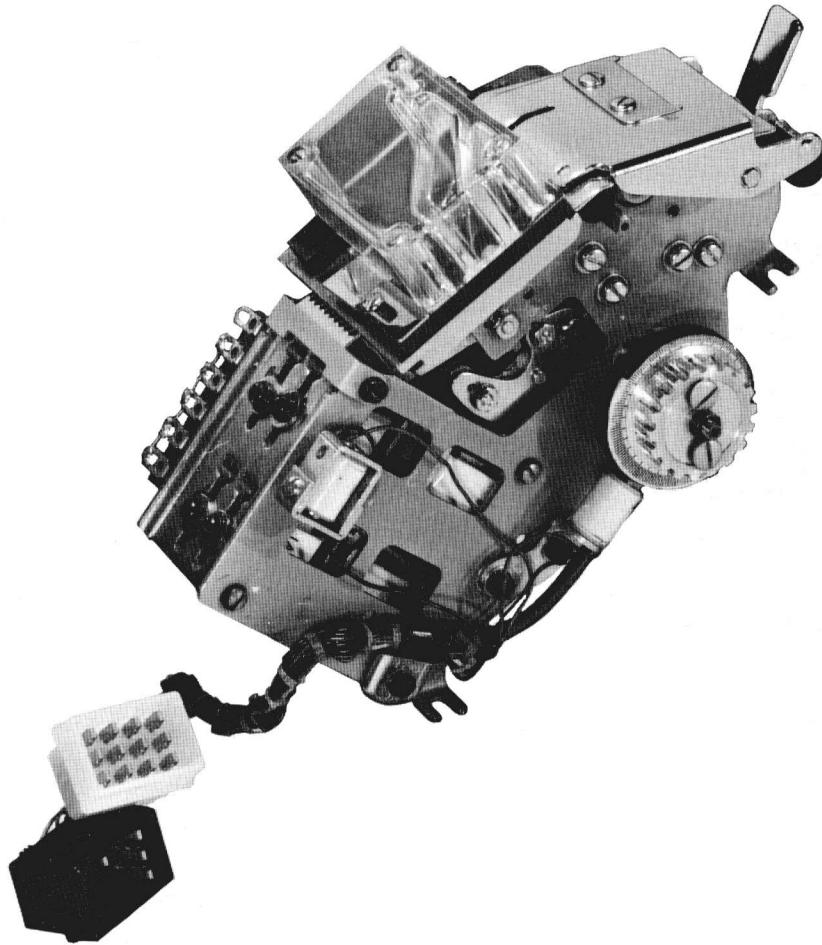


PUNCH BASIC MECHANISM



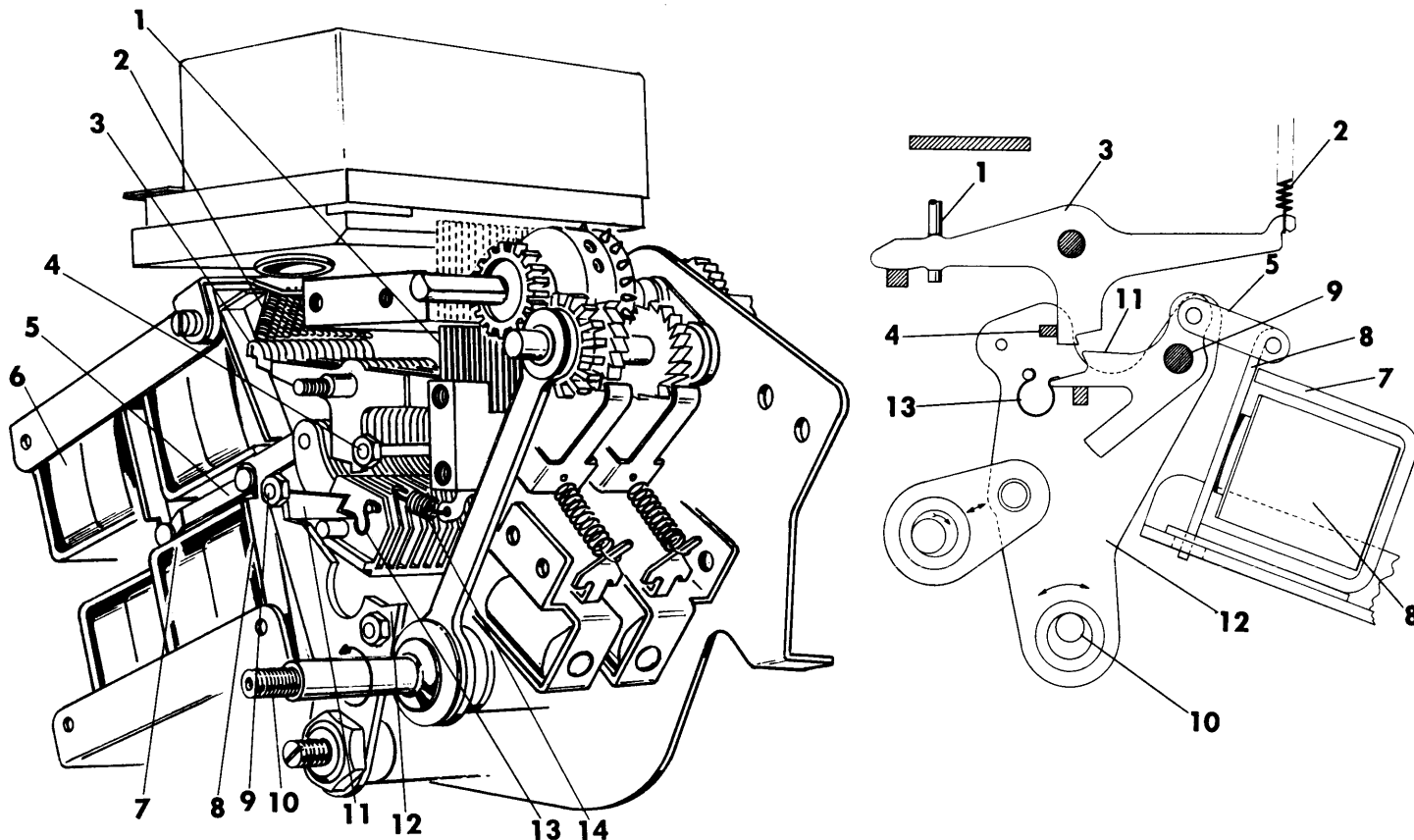
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O.E.M. PRODUCTS DIVISION

AUTOMATED BUSINESS SYSTEMS, A DIVISION OF LITTON INDUSTRIES
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PUNCH - FUNCTION AND OPERATION

