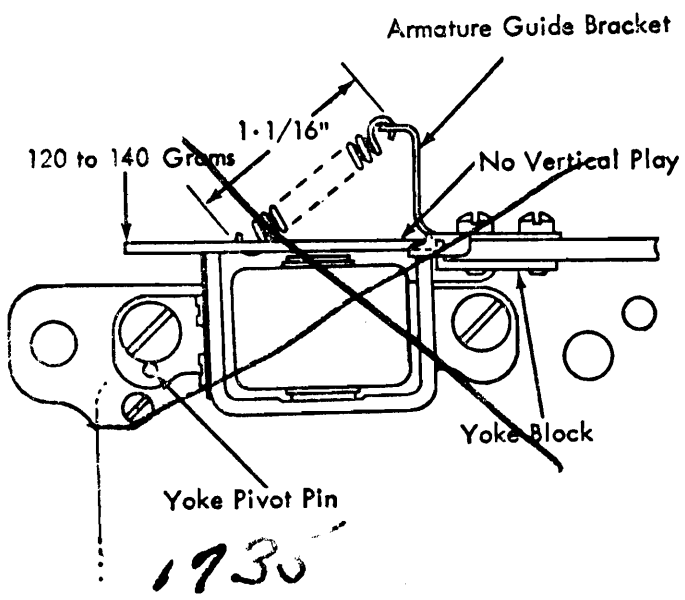



*Figure 5. Escapement Adjustment*

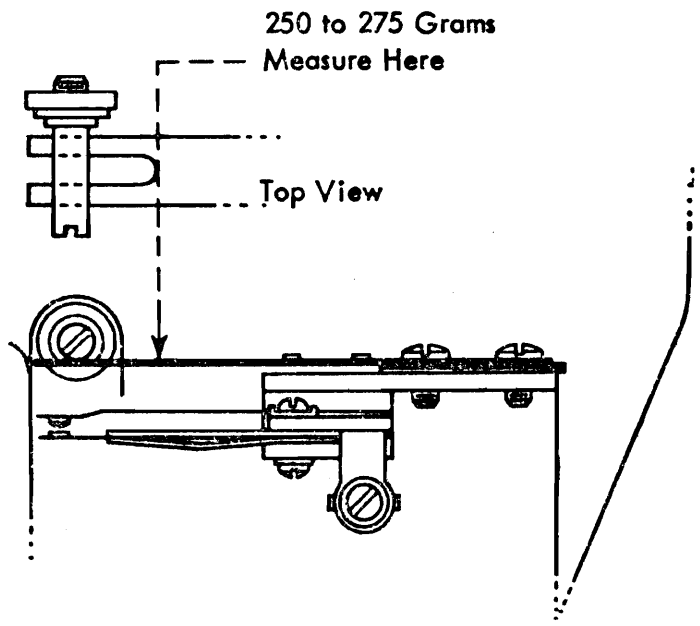



*Figure 6. Escapement Adjustment*

straps. The operating strap should be tensioned toward the N/C side with enough pressure to raise the stationary strap .020" to .030" off its support.

2. Set the contact levers on the high point of the cam (approximately column 84). Position the contact bracket for .020" to .030" rise of the N/O contact off its support. Form the N/C contact support for an air gap of .020" to .025".

3. Position the contact lever bracket laterally to time the number 1 contact. It should drop the escapement armature at column 88-1/6 to 88-1/3 (2/3 tooth before column 1).

Rotate the contact lever bracket to obtain a clearance of .010" to .020" between lever 2 and the pad on the contact strap when the levers are off the cam.

4. The break of contact 1 is critical. The above adjustments may have to be modified to meet the following timings with reference to program columns:

No. 1 make 80-1/3 to 80-2/3, break 88-1/6 to 88-1/3.

No. 2 N/C break 81-1/2 to 83, make 87-1/2 to 88-1/2.

## Back Space Adjustment

Back spacing should maintain good registration over a group of 20 consecutive columns.

The actuating arm should be straight and free of binds so that its spring can return it to normal.

1. Position the back space ratchet by means of its three screws to cause a card to back space into column 1 and not column 88 of the program drum. Each back space should cause the escape wheel teeth to move 1-1/4 teeth past the end of the armature.

2. Position the back space switch to operate with 1/16" depression of the actuating arm.

## Escapement Magnet Unit Adjustments

The adjustments are made with the unit removed from the base.

1. Remove the contact mounting bracket and slide the yoke block to the right until it seats firmly against its bracket (Figure 5).

2. Remove the vertical play from the armature pivot by rotating the magnet yoke about its pivot pin. The operating end of the armature must be free to move 1/8" without binding (Figure 5).

3. Form the armature guide bracket to require 120 to 140 grams to seal the armature, with the armature pin removed. A quick check can be made with the unit in the machine by measuring the 1-1/16" dimension as shown in Figure 5.

4. Form the auxiliary spring near its mounting bracket to exert 250 to 275 grams pressure against its stop stud when measured at the point shown in Figure 6. An approximate adjustment can be obtained by removing the stop stud

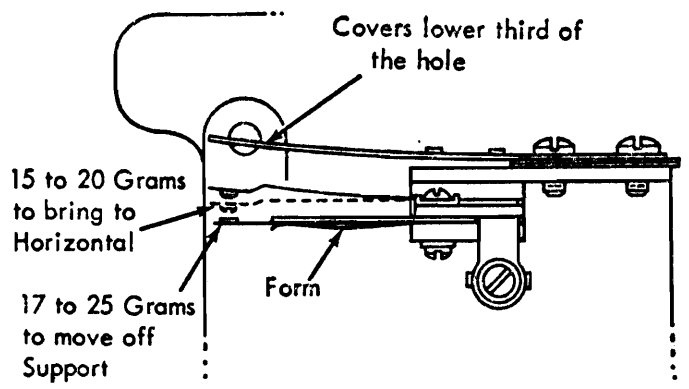



*Figure 7. Escapement Adjustment*

and armature pin, and forming the spring to pass across the lower third of the stop stud hole. The spring should be kept as straight as possible, and both fingers of the spring should leave the stud simultaneously. Loss of the spring tension is a common cause of erratic spacing.

5. Form the stiffener spring, without kinking, for 17 to 25 grams tension to move the stationary contact off its support (Figure 7).

6. Form the operating strap to require 15 to 20 grams to bring the strap into the horizontal position (Figure 7). After this step, attach the operating pin and armature stop. Attach the contact assembly to the main magnet bracket. If necessary, position the auxiliary armature spring and escape contact assembly to free the pin at all three points of contact.

7. With a .015" gage between the armature and the yoke, position the contact mounting bracket to remove the vertical clearance of the operating pin shoulders at the armature and at the auxiliary spring. The pin must still be free of binds.

8. Form the stationary support to close the escapement contact with an .008" gage between the armature and the yoke. Make this adjustment accurately by using a meter. When inserting the feeler gage, do not rest the gage against the armature spring loop. This would give a false adjustment.

9. Position the escape magnet assembly to allow the escapement wheel to rotate under power, with an .008" gage between the armature and yoke and the magnet energized. With a .010" gage the wheel should stop. In correct adjustment the armature may nip teeth but continue to rotate with an .008" gage, and with a .010" gage it may slip a few teeth before stopping.

## Pressure Rails Adjustment

If the gram gage is held as shown in Figure 8, the eyes are free to watch the rail leave the card.

1. Tension the two pressure rails in the punch station to exert 23 to 27 grams pressure on a registered card. Check the above by the tension required to move the rail away from the card evenly. The blades of the gage must be held squarely against the center of the lip on the rail. Adjust bracket.

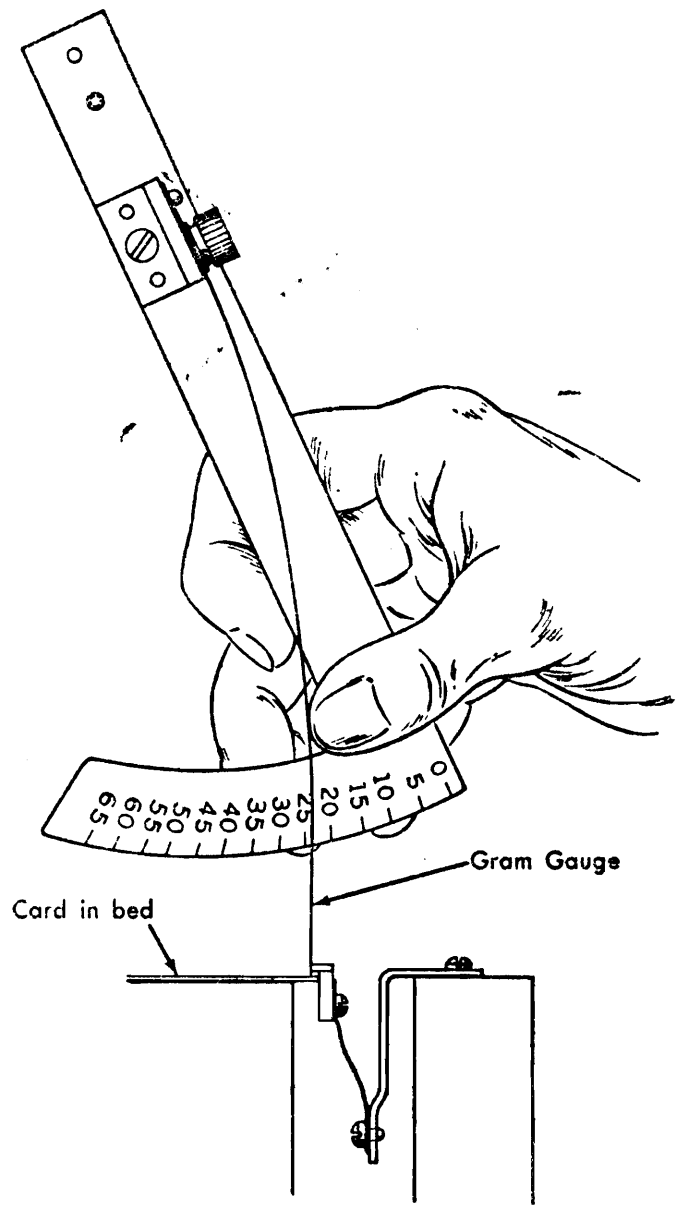



*Figure 8. Pressure Rail Adjustment*

2. Adjust the two rails in the master card station to exert a force of 13 to 17 grams against a card in the bed. Measure the same as step 1. Machines having two screws in the plastic card bed also have adjustable rail brackets.

## Stacker Unit Adjustment

1. With the card feed index latched at 0°, time in the stacker with the teeth which provide the closest measurement to 4-11/16" from the upper cut in the stacker drum to the front edge of the base (Figure 9, step 1). It is advisable to measure this distance before removal of the unit to prevent changing other adjustments which might be affected because of a change in timing.

2. Register a card in the read station and space it about half-way through. Position the stacker bed plate for a clearance of .025" to .030" from the bottom of the card to the narrow rail on the bed plate (Figure 10, step 2).

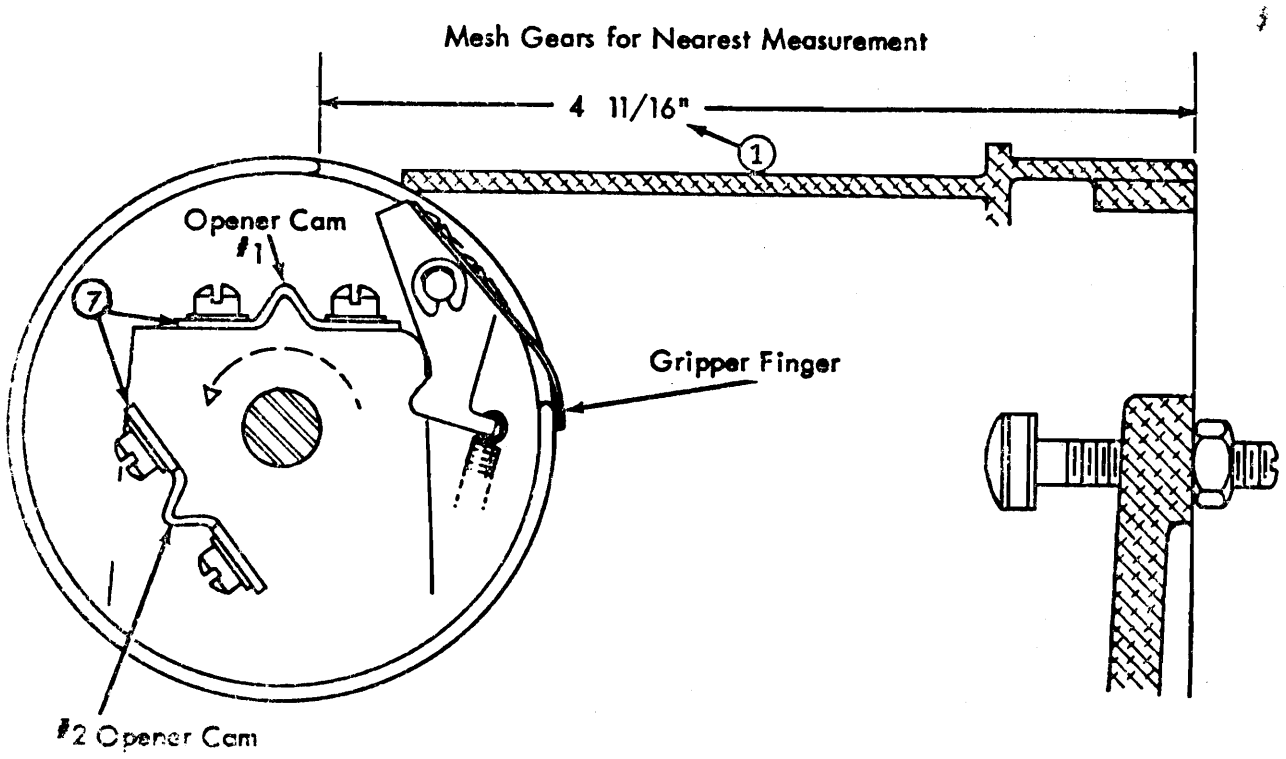



*Figure 9. Stacker Adjustment*

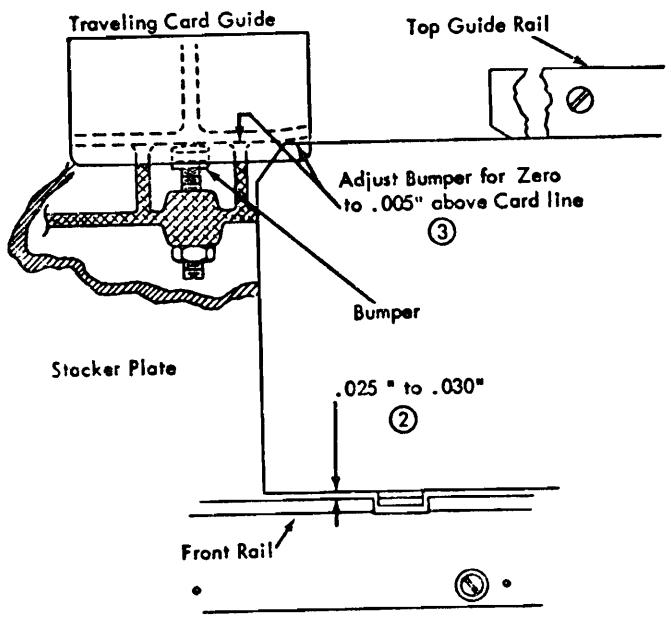



*Figure 10. Stacker Adjustment*

3. Adjust the traveling card guide bumper to put the vertical surface of the traveling card guide in line with the top rail and not more than .005" above. This position can be determined by laying a straight edge (.0125"-.018" thickness gage) along the edge of the top card rail and extending it into the stacker (Figure 10, step 3).