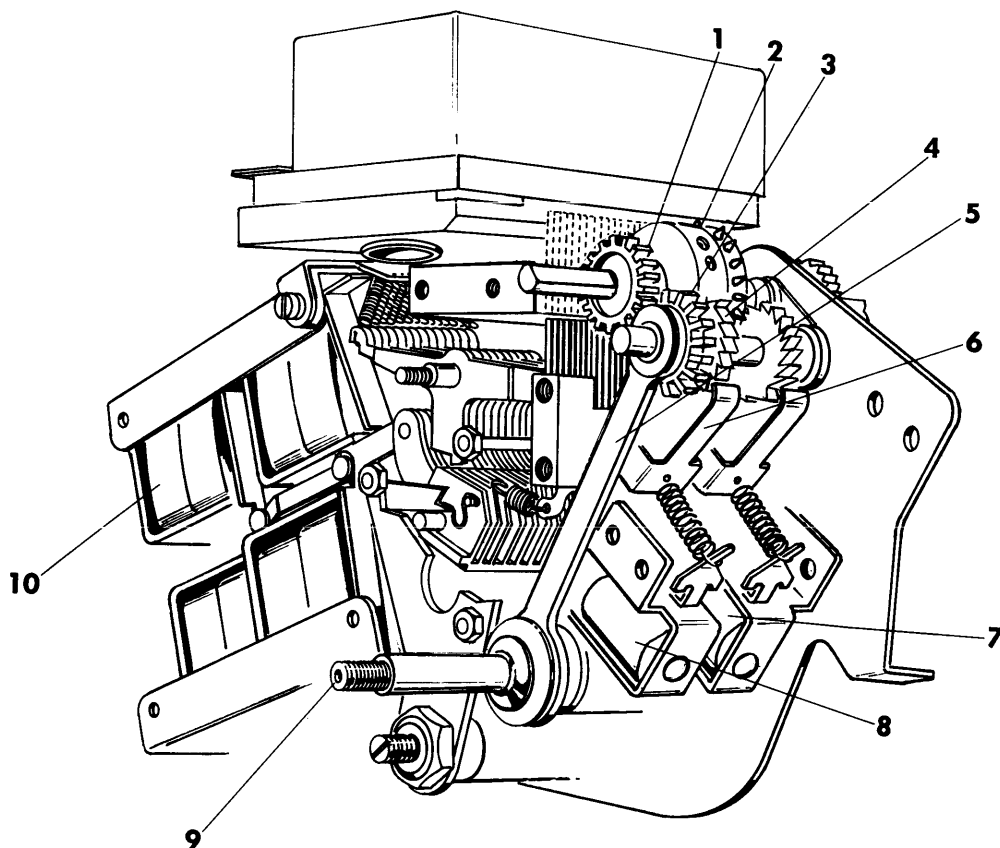
Input Eccentric Shaft (10) rotating in the direction indicated, imparts motion to Punch Pawl Yoke (12).

When a Punch Magnet (6) is energized while Punch Yoke (12) is moving to the rear of the Unit, the pulling action against Link (5) causes Punch Pawl (11) to pivot about Shaft (9). The end of the Punch Pawl moves up, against the tension of Over-Centering Spring (13). Once Pawl (11) is past center of Spring (13), the spring tension pushes Pawl (11) into contact with Punch Driver Arm (3).

As Yoke (12) and Pawl (11) continue to move rearward, Punch Driver Arms (3) pivot up and drive Punches (1) through the Tape to produce the perforated Code. Shaft (10) continues to rotate. Yoke (12) and Pawls (11) move to the front of the Unit

and allow Springs (2) to pull Driver Arms (3) and Punches (1) out of the Tape. Just before Yoke (12) is fully to the front of the Unit, Armature (8) contacts Magnet Shell (7) and as Yoke (12) moves to its full forward position, the force from Armature (8) contacting Shell (7) through connecting Link (5), pushes Pawl (11) against Over-Centering Spring (13) until Pawl (11) is past center and the tension of Spring (13) returns Pawl (11) to its inactive position. Positive Retractor (4) insures the retraction of Punches (1) should Springs (2) fail to pull the Punches from the Tape. Subsequent rotation of Shaft (10) and energizing of Magnets (6) will repeat the punching operation.

Spring (14) eliminates excessive chatter during high speed movement of Yoke (12).



PUNCH - FUNCTION AND OPERATION - Continued

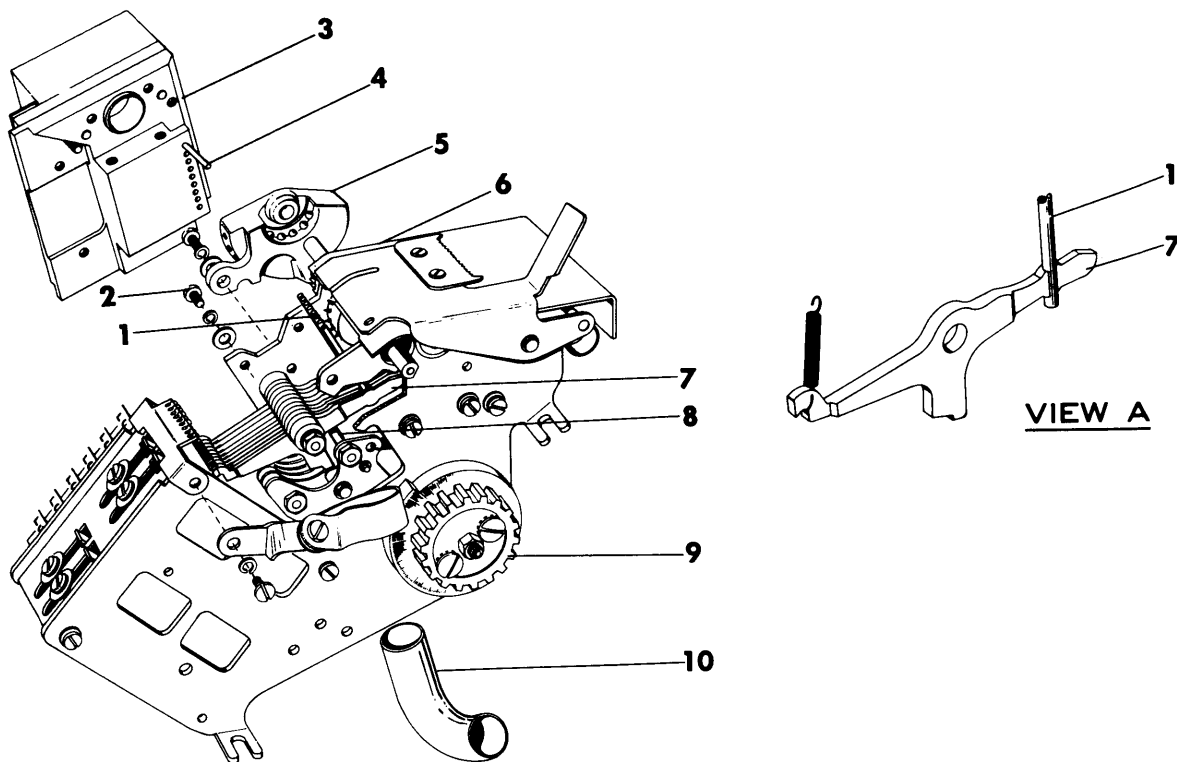
During the rotation of Eccentric Shaft (9), Index Link (5) moves up and down rolling Gear (3) over Gear (1). When the Punches are below the Platen level, Index Link (5) is at its highest point and Forward Index Magnet (8), when energized, brings Interposer (6) into contact with Ratchet (4).

Once Interposer (6) has stopped Ratchet (4) and Gear (3) from turning, the downward motion of Link (5) is transmitted to Gear (1) turning Gear (1) and Sprocket (2) one space.

When the Sprocket is fully advanced, Index Magnet (8) is de-energized and Interposer (6) returns by Spring tension

to its inactive position. The rotation of Shaft (9) raises Link (5) to its highest point to repeat the preceding operation.

The Tape can be fed in the reverse direction by energizing Reverse Magnet (7). The Tape will feed the same way as described in Forward Feeding; however, the feeding occurs during the upward movement of Link (5). The Punching operation occurs at this time and it is, therefore, essential that Punch Magnets (10) are not energized during the Reverse Feed mode.



INDIVIDUAL PUNCH - REMOVAL AND REPLACEMENT

Removal

With the basic mechanism removed from the Unit, remove Chad Tube (10). Remove Ball Detent Assembly (5). Remove the four Punch Die Assembly Binding Screws (2) and carefully pull Punch Die Assembly (3) forward to clear Platen (6). Remove Punch Die Assembly from Unit.

End Punch (4) does not have an Arm adjacent to it and will fall from the Unit when the Punch Die Assembly (3) is removed.

The remaining Punches (1) may be removed by turning Pulley (9) until Positive Retractor (8) is as far rearward as possible. Raise Punch Driver Arms (7) and pull the Punches off the front of Arms (7).