4. Adjust the lower bumper (Figure 15, step 4) to deaden the stacker noise. It must permit the traveling card guide to drop below the outer circumference of the two stacker drums.

5. Adjust the upper bumper to deaden noise and still maintain a

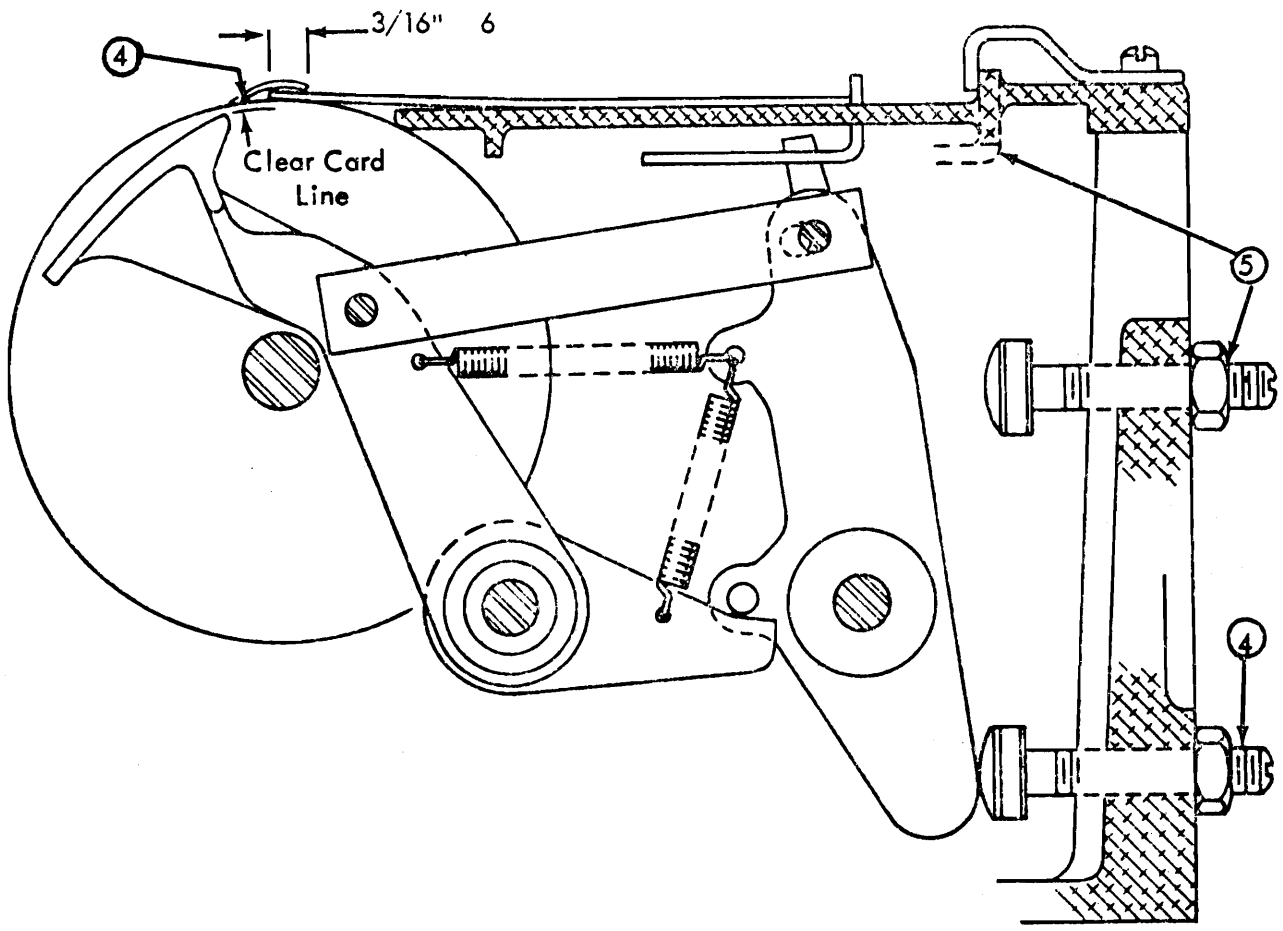



*Figure 11. Stacker Adjustment*

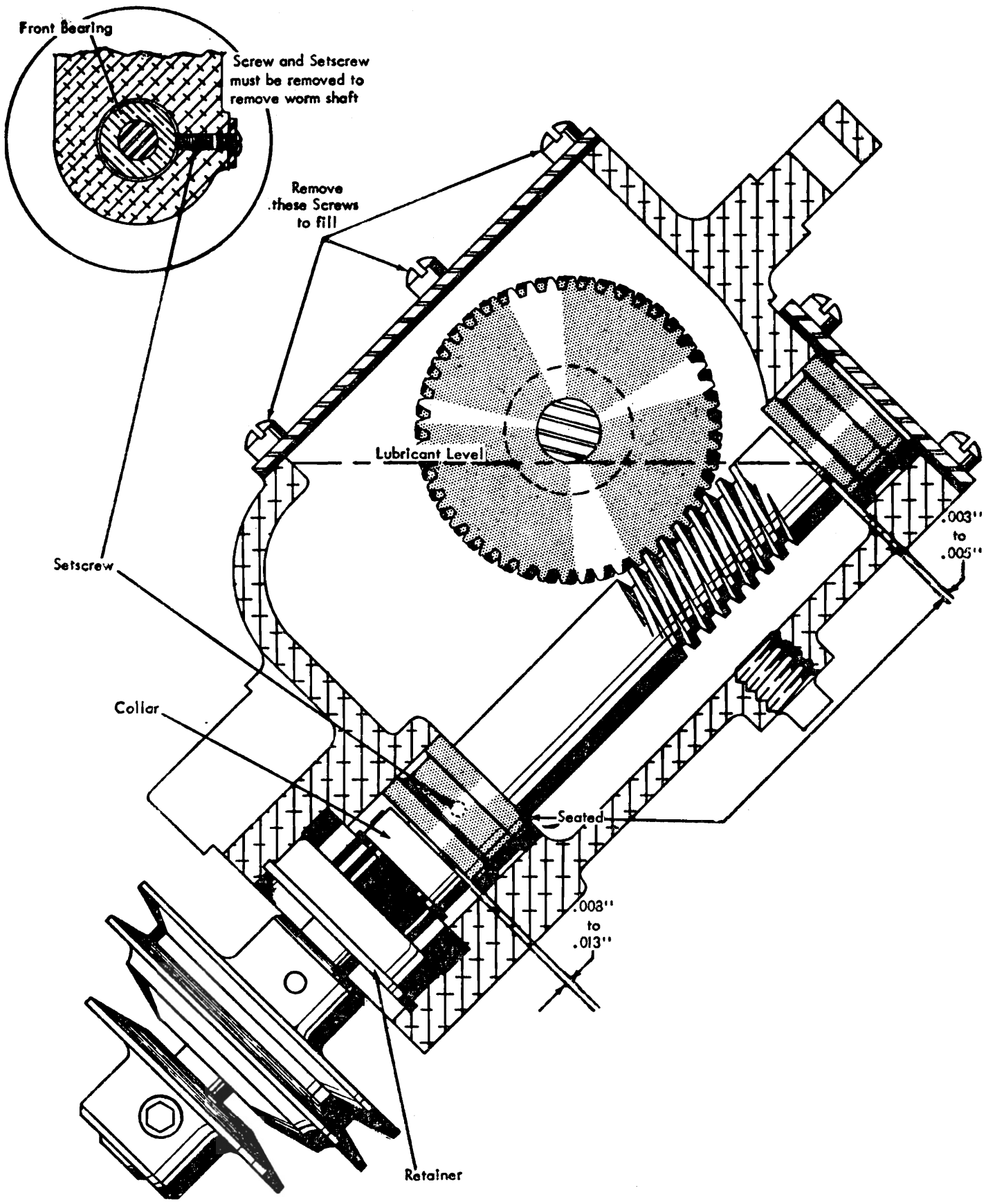



*Figure 12. Reduction Drive Adjustment*

clearance from the bottom edge of a card to the card pushers.

6. The grippers should overlap the card being stacked 3/16", and the cards should stack evenly without being damaged.

This operation must be checked under power with a partially filled hopper. An initial setting of the cams should cause the gripper finger blocks to contact the number 1 cams at 73° of the CF index. Adjust the number 2 cams to stack the cards without marking them (Figure 9, step 7).

The stacker cam mounted on the side of the stacker gear is held with three screws in elongated holes. A pilot hole in the gear and cam helps to set up the adjustment by locating the middle of the adjustment as a starting point. The unit depends upon card throw to operate properly.

## Reduction Drive Adjustment

1. With the worm shaft removed from the housing, place the outer bearing on the shaft against the shoulder. Install the collar and lock it in place with .008" to .013" clearance to the bearing.

2. Keeping the outer bearing against the worm gear shoulder, insert the shaft in the housing and lock the front bearing in place with .003" to .005" end shake for the worm shaft (Figure 12). No timing is necessary to install the housing.

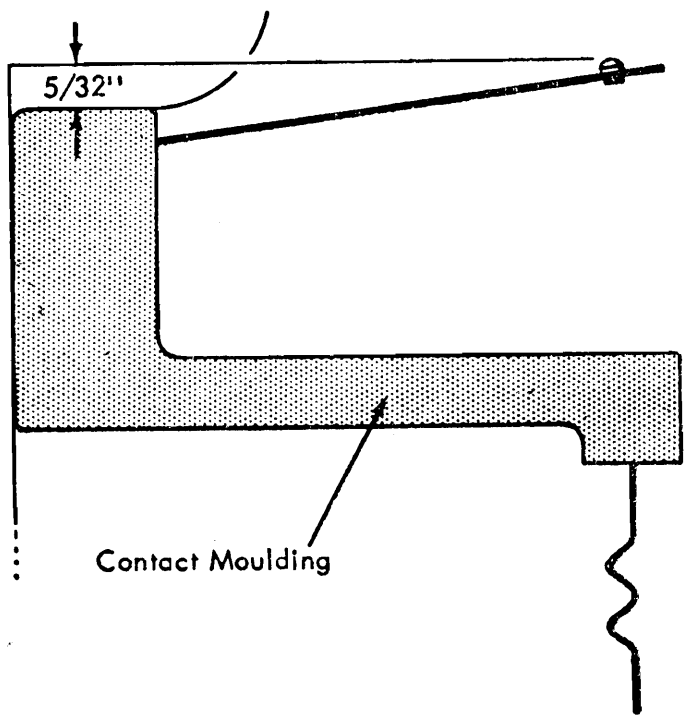



*Figure 13. Pin Sensing Adjustment*

## Pin Sensing Unit Adjustments

These adjustments are made with the unit removed from the base, except adjustment 6.

1. The contact pressure on each point should be 20 to 30 grams. Before installing a new contact moulding, the contact straps must be pre-formed for this tension as shown in Figure 13. A cylinder, similar to a Type 31 duplicating contact roll, is helpful in forming the contacts evenly.

2. Place the eject unit on the pin sensing assembly in its normal operating position. Hold together with screws if necessary. Adjust the throat gap for .012" to .020" clearance (Figure 14). Shim the throat

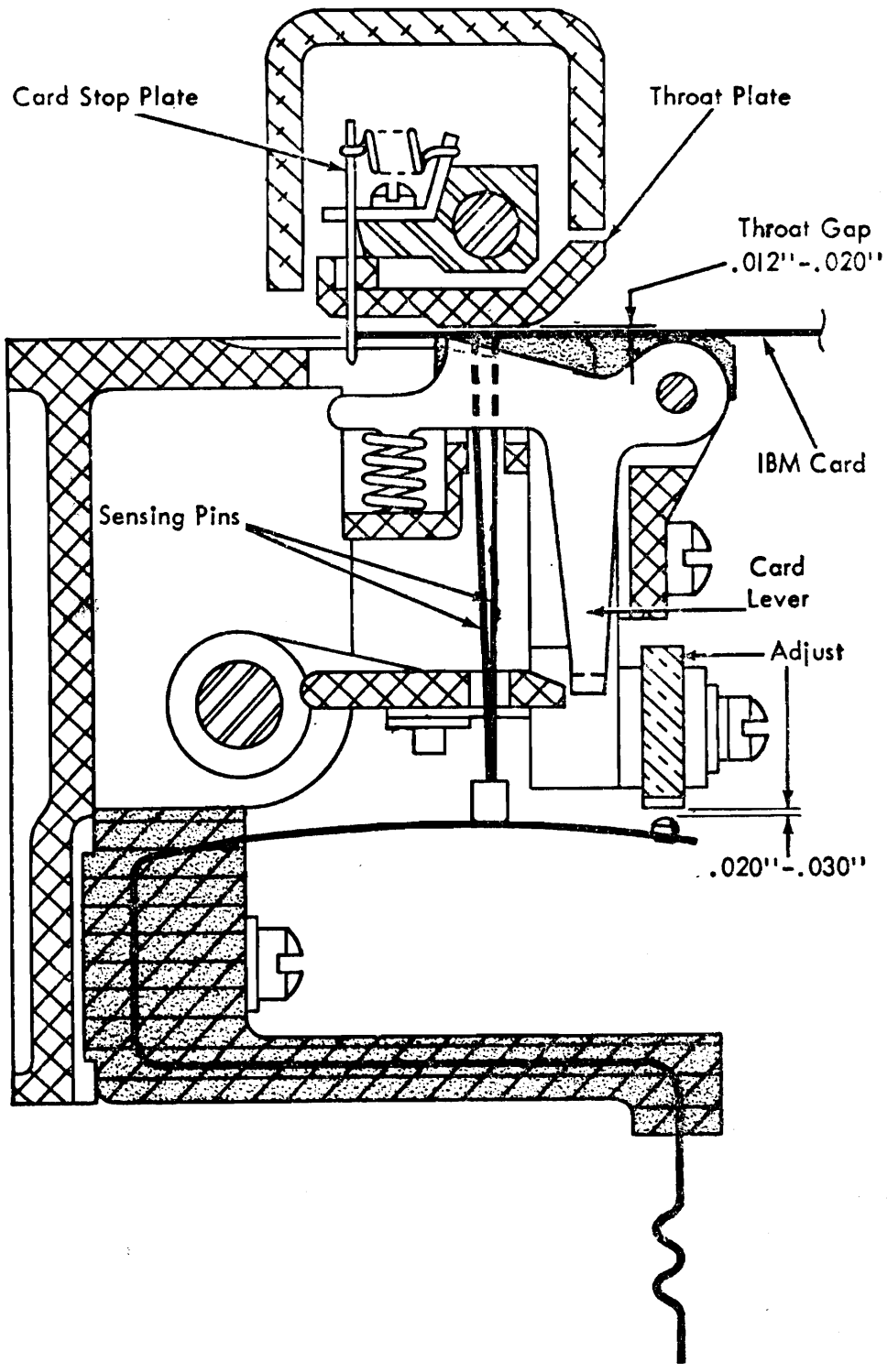



*Figure 14. Pin Sensing Adjustment*

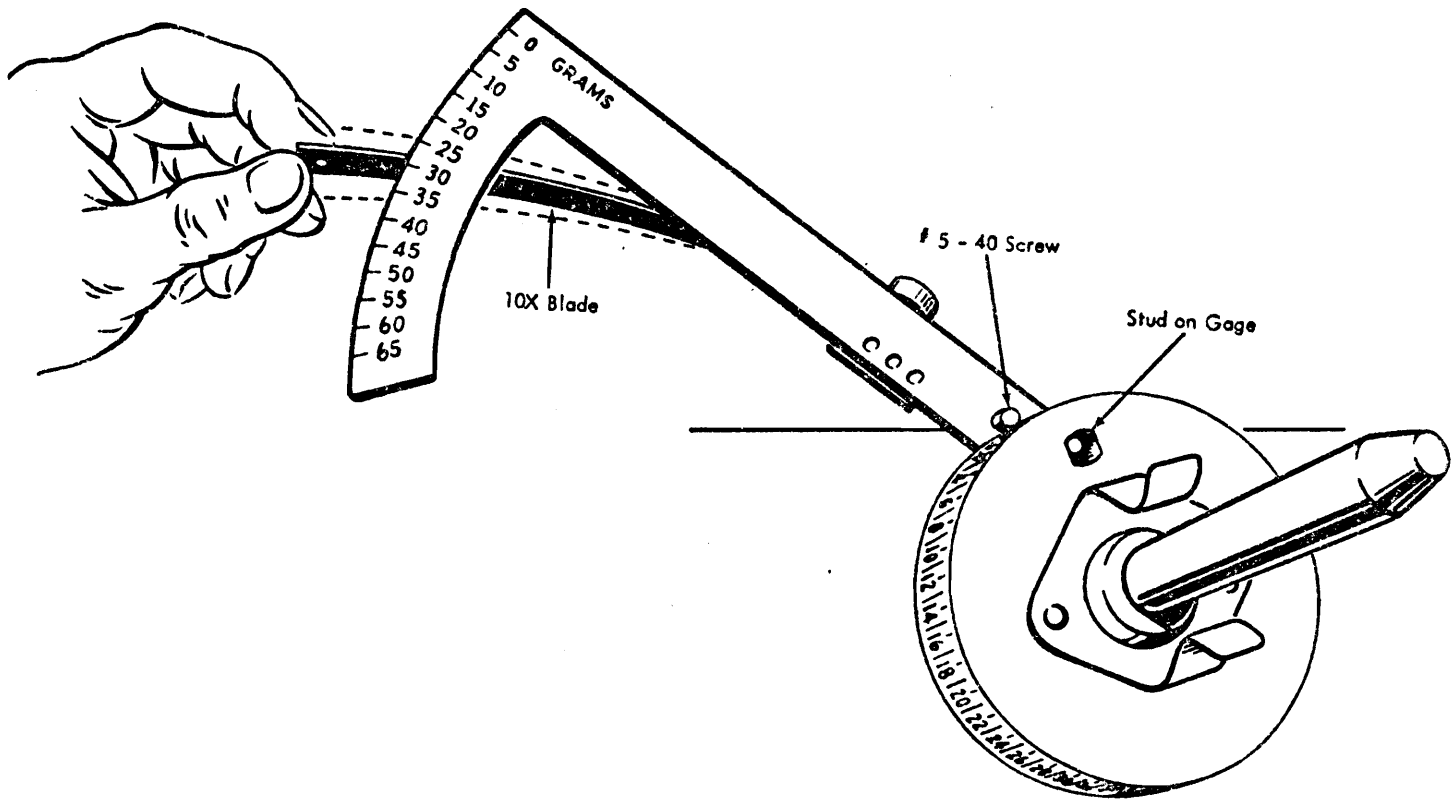



*Figure 15. Friction Drive Adjustment*

plate (bottom of the eject unit) to decrease the clearance and to take up for wear. If worn by cards passing through the unit, check the .012" at the closest point and the .020" at the widest point. Replace throat plates worn beyond these dimensions.

3. Insert a blank card and let the pins rest against it. Remove the contact cover (some machines do not have the cover) and adjust the common contact bar for a minimum air gap of .020" and a maximum gap of .030" (Figure 14).

A quick and accurate check of the contact adjustment can be made with the unit in the machine. Loosen the two screws holding the eject unit 1/4 turn. Place an .008" gage under the front edge of the eject unit and tighten the front screw to level the unit. All positions should duplicate correctly without picking up extraneous punching.

4. Normally it is unnecessary to alter the factory setting on the pin bail arm eccentric stop. If it becomes necessary, loosen the locking screw and adjust the eccentric to stop the pin bail arm when the sensing pins are retracted .010" to .015" below the surface of the separators. Tighten the locking screw (Figure 28).

5. Position the card lever to clear the pin bail by .005" to .010" when the pin bail arm is against its stop.

6. With the punch index at 345°, reinstall the unit in the machine. Extend the pin bail link to bring the pin bail arm up against the eccentric stop. Check to see that P5 makes after and breaks before the pin contacts.

## Friction Drive Adjustment

CAUTION: Graphite alloy friction rings must not be lubricated. These may be identified by the adjustable spider spring. The gram gage is used to measure the torque as follows:

1. Remove the screw in the gage used to store the unused blade.

2. Install a 5-40 screw from the opposite side of the gage which will extend 1/2" on the same side as the stud (Figure 15).

3. With the gage in position as in Figure 15, hold the gage firmly while operating the space bar. When it is determined that the torque is not excessive for the gage range, increase the pressure on the blade until spacing stops. Read the gage. Adjust the spider spring for a reading 250 to 375 grams, resulting in 4 to 6 inch pounds torque. Avoid passing column 87 because the program cam contact levers will drop off the program cam and prevent back spacing.

## Eject Unit Adjustments

1. Loosen the locking setscrew and adjust the pressure roll lever shaft to align the pressure roll with the feed roll and cause proper feeding through the read station.

2. Add or remove shims for a throat clearance of .012" to .020".

See *Pin Sensing Unit Adjustment*, step 2.

.004" shim p/n 121397
.010" shim p/n 49901

3. For pressure roll opening see *Pressure Roll Adjustments.*

4. To measure the register arm tension, tip the bed to vertical and turn the CF index to 30°. Insert a strip of card between the rolls. Form a paper clip to hook under the arm just inside the roller and hook the other end in the hole of the X10 blade. Form the long end of the spring to require 250 to 300 grams to free the paper.

5. Repeat adjustment 4 for the eject arm but for a tension of 450 to 500 grams.

6. The plastic eject card guide should clear the stacker plate by at least 1/64". It can be raised by filing the eject casting slightly, or by shimming the right end of the guide. Forming the plastic is unsatisfactory because, even if heat is used, the plastic returns to normal.

For replacement eject units refer to CEI Memo 1398.

# CARD FEED PREVENTIVE MAINTENANCE

*Feed Clutch Armature Stop.* On machines prior to 24-11696 PM and 26-10011 MM, the card feed armature stop post is of steel and must be insulated with cellulose acetate tape 700 which serves as a residual. This tape is recommended because of its durability. Machines built after these numbers, have posts of brass which are plated and look like the steel posts. The steel posts usually cause failure to auto-feed.

*Card Feed Pusher Spring Tension.* To improve feeding, the card feed pusher spring tension has been decreased. It should have 4 to 4-1/2 turns tension to its spring shaft when inserted from the rear instead of 5 or 6 turns as previously prescribed.

*Last Card Feed Failures.* In cases where the last card fails to feed out of the hopper, it is recommended that washer (p/n 22066) be added between the pusher casting and the pressure plate to permit the pressure plate to be more self-aligning. A final check should be made to determine the best operating condition by feeding cards both from a full hopper and then with a few cards.

*Card Feed Clutch Latching.* Check to be sure that the CF clutch latches in a fully detented position and that the clutch dog does not nip on the ratchet.

# CARD FEED UNIT ADJUSTMENTS

## Card Stop Cam Timing

Loosen the setscrews on the index shaft bevel gear. With the CF clutch latched, rotate the card stop cam to a point where the cam follower is at the approach, but is not up on the rise of the cam. Lock the setscrews. Check the timing by watching the eject and register arms to be sure they do not start downward again at the end of the CF cycle.

The beveled gears are spot marked at the factory to enable this timing to be regained after removal of the feed by simply lining up the spot marks.

## Feed Clutch Adjustment

1. Form the armature spring to exert a tension of 100 to 120 grams in the direction of A, and 230 to 250 grams in the direction of B, as shown in Figure 16.

2. Adjust the magnet yoke mounting screws (Figure 16) for a clearance of .032" to .036" between

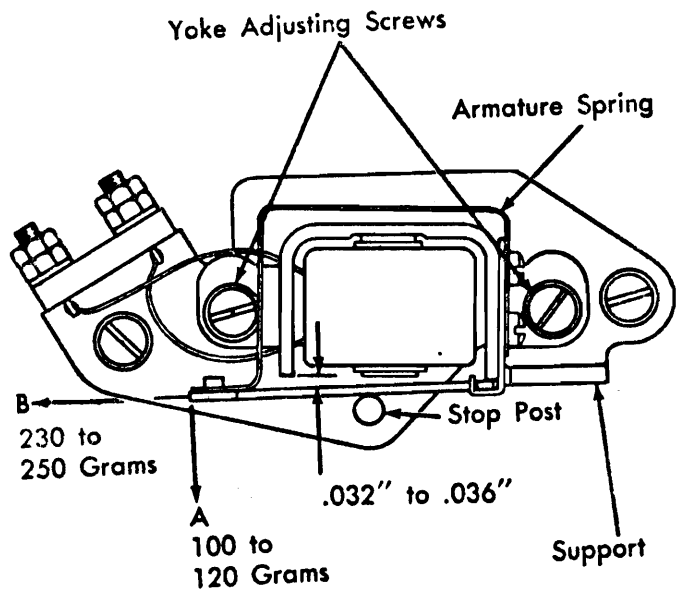



*Figure 16. Feed Clutch Magnet Adjustment*

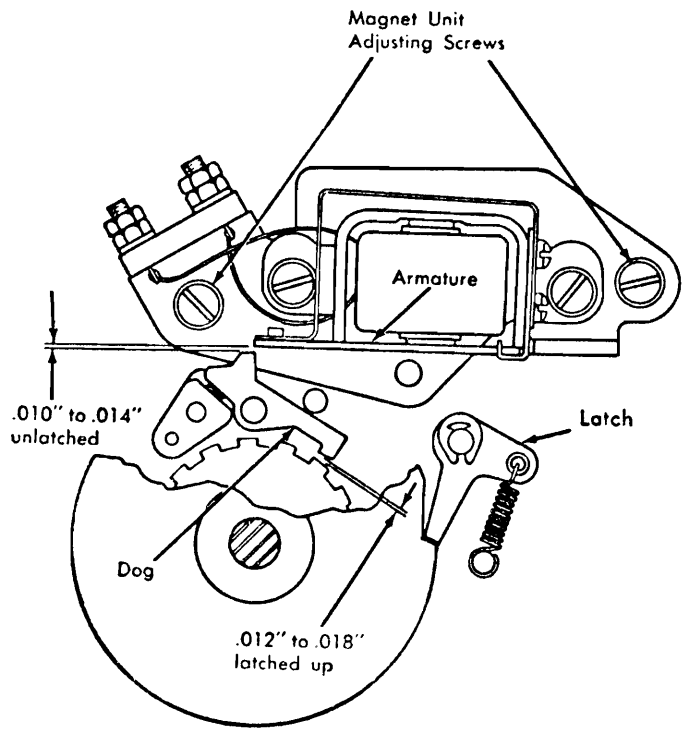



*Figure 17. Feed Clutch Adjustment*

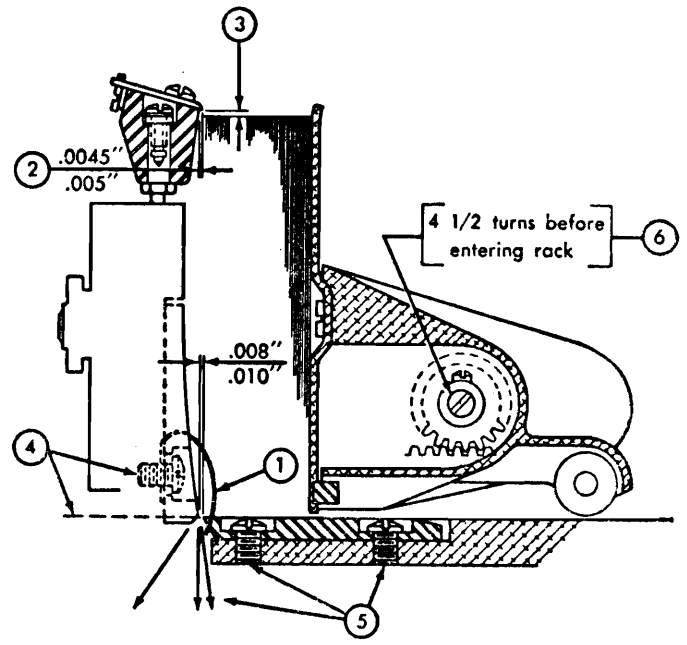



*Figure 19. Card Feed Unit Adjustment*

the armature and the yoke at the operating end.

3. The CF magnet unit is positioned to satisfy the following conditions (Figure 17):

a. A clearance of .012" to .018" between the CF dog and ratchet with armature normal and the disc fully detented by the latch.

b. An unlatching clearance of .010" to .014" between the armature and the CF dog with the armature attracted.

## Latch Magnet Adjustment (Figure 18)

1. With the contacts properly aligned against straight supports, turn the armature backstop screw up until there is a 1/32" rise from the contacts to their supports.

2. With a .010" gage between the armature and the magnet core, position the magnet yoke so that the lower yoke strikes the armature. Tighten the screws.

3. Back off the backstop screw two full turns. This will provide approximately 3/64" from a center line over the magnet yokes to the operating hook of the armature.

4. The assembly should be positioned to provide 3/64" (7 IBM cards) from the latch armature to the ear on the CF cam follower arm.

5. There should be a latching clearance of .012" to .017" from the cam follower arm to the armature tip when the latch magnet is energized.

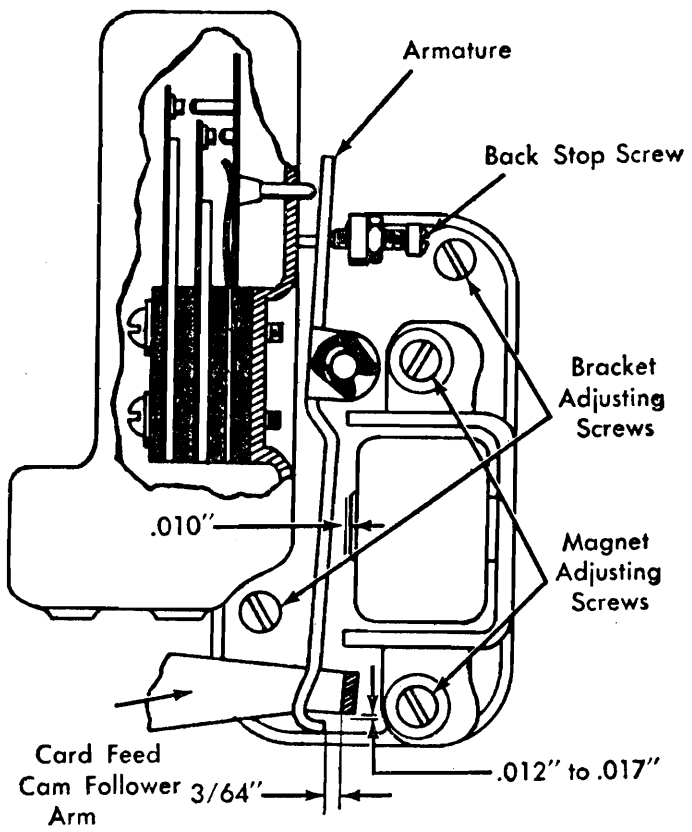



*Figure 18. Latch Magnet Adjustment*

## Hopper Adjustments (Figure 19)

1. Form the magazine springs to touch the feed bed.

2. Adjust the feed knives for a projection of .004" to .0045" with a go no-go gage.

3. With the CF latch armature engaged with the CF cam follower arm, adjust both feed knives evenly to give a .012" to .017" clearance from the feed knives to the top of the cards in the hopper.

4. Adjust the throat block to place the crown in direct line with the top edge of the throat knife.

5. Adjust the throat knife for an opening of .008" to .010". If the throat block is properly adjusted, an .008" gage should pass freely in the three directions indicated, but a .010" gage will not.

6. The card feed pusher plate should have 4 or 4-1/2 turns to its spring shaft when inserted from the rear of the hopper.

## Card Feed Pressure Roll Springs Adjustment

Check for even drag on one card inserted endwise at either side. Rollers should be free of binds, and the two flat type springs should be straight when removed from the machine.

## Card Feed Circuit Breaker Adjustment

1. Replace badly pitted or worn points.
2. Check for a worn operating arm roller.
3. Align points to make the sides and faces of the contacts parallel.
4. Adjust the stationary contact for an air gap of .020" to .025" on the high dwell of the cam.

## Card Aligner Fingers Adjustment

The factory setting for the card aligner fingers is .020" to .040" motion ahead of the top card rail. This adjustment can be altered by adjusting the eccentric cam follower for a maximum forward travel of .055".

The card must snap off the fingers and into position along the top rail before punching. If this fails to happen, the first 15 columns may be in correct registration and the balance of the card off punched to the left. After adjusting the front pressure rail for 23 to 27 grams on a card registered in the detail bed, the aligner fingers can be formed in conjunction with the eccentric adjustment. Up to 10° backward angle should help the card snap off the fingers before it is gripped by the feed rolls.

# PUNCH DRIVE PREVENTIVE MAINTENANCE

*Interposer Magnet Armatures.* Failure to punch 2's or 3's unless they occur consecutively may be caused by friction between the interposer and the armature. Apply IBM 22 at the latching surfaces. Weak armature springs may cause extraneous punching. Use a heavier spring, p/n 27084.

*Cam Timing, P5.* Intermittent or complete failure of the sensing unit can result from P5 being out of time. Arcing sensing pin contacts may be caused by P5.

*Extraneous Punching, Manual Operation* Possible causes are:

1. Escapement contact making too soon causes a punch cycle before the card is advanced.
2. Insufficient air gap of the keyboard latch contacts.
3. Punch interposer not relatching or knockoff bail cam follower worn. (The bail can be replaced by pulling all interposer armatures first.)
4. Guide comb and bumper too high, causing a blank column and a double punched column on duplication.
5. Wear at the latching points of the armatures. Armatures can be reversed, top row for bottom, thus using new surfaces of the armatures.
6 Improper adjustment resulting in failure to restore the interposers in the armature notches by 100° (by hand).

*Interposer Bail Contacts.* Insufficient air gap causes skipping columns while duplicating. Bouncing of the interposer bail contacts in conjunction with the escape contact can cause information to appear one column early as well as in the proper column. This is also caused by weak tension on the stationary strap. Make both front and rear contact adjustments equal to prevent whipping of the bail.

*Punch Clutch.* Check the punch clutch overthrow manually at every inspection. It is desirable to obtain 3° to 5° overthrow by hand. Avoid a condition which will permit the detent latch to drop in without overthrow. Excessive overthrow causes blank columns to appear in manual fields. The cam shaft rotates past zero degrees and rolls back to 345°. A dry clutch becomes noisy.

*Punch Penetration.* Excessive punch penetration can cause off gage punching by delaying the card during escapement.

*Punch Drive Removal.* To expedite removal and replacement of the unit, leave the screws in the front mounting plug attached to the base by a

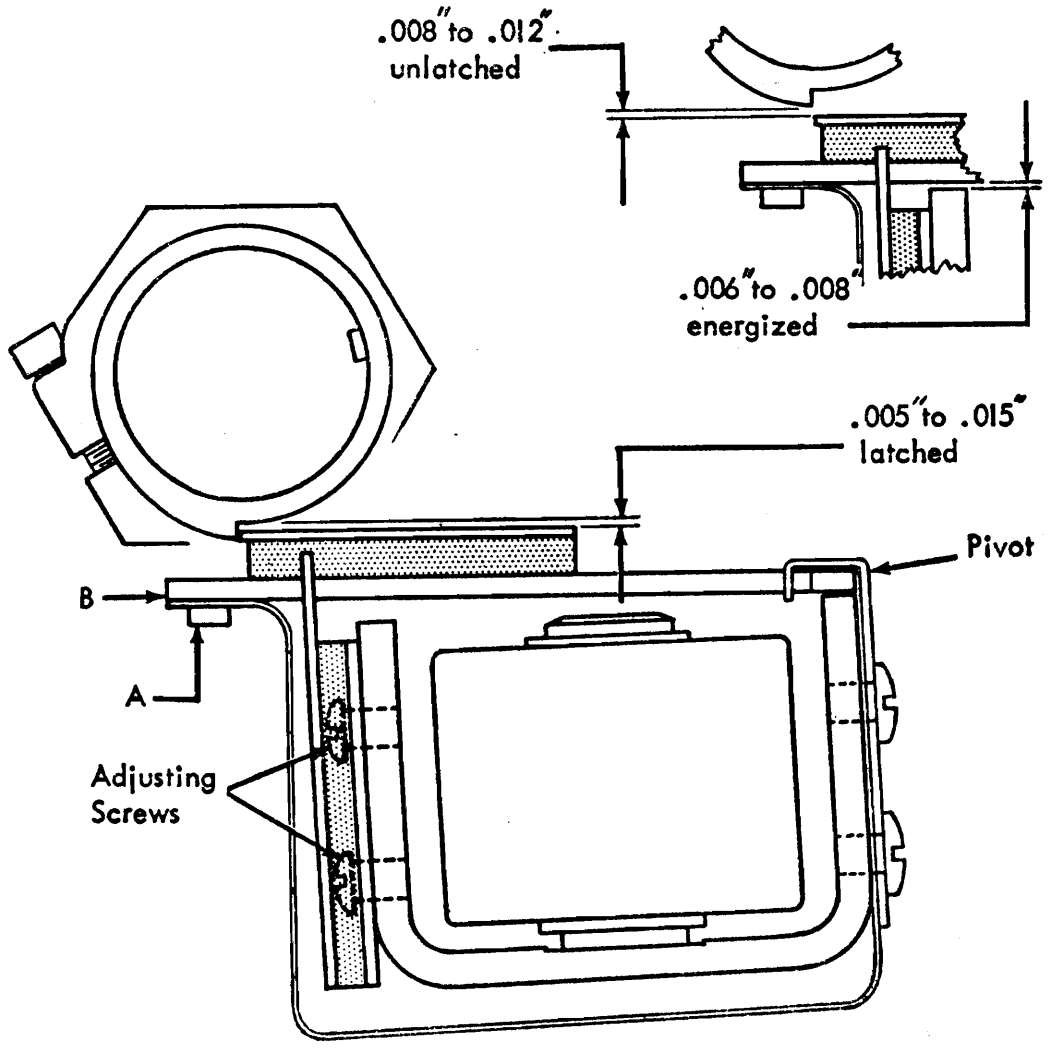



*Figure 20. Punch Clutch Magnet*

thread or two. Shake the drive unit to loosen the plug.

# PUNCH DRIVE UNIT ADJUSTMENTS

## Punch Clutch Magnet Adjustment (Figure 20)

1. Adjust the rubber mounted armature stop for an air gap of .006" to .008" from the armature to the outer yoke when the armature is attracted.
2. Form the armature spring to obtain a tension of 140 to 160 grams away from the magnet core when it is measured at the operating end of the armature (A).
3. Shape or adjust the armature spring to exert a force of 75 to 150 grams toward the armature pivot (B).
4. Position the magnet assembly against its support bracket to clear the step on the clutch sleeve by .008" to .012" when energized.

## Punch Index Pointer Adjustment

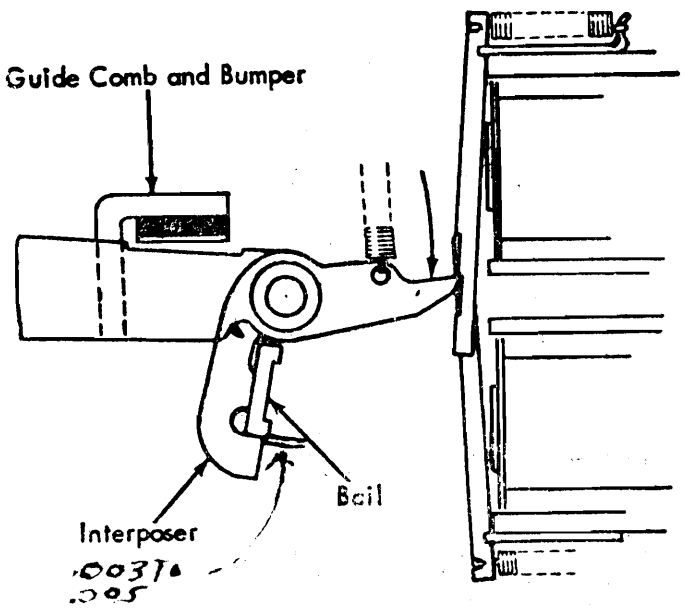
With the punch clutch detent back against the punch clutch latch, set the punch index pointer to 345° ± 2°. Check to be certain that the pointer clears the index periphery.

## Punch Clutch Spring and Collar Adjustment

1. Install the punch clutch collar against the side of the detent.
2. Grease the clutch spring and insert it under the collar against the shoulder on the shaft.
3. Place the sleeve over the clutch spring. Engage the stud inside the sleeve with the outer end of the clutch spring. Rotate the sleeve clockwise to expand the spring and install the pulley. Install the retaining collar, and when the pulley is properly located, 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 by means of the adjusting collar until it is tight within the sleeve. Rotate the punch index to 348° and lock the collar. When the index is turned by hand, there should be an overthrow of 3° to 5° past 345° to permit the detent to drop in.

## Guide and Bumper Comb Adjustment

With the clutch latched, adjust the comb to make the bumper portion hold the punch operating arms down against the punch bail. There should be a minimum of .003"



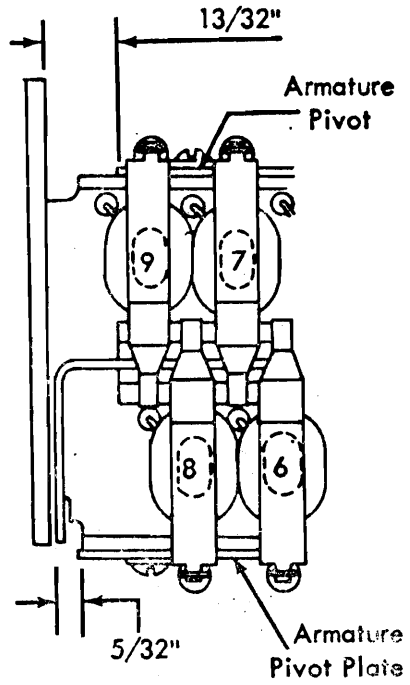




*Figure 23. Armature Pivot Adjustment*

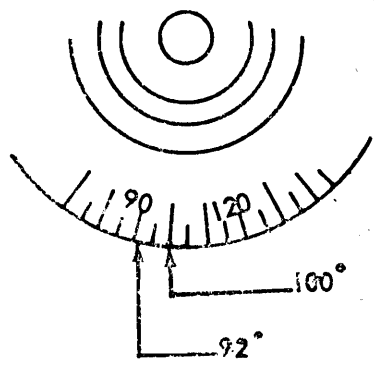



*Figure 21. Interposer Relatching*

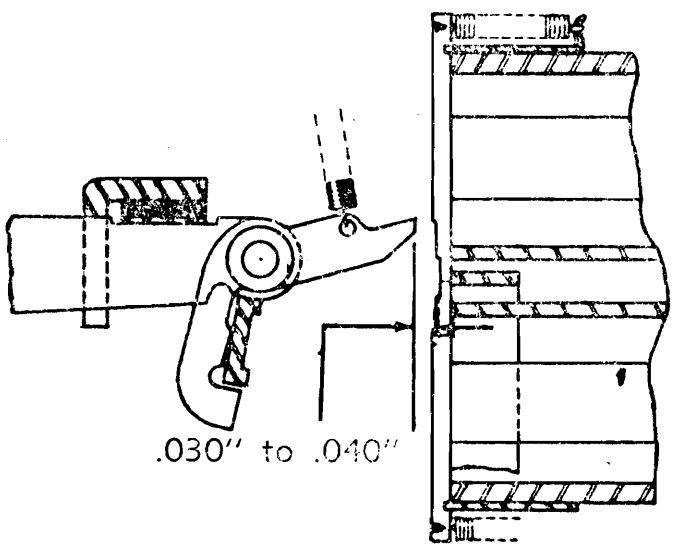
clearance between the bottom of the bail and the interposers when the interposers are hooked under the bail. Check by placing the hand on the punch arms to take up any clearance between the top of the bail and the arms, then trip all interposer armatures. All positions should latch under the bail.

## Interposer Magnet Assembly Adjustment

These adjustments are made with the unit removed.

1. Trip four interposers across the unit and position the unit vertically so that the interposers start to relatch in the armature notches at 92° and are all in their notches by 100° (Figure 21). The space interposer latching time will vary, but may not be later than 100°.

2. At 345° trip all the armatures and position the magnet unit for a clearance of .030″ to .040″ from the interposers to the attracted



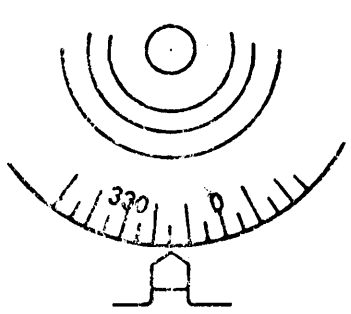




*Figure 22. Armature Clearance Adjustment*

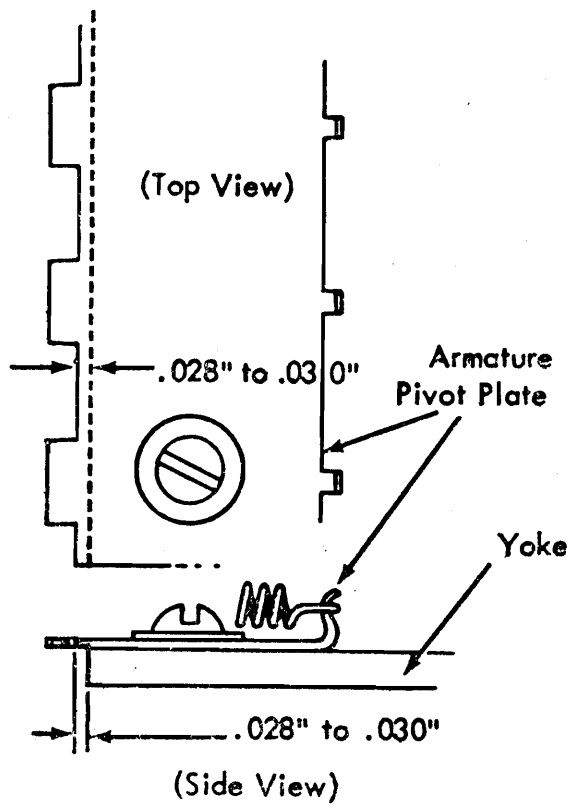



*Figure 24. Armature Pivot Adjustment*

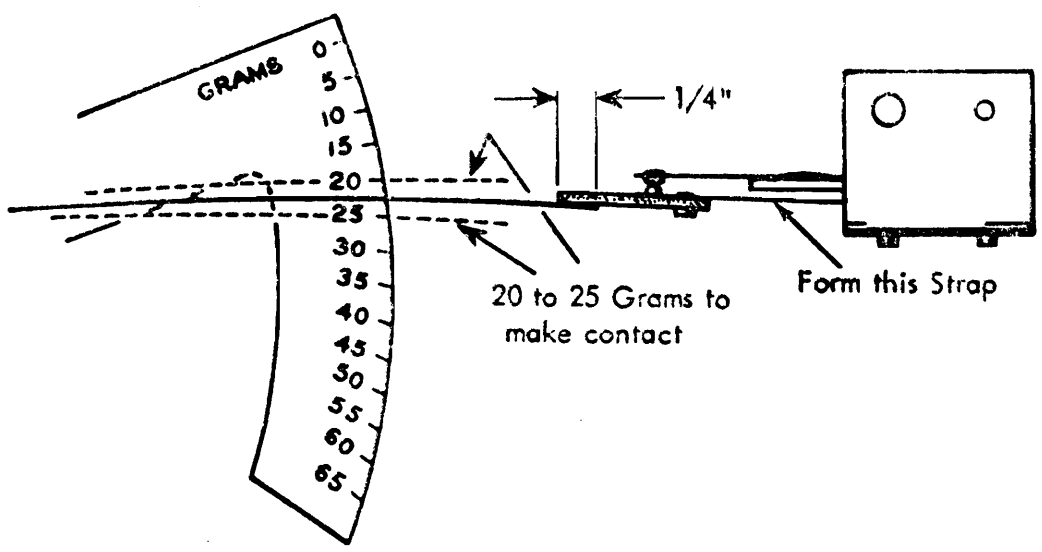



*Figure 25. Interposer Bail Contact Adjustment*

armatures as shown in Figure 22. The gap should be even across the entire unit.

3. Adjust the eccentric screw until the knockoff bail contacts the attracted armatures evenly at both ends of the unit between 13° and 20°. Where the eccentricity is insufficient, the adjustment may be obtained by pivoting the magnet unit about the armature latching point.

## Interposer Magnet Unit Adjustments

When replacing coils, a little slack left in the wire leads will prevent the yokes from cutting through the insulation. All the Type 24 coils are of equal resistance. The 12, 11, 0 and space magnet coils on the Type 26 are the same as the Type 24 coils. All other Type 26 coils (p/n 228567) are of less resistance. The coils are held to the cores by cement (p/n 261096). The upper and lower armature pivot plates, as well as all armatures, are interchangeable.

1. Position the armature pivot strip as shown in Figure 23 to center the armatures over the cores. The bottom of the notch in the strip (the pivot point for the armature) should extend .028" to .030" from the end of the yoke, as shown in Figure 24.

2. Form the armature pivot strip at the pivot point by lifting the tip of the armature until there is at least 1/8" free movement to the operating end.

3. Form the armature to contact, within .005", the core and both yokes when attracted.

## Interposer Bail Contact Adjustment

Master card bed plates having one screw can be removed by first pulling the top rail dowels. Standard dowels have a threaded top. Unthreaded pins are oversize. Do not interchange them. Plates held with two screws can be removed without disturbing the top rail.

1. With the contact assemblies removed, form the operating strap near the mounting to require 20 to 25 grams to close the contacts (Figure 25). Place the gram gage finger under the phenolic pad with 1/4" overlap when checking the adjustment.

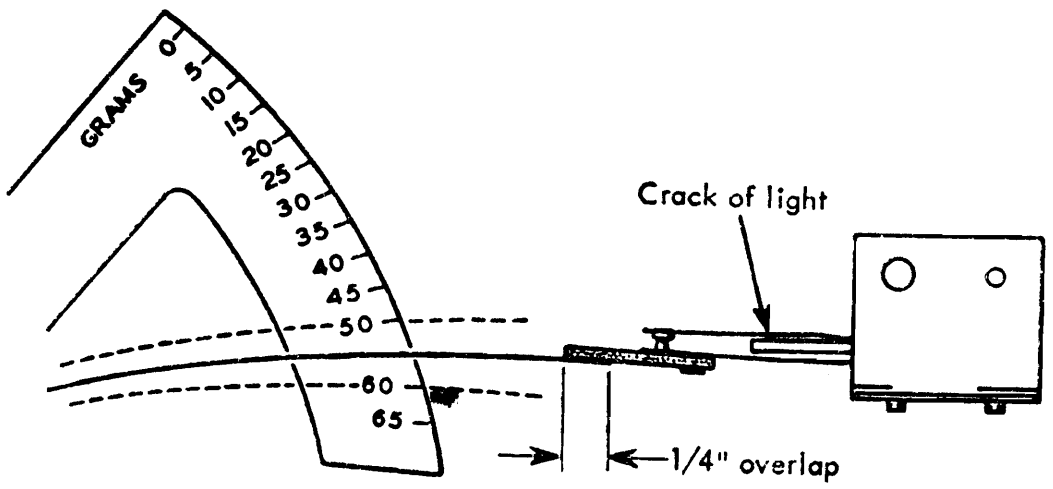



*Figure 26. Interposer Bail Contact Adjustment*

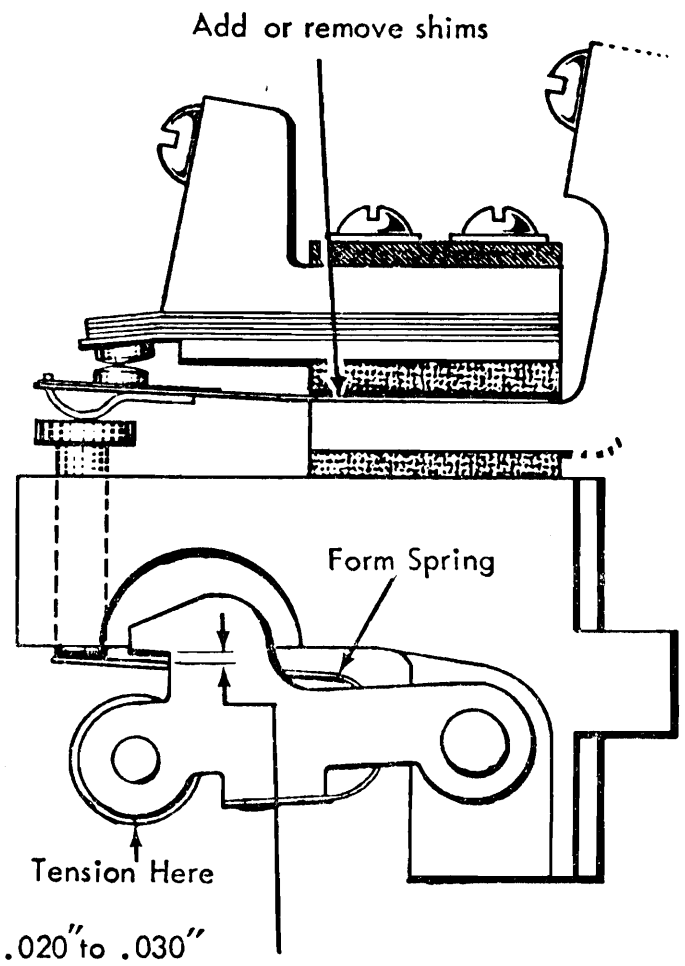



*Figure 27. Circuit Breaker Adjustment*

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. One method of forming the contact strap is to insert a straightened paper clip between the strap and its support. Form the contact strap to obtain a point-to-point contact at the outer tip of the support strap. When properly adjusted, a crack of light will appear at the tip of the support strap during measurement. A total of 50 to 60 grams should be required to close the contact and raise the stationary contact off the support strap as demonstrated in Figure 26. It is of greatest importance that both contact assemblies are of equal tension.

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

## High Speed Circuit Breaker (P Cam) Adjustment (Figure 27)

1. Form the operating strap to require 100 to 150 grams to close the contacts. Measure at the tip.

2. Add or remove shims to obtain .027" to .032" air gap with the assembly removed and the plunger seated against the frame.

3. Form the cam follower spring to require 475 to 550 grams pressure to close the contacts with .020" to .030" overtravel of the cam follower.

4. Adjust the circuit breaker assembly for .017" to .023" air gap with the cam on the low dwell. The plunger shoulder must be away from the frame.

## Punch Penetration, Type 24 (Figure 28)

This method of adjustment eliminates partially punched holes during the setup process. The heel of the lowest punch must enter the die .015" to .020".

1. Loosen the following: support screws in the anchor bar, holding screws in the pin bail links, drive

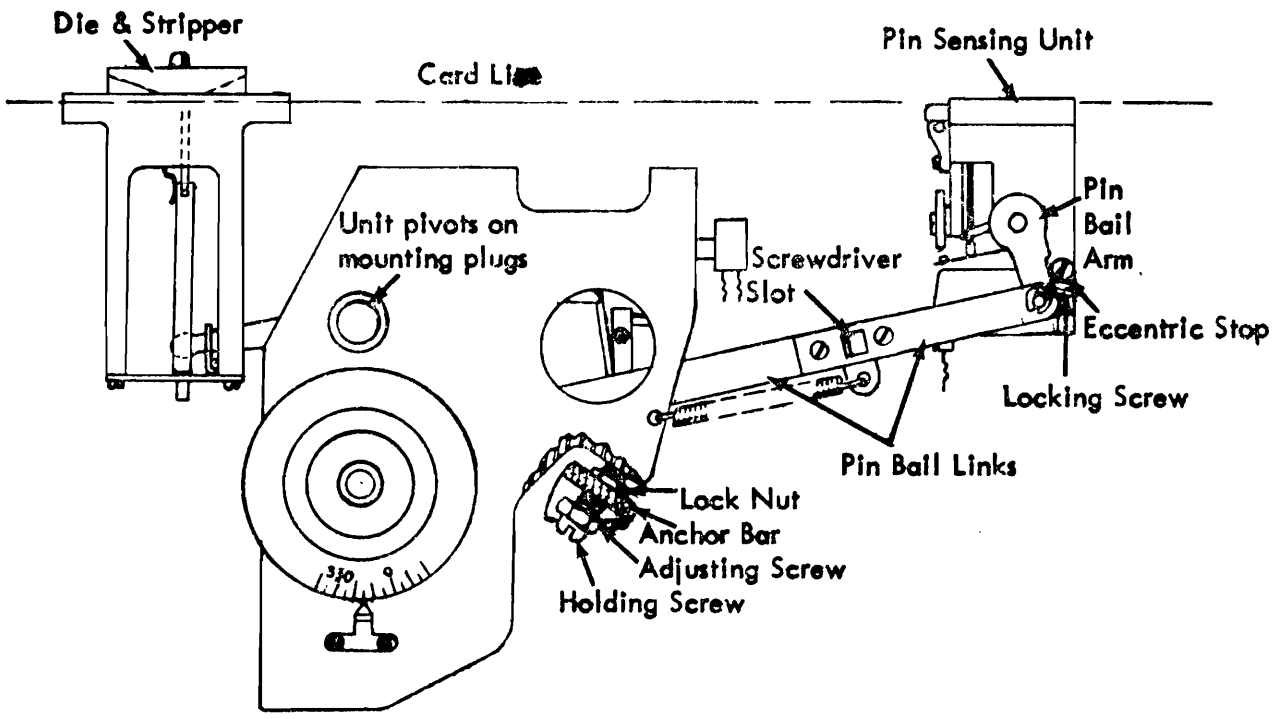



*Figure 28. Punch Penetration Adjustment*

unit adjusting screw lock nut, and holding screw.

2. At 345° (punch index), trip all punch interposer armatures. It can be done electrically by pulling R25 to open affected grids and using an interposer bail contact lead at the drive unit to energize each magnet.

3. With the index turned to 126° (punches up) turn in on the drive unit adjusting screw until a .010" gage passes between the lowest punch and the die. The holding screw must be tightened after each trial.

4. Remove the feeler gage and back off two complete turns on the adjusting screw. Tighten the lock nut.

5. Turn in the two support screws until they rest against the drive unit side frames, then lock their nuts. Extend the pin bail links. Additional travel, when needed, should not exceed 1/6 turn (.003") per step.

For *Punch Penetration, Type 26* see Type 26 Printing section.

# KEYBOARD PREVENTIVE MAINTENANCE

*Contact Air Gap.* Insufficient air gap at the latch contacts can cause double punching to appear in a single column.

*Latch Assemblies.* Failure of a latch to restore may cause extraneous punching. Check the pivot on the latch assembly for a bind and oil it. See the revised restoring magnet adjustment, step 2. Do not oil the interlock discs.

*Restoring Bail Contact.* When there is a lack of clearance between the phenolic pad on the restoring bail and the operating strap, the contact will break earlier than desired. It may result in skipping, without punching an X, with the —SKIP key. Set the contacts for .002" minimum clearance to the pad.

*Alphabetic Shift Key.* A combination of the location of the key and close contacts can cause extraneous punches to appear in a column along with the desired information. It is attributed to operators striking the Alpha-shift key with the heel of the hand when in the numerical shift. Increase the air gap to eliminate the condition.

*Dummy Plugs.* When replacing the keyboard cover, the dummy plugs can be held in place with cellophane tape until the unit is assembled.

*Sluggish Keyboard.* This can be caused by improper adjustment of the punch clutch and the escapement assembly, since successive operation of the keys depends upon completion of the previous punch cycle.

*Alphabetic Keyboard Bails.* When working on these bails or the bail contacts, the use of cellulose acetate tape is recommended to hold the bails in place when the bail contacts are removed. A hole can be punched into the tape to remove any particular bail.

# KEYBOARD ADJUSTMENTS (FIGURE 29)

## Contact Bails Adjustment

Form all tabs on each contact bail for zero to .005" clearance to their associated operating ears on the permutation bar, with the permutation bars in the restored position.

## Support Bar Guide Comb Adjustment

The support bar (which acts as a support for the latch pull bars and a guide comb for the permutation bars) should be parallel, within .008", of the interlock support bar upon which it is mounted.

## Permutation Bar Travel Adjustment

Adjust the four setscrews positioning the bar stop plate to allow the bars to drop .042" to .048". Measure at the center and the fourth bar from each end.

## Restoring Magnet Adjustment

1. Adjust the pivot bracket for a minimum clearance without binding the pivot.

2. Restore all latches on the latch bar. With a .003" gage between the core and the armature, position the magnet brackets evenly until the restoring bail meets the

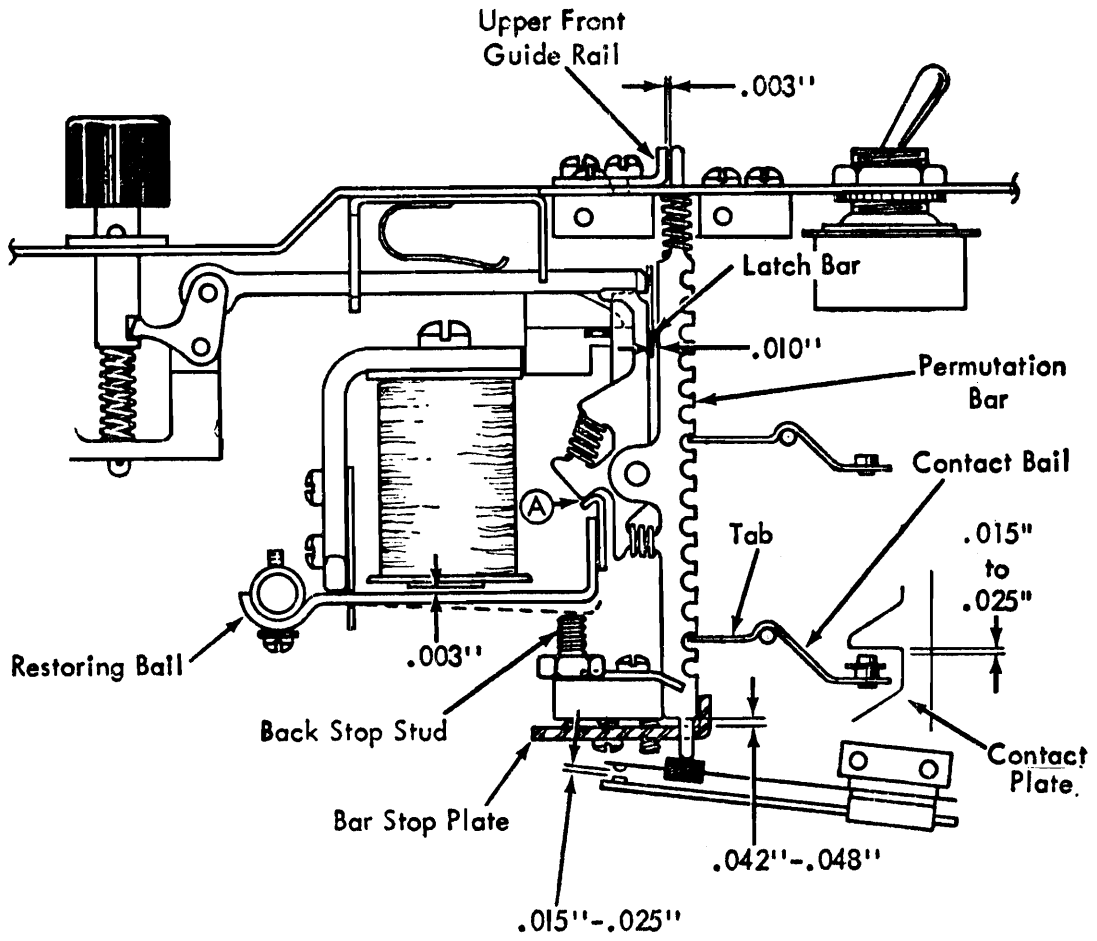



*Figure 29. Keyboard Adjustment*

lowest latches at *A*. This should result in .010" maximum overtravel of the latching point with the gage removed.

3. With the magnet de-energized, adjust the two backstop studs for .002" clearance between any tripped off latch and the restoring bail. Check at both ends and the middle.

## Upper Permutation Support Adjustment

(Die cast supports are not adjustable.)

1. Position the switch mounting plate comb evenly across the unit for .010" clearance between the permutation bars and the latch bar.

2. Position the upper front guide rail evenly for .005" clearance to the permutation bars.

## Key Unit Adjustment

Seventy to eighty grams tension should trip any key operating a latch assembly and interlock disc. Keys which do not operate latch assemblies should travel 5/32" with 50 to 70 grams key pressure.

## Keyboard Contacts Adjustment

1. *Bail Contacts.* Adjust the contact plates for .015" to .025" air gap with all the latch assemblies restored. It should require a minimum of 15 grams to break any closed bail contact. Form the contact straps to obtain the correct tension while maintaining the air gap.

2. *Latch Contacts.* Form the operating strap to require 17 to 24 grams of tension to close the contacts when measured at the pad of the operating strap. Pivot the contact assembly mounting bar to obtain .015" to .025" contact air gap across the unit. Stationary straps can be formed for individual air gaps. Be careful to keep the contact points lined up properly.

3. *Restoring Bail Contact.* Form the operating strap to require 50 to 60 grams to break the contacts. Adjust the contact bracket for a minimum clearance of .002" between the operating contact strap and the phenolic pad on the restoring bail. This contact must break before the latch or bail contacts. It should break with a minimum air gap of .010".

4. *Key Stem Contacts.* The N/O contacts should have a minimum of 1/32" air gap and should close with a key depression of 1/16" to 1/8". The stationary contacts must be formed toward their support straps with 15 grams tension when measured at the contacts. It should require a minimum of 15 grams to break the numerical key contact when measured at the end of strap.

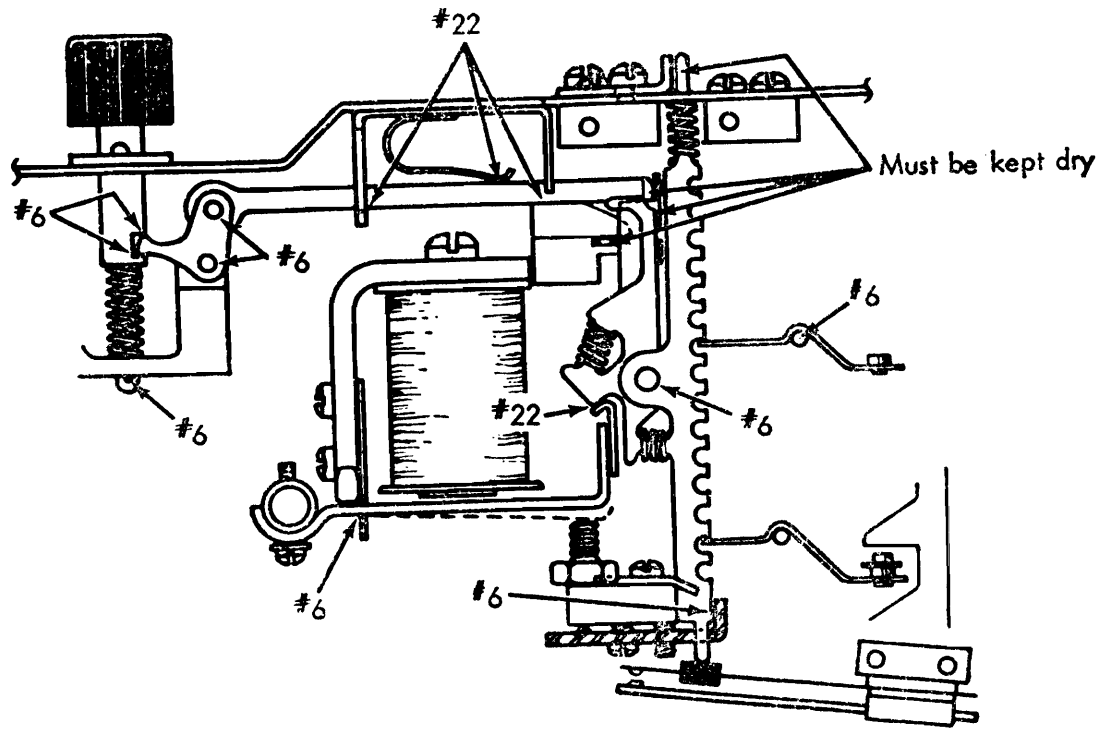



*Figure 30. Keyboard Lubrication*

# PRINTING PREVENTIVE MAINTENANCE

## Code Plate

*Lubrication.* Keep oil or grease away from the back of the code plate because it causes printing failures.

*Missing Projections.* Broken or missing projections can be determined easily if the code plate is in proper alignment. Each projection on the code plate is used for one specific character. A test of other characters will usually determine if it is a shifting error or bind. Make an overlay on Figure 31 with transparent paper, marking out the 35 home positions with circles. Shift the overlay the desired number of units and the character will appear inverted. The rows of projections can be counted for the exact projection in question.

*Return Springs.* Always make sure the two code plate return plungers are in place before running the machine. It might be possible to run the machine a short time without one plunger, but broken wires or code plate projections will result.

## Test for Code Plate Alignment

1. Loosen the vertical (right-hand) fixed stop locking screw. While printing an R, back off on the adjusting screw until extra wires print. Mark the position of the screw slot and turn the screw in until failure occurs at the other extreme of the adjustment. Mark the position of the screw slot and turn it to the mid-point between the two marks. These marks indicate the critical limits of the adjustment and the mid-point represents the maximum safety factor. Tighten the locking screw.

2. Loosen the horizontal (left-hand) fixed stop locking screw. While printing 3's, back out on the adjusting screw slowly. If the code plate is in true vertical alignment with the rows of print wires, all the wires printing the 3 will drop out simultaneously because the code plate is being moved to its neutral position by the adjusting screw. If a corner of the number disappears first, remake the vertical shift adjustment using the aligning tools.

3. Repeat step 1 with the horizontal adjusting screw. An R is suggested because several extra wires are picked up at once, making the distortion of the R easy to detect. Tighten the locking screw.

## Removal of the Code Plate

1. Remove the ribbon spools, leaving the ribbon under the die. Place the spools under the card lever pressure finger.

2. Transfer the vertical shift spring to the bellcrank to hold compression on the interposers.

3. Insert the aligning tool to keep the code plate in position until it is ready to be removed. This is necessary to prevent losing the pressure plungers and springs. Unscrew the flexible shaft gear (left-hand thread).

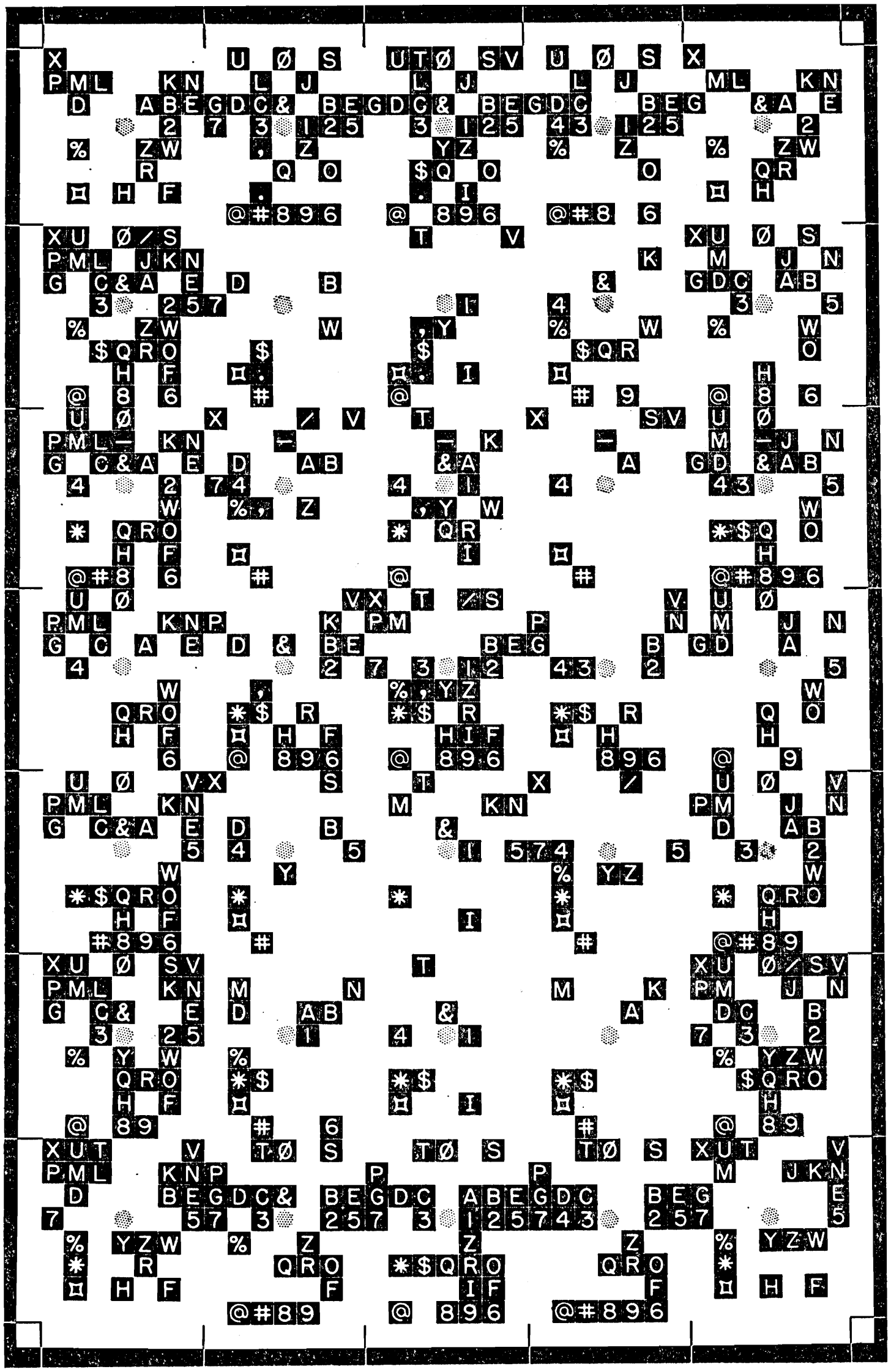


*Figure 31. Code Plate Chart*

4. Remove the chip tube to make it possible to lift the guide bushing out of the die with the print wires. Keep the bushing on the wires, with tape if necessary, to protect them.

5. Disconnect the print drive rod from the print arm. Remove the four screws holding the printing head to the base and lift the head off the guide pins.

6. Unhook the ribbon feed pawl

spring and separate the ribbon feed and printing mechanism. Four screws hold these units together.

7. Remove the two vertical shift plate pivot screws and move the plate out of engagement with the code plate. Unhook the code plate return spring.

8. Withdraw the upper aligning tool while inserting a piece of IBM card between the code plate and the wires to protect the wires. Pull out the lower aligning tool and remove the two pressure plungers and springs to prevent losing them. The code plate is then free to be drawn out of the bottom of the printing unit.

## Print Wire Assembly

*Print Wires.* Wires do not require additional oiling.

*Chip Tube Position.* The housing helps position the wire guide closures. Exchanging or repositioning the chip tube may affect printing.

*Replacement of Wires.* Single wires can be replaced. Be sure the collar portion of the wire which extends through the guide plate is the same size as the one being replaced.

*Replacement of Wire Guide Assembly.* A precut set of 35 wires is not available because the wires are ground in a tool jig after assembly. If the units become troublesome or worn, replace the wire guide assembly.

*Character Patterns.* Figure 32 is supplied as a guide to the wires used for printing each character. It can be used to determine when extra wires are being picked up in printing.

*Removal of the Wire Guide Assembly*

Remove the code plate and proceed as follows:

1. Remove three horseshoe clips from one side of the unit (the two smallest clips and the one holding the print drive rod shaft). Pull out the three shafts that are freed (see Figure 36).

2. Remove the four screws holding the adjusting screw plate and pull the units apart.

## Platen, Smudging, Printing Pressure

1. Avoid adjusting for printing pressure with a dry or worn ribbon.

2. A thin platen will require the print wires to extend farther into

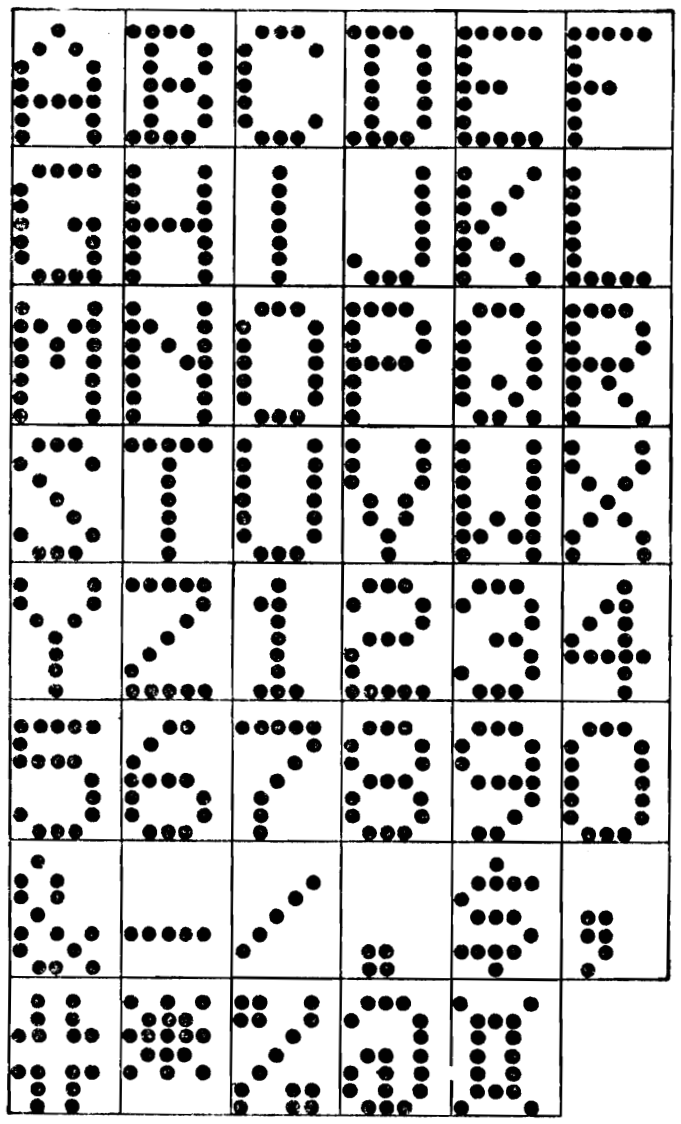


*Figure 32. Character Impression Patterns*

the card path than normal and cause smudging. Replace thin platens and check the platen and printing pressure adjustments. Remove any burrs from the platen.

3. A worn or undersize print cam will result in smudging cards. Replace defective cams.

4. Insufficient clearance between the eccentric drive link and the washer on the end of the shaft will place an extra load on the punch drive unit. It sometimes shows up by causing clutch latching failures.

## Removal of a Punch, Type 26

The quickest method is to remove the print interposer assembly.

1. Remove the nuts and springs from the 12 punch extensions. The springs are interchangeable.

2. Transfer the vertical shift spring from the shift plate to the eye in the bellcrank to keep the vertical shift interposers compressed.

3. Remove the horizontal shift spring. Compression must be held on the horizontal interposers by hand when shifting the unit.

4. Remove the three screws from the corners of the rectangular punch extension guide which is

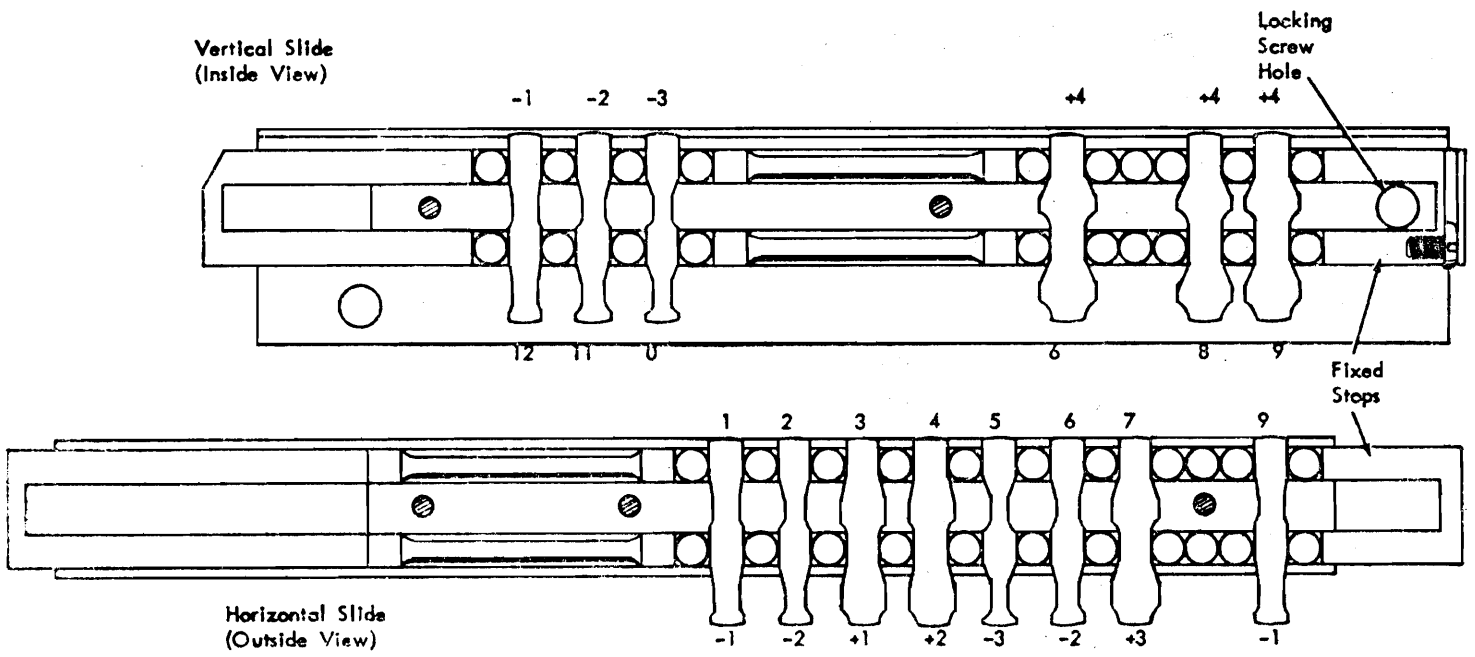



*Figure 33. Print Interposer Assembly*

mounted on the bottom of the stripper.

5. Install the code plate aligning tools to protect the print wires and retain the code plate return plungers. Pull the interposer assembly straight out to avoid lifting all the extensions off their punch arms. The desired punch can be removed by lifting its extension out of engagement with the associated punch arm.

6. A flat guide (.0125" - .018" thickness gage) is helpful in inserting a punch into the stripper. The highest point of the punch belongs toward the front of the machine and the head of the retaining pin belongs toward the retaining plate.

7. Slip the extension guide plate over the punch extensions to hold them located with respect to the interposer yokes.

8. Place the interposers in their lowest operating position while replacing the interposer unit on the extensions. A fillister screwhead placed between the 9 yoke and the frame will align the yokes with the punch extensions.

9. Install the 12 springs and nuts, turning the nuts up until they seat against the shoulder on the extensions.

CAUTION: Do not force the nut tightly against the shoulder because the extensions break off easily.

## Electrical

*Relay 31.* Both pick and hold coils should be of equal resistances (625 ohms each). Relay 31 coils are in series with interposer magnets. When interchanged with relays of higher resistance, duplicating failures will result. Failure to duplicate only 8's and 9's is attributed to a relay with a high resistance hold coil being substituted for R31.

*Fuses.* All Type 26 machines operating on 115 V, 60 cycle, should be equipped with a 3.2 ampere fusetron p/n 107664.

## Print Interposers

Figure 33 contains the location of the print interposers, rollers and slides. Each unit of cam action equals .020" motion to its slide. A −1 cam has a .010" cut from both sides of the interposer, resulting in .020" motion. A +4 interposer moves the slide .080". Use this chart as a guide to reassembly. The + or − values are now being etched on the interposer faces. (The ratio of motion of the slides to the code plate is 10 to 11.)

# PRINTING ADJUSTMENTS

## Punch Drive and Print Yoke Adjustment

There should be a clearance of .015" to .020" between the yokes and guides as shown in Figure 34. It is obtained by adjusting the punch drive unit. The clearance will result in the rollers contacting the print interposers a minimum of .015" above the start of cam action. Because the clearance cannot be measured, it is obtained as described below.

1. Remove the belt guard and punch drive belt to take the load

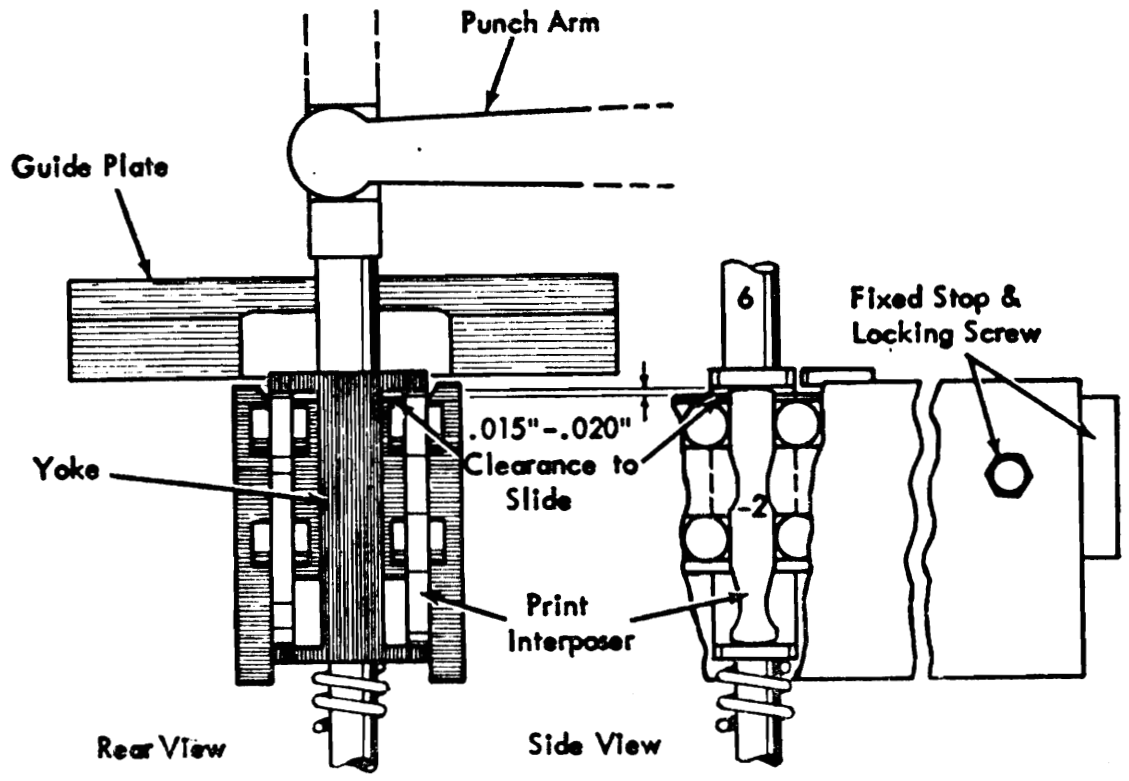



*Figure 34. Punch Drive and Yoke Adjustment*

off the drive unit.

2. Remove the cover from the punch extensions and remove the 12 nuts and springs to reduce the load on the punch extensions.

3. Remove the two screws from the pin bail drive link.

4. In the drive unit anchor bar, loosen the adjusting screw lock nut, the holding screw, and the two support screws. Unhook the print spring.

5. With the punch clutch latched, rotate the drive unit counterclockwise until the yokes can be felt to bottom on their inner guides. Turn the adjusting screw in until it touches the casting, then back off one full turn and tighten the lock nut. Tighten the holding screw. The two support screws should be turned in until they rest against the side frames. Reassemble the machine and test the punch penetration with standard codes.

6. Readjust the printing pressure.

## Punch Penetration Type 26

Satisfactory punching should result from the preceding print yoke adjustment. If more penetration is required on machines with .012" to .015" throat gap, the yoke adjustment will have to be altered and the printing pressure adjustment remade. On machines with .020" to .026" throat gap, the penetration can be changed by its adjustable punches without affecting the yoke or printing pressure adjustments. See the following two items.

## Additional Punch Penetration (.012" to .015" Throat Gap)

After loosening the pin bail drive link and the two support screws in the anchor bar, back out the drive unit adjusting screw 1/6 turn to a step. Turn in on the support screws and connect the bail link after each step and test the machine with standard codes. Each step will result in .004" more penetration. Do not exceed 1/2 turn over the yoke adjustment because the yokes will strike the extension guide plates.

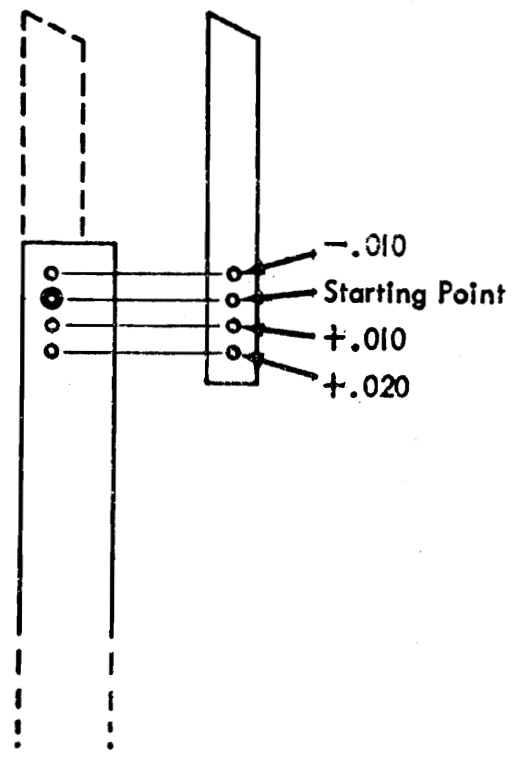



*Figure 35. Adjustable Penetration - Type 26*

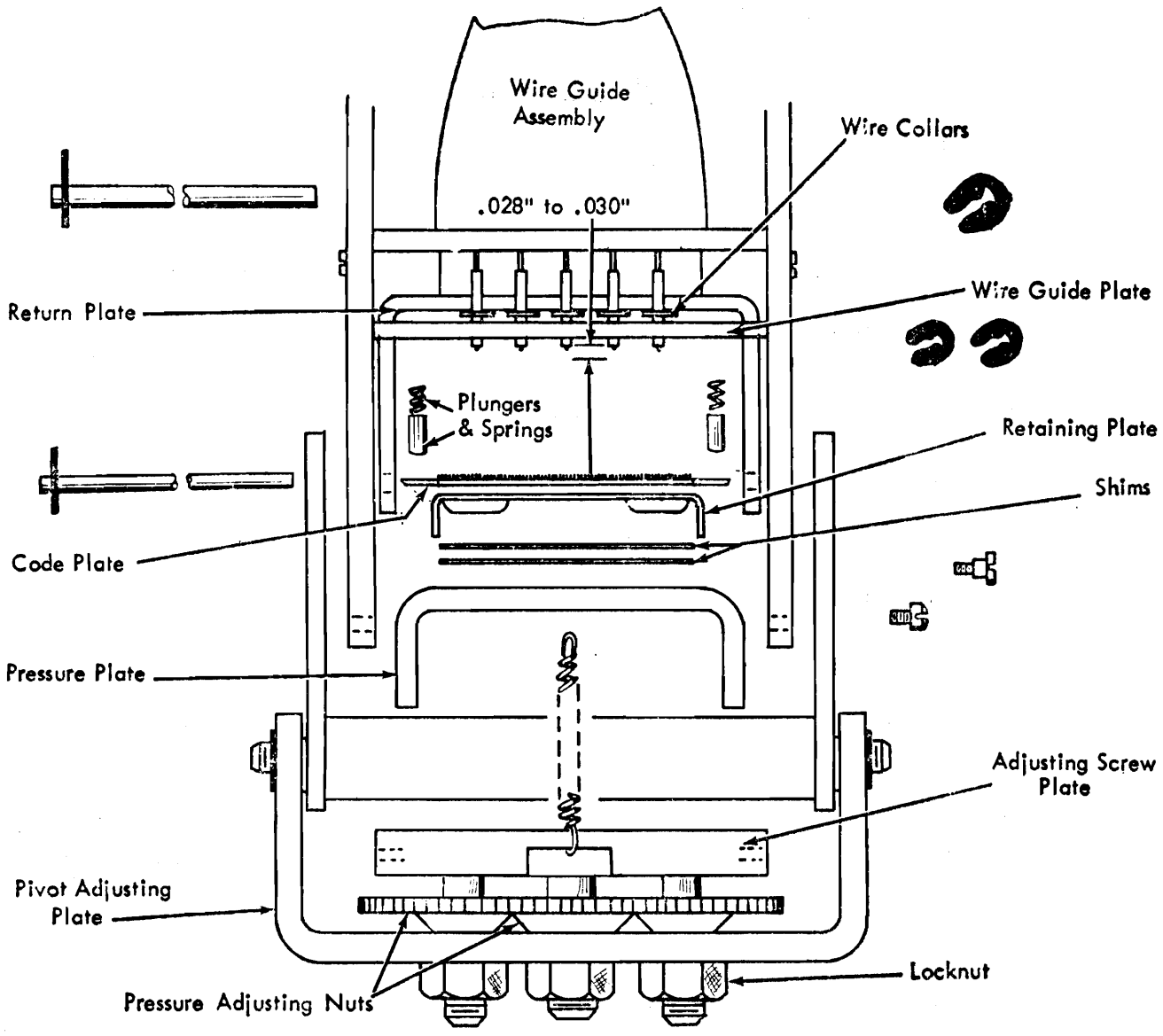



*Figure 36. Code Plate Adjustment*

## Additional Punch Penetration (.020" to .026" Throat Gap)

These units contain adjustable punches which are assembled with the punch retaining pins in the second hole from the top. Each hole varies the punch penetration .010" as shown in Figure 35. Always keep the hole in the punch associated with the corresponding hole in the extension. Adjust individually according to need.

## Printing Pressure Adjustment (Figure 36)

When replacing a wire guide assembly, it is necessary to remake the pressure adjustment and the code plate adjustment. Assemble the printing head, using Figure 36 as a guide. Install the vertical shift plate. Be sure the two lower pressure plungers and springs are in place.

1. Insert both aligning tools to hold the code plate in place and avoid damage to the wires. Loosen the three lock nuts holding the pivot adjusting plate. With the tungsten bushing over the end of the wires, install the head on the stripper frame.

2. Connect the print drive rod and remove the aligning tools. Unscrew the three knurled adjusting nuts until the wire collars meet the guide plate.

3. Shim the code plate for a clearance of .028 to .030" to the ends of the print wires (.003" shim p/n 305243, .007" shim p/n 228296). Use one .007" shim instead of two .003" shims.

4. Turn in evenly on the three knurled nuts, 1/4 turn at a time, until printing is obtained. Snug up the lock nuts after each step and operate the space bar to prevent damage to the wires. A practical test to show up uneven printing can be obtained by disengaging the ribbon feed pawl and printing an H until the printing grows faint. Too much printing pressure will make the machine noisy and cause marks to appear when spacing.

5. The print arm roller must be free to lift .010" off the cam during print suppression to reduce noise and wear on the cam. Check for this clearance with the print spring removed. The lifting motion drives the wire collars .005" closer

to the wire guide plate than their normal return after printing. If necessary, remove shims and readjust the pressure to maintain sufficient clearance to prevent the wire collars from striking the wire guide plate.

## Code Plate Adjustment

The code plate must be adjusted for its blank or zero shift position and must be made to travel in true alignment with the rows of print wires. The adjustment is originally obtained by using the aligning tools (p/n 460028). For readjusting or checking see *Test For Code Plate Alignment, page 23.*

1. Latch the punch clutch and loosen the horizontal and vertical fixed stop locking screws. Back out a turn or two on both fixed stop adjusting screws (Figure 34).
2. Loosen the vertical shift guide locking screw and unhook both shift springs (Figure 37).
3. Shift the code plate until the aligning tools can be inserted through the guide holes in the back of the code plate and wire guide plate (Figure 37).
4. Center the aligning tools in their holes where they will move in and out freely and tighten the vertical shift guide locking screw.
5. Rehook the vertical shift spring. Turn in on the vertical fixed stop adjusting screw (the right-hand screw from the front of the machine) until the lower tool can be moved in and out freely.
6. Rehook the horizontal shift spring and adjust the horizontal screw as in step 5. Tighten both fixed stop locking screws. CAUTION: Remove both aligning tools before running the machine.

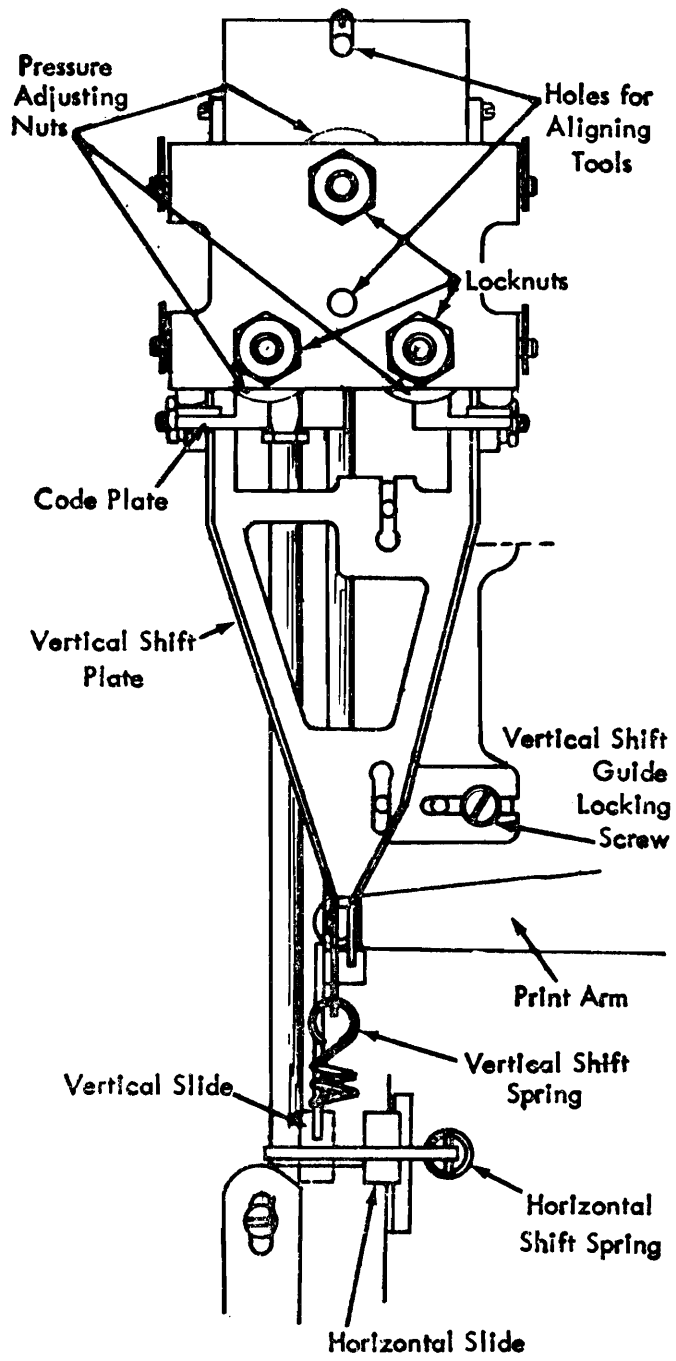



*Figure 37. Code Plate Adjustment*

## Print Suppression Magnet Adjustment

1. The armature should be flat within .005".
2. Adjust and form the ears of the armature pivot so the armature lies flat against both yokes.
3. Form the ears of the armature return spring to extend out 1/16" from the pivot, with the armature removed.
4. Adjust the armature retainer squarely for an air gap of .035" to .037" between the armature and the residual with the magnet de-energized. The sides of the retainer must not drag on the armature.
5. With the armature attracted, position the magnet bracket so that the armature contacts the suppress arm and the interposer block clears the sides of the print arm by .003" to .005".

## Print Suppression Adjustment

1. Loosen the left-hand screw at the rear of the punch shaft and position the eccentric to line up its groove with the mark on the print cam.
2. With the punch clutch latched and the print suppression armature attracted, adjust the eccentric screw in the eccentric drive link for .024" to .026" clearance between the suppress arm and the block on the armature.
3. Unhook the print spring and make sure it is possible to lift the print arm roller .010" off the cam. If the clearance is unobtainable, check step 5 of the *Printing Pressure* adjustment.

### Platen Adjustment

File or stone the platen flush with the stripper to not more than .004" below it. To extract the platen, remove the screw and slide the platen to the right.

## LUBRICATION

CARE must be taken to keep lubricants off the following items:

1. Adjustable friction drives (alloy discs).
2. Keyboard interlock discs.
3. Plastic moulding used for a bearing surface.
4. Stacker card pushers.
5. The back of the code plate.

Difficulties may occur from the use of other than specified lubricants. Some oils contain additive elements which tend to seal off porous bearings and prevent their self-lubricating action.

Frequency of lubrication is based on average conditions and 40 hours per week usage. It is intended merely as a guide for new machines and the customer engineer may have to vary frequency to suit individual machine requirements.

### Lubrication Requirements

The number to the left of the item is a code number for the unit. To find each item necessary on the Punch Drive, for example, refer to each item labeled 2. The complete code number list follows:

1. Die and Stripper
2. Punch Drive
3. Eject and Pin Sense
4. Program
5. Card Feed
6. Stacker
7. Mechanical Drive
8. Print Unit

(For keyboard lubrication, see Figure 30, page 23.)

### *IBM 6*

#### *3 Month Period*

1. Die and stripper. Punch an oiled card at least every 3 months.
2. Punch drive unit:
   a. Cam follower rollers.
   b. Circuit breaker rollers. Be sure they are free.
8. The print interposers, yokes and rollers. Tip punch bed to vertical and let oil run through the units.
8. Code plate linkage, not the code plate. There should be absolutely no lubricant between the back of the code plate and the shim retaining plate.
8. The print drive linkage on the printing head.
8. Print cam follower roller.
8. Eccentric bearing and eccentric screw in the suppression arm.

#### *6 Month Period*

2. Punch drive unit:
   a. Interposer pivots.
   b. Felt spacers.
3. Sensing pin bail shaft bearings. Saturate wicks. Remove the eject unit to make the oil holes accessible.
3. Sensing pin bail arm stud.
4. Star wheel pivots, oil sparingly. Wipe off excess.
5. CF circuit breaker rollers and pivots.

#### *Yearly Period*

1. Punch retaining pins.
3. Eject unit mechanism sparingly. Eject and register arm rollers. Keep oil off the continuously running rubber feed rolls.
5. Card feed knife linkage.
6. Stacker gripper block pivots.
7. Drive Motor.

### *IBM 22*

#### *3 Month Period*

2. Punch clutch spring (grease fitting at least every 3 months). Wipe excess off sleeve and pulley. Where clutch becomes noisy, grease more often according to individual needs.
2. Knockoff bail cam follower. Lift off cam.
2. Sensing pin bail link guide stud.

#### *6 Month Period*

2. Punch interposers at latching points.
2. Punch bail bottom (film of grease).
5. CF steel pressure roller pivots.
8. Rear mounting plug grease fitting.
8. Print spring ends.

8. Print suppress armature at the yoke ends and on the interposer block.
8. Ribbon reverse mechanism.

*Yearly Period*

1. Flexible shaft.
1. Pressure roll release pin (ends).
1. Punch arm guide comb on the stripper.
2. Punch operating arm at the punch extensions.
3. Pressure roll release pin (ends).
4. Program cam.
5. Card feed clutch.
5. Card pusher stop cams and followers.
5. CF latch magnet pivot.
6. Card gripper cams.
6. Stacker cam and follower.
6. Phenolic stacker gear.
7. Escape armature pivot.
7. Reduction drive housing.

The level should be checked yearly if the housing does not show signs of leaking and at least every 6 months if oil shows on the surface. Oil seals can be replaced. The oil level cannot be checked by removing the pipe plug. The housing must be pulled and the top cover removed. The lubricant should cover a point 1/4" above the point of contact of the worm and wheel when held in operating position.