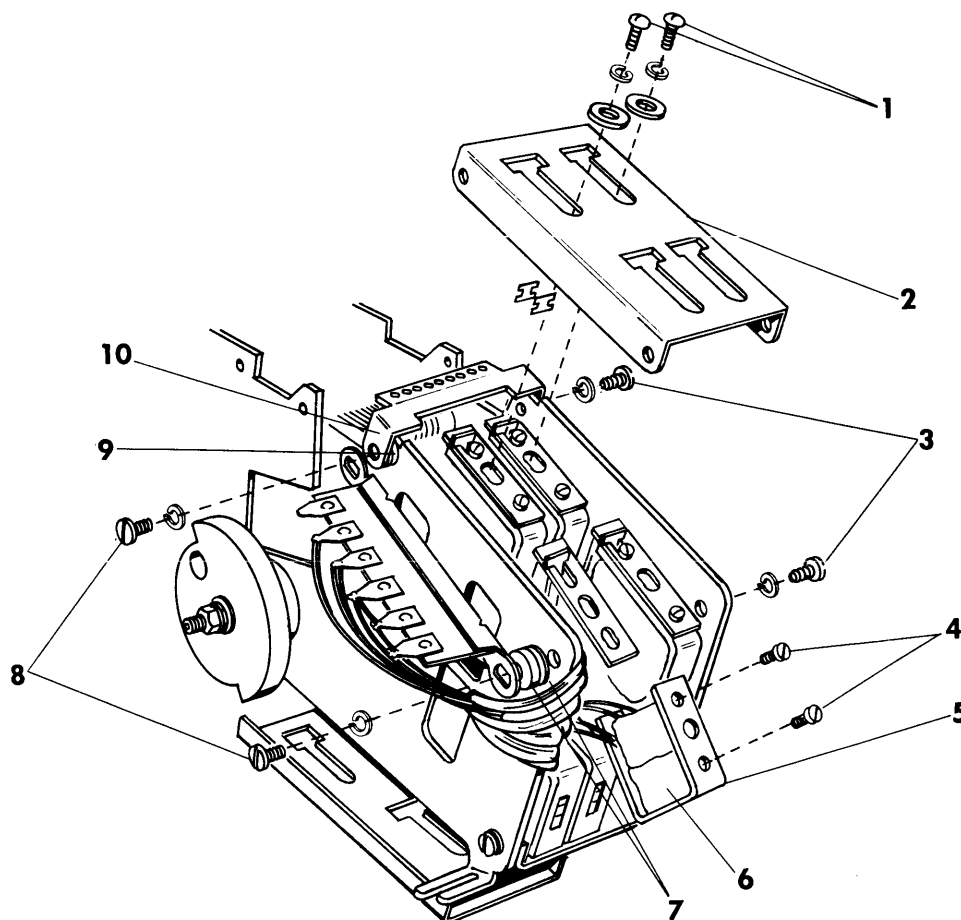
Replacement

With Positive Retractor (8) fully rearward raise Punch Driver Arm (7) and slide Punch (1) into position on Driver Arm (7) as illustrated in View A.

Place End Punch (4) into Punch Die Assembly (3), as illustrated, with the Punch Slot in the proper relation to its Driver Arm.

Position Punches (1) into Punch Die Assembly (3). Lower Punch Die Assembly into Unit and push End Punch (4) down into position over its Driver Arm.

Press the Punch Die Assembly into the Unit and slide it forward to engage Platen (5) with the Slot in Punch Die Assembly (4). Install Screws (2) and check Punches for freedom of movement. Install Ball Detent Assembly (5) and Chad Tube (10). Install the basic mechanism in the Unit.



PUNCH MAGNET - REMOVAL AND REPLACEMENT

Removal

Disconnect Leads to the Winding to be replaced. Remove Binding Screws (1) and (3). Note the amount and location of Spacers (7) and (9). Move Spring Anchor (10) forward and slide Plate (2) out of Unit. Punch Magnets (5) will now lie loose in the Unit and Windings (6) may be removed by removing Binding Screws (4).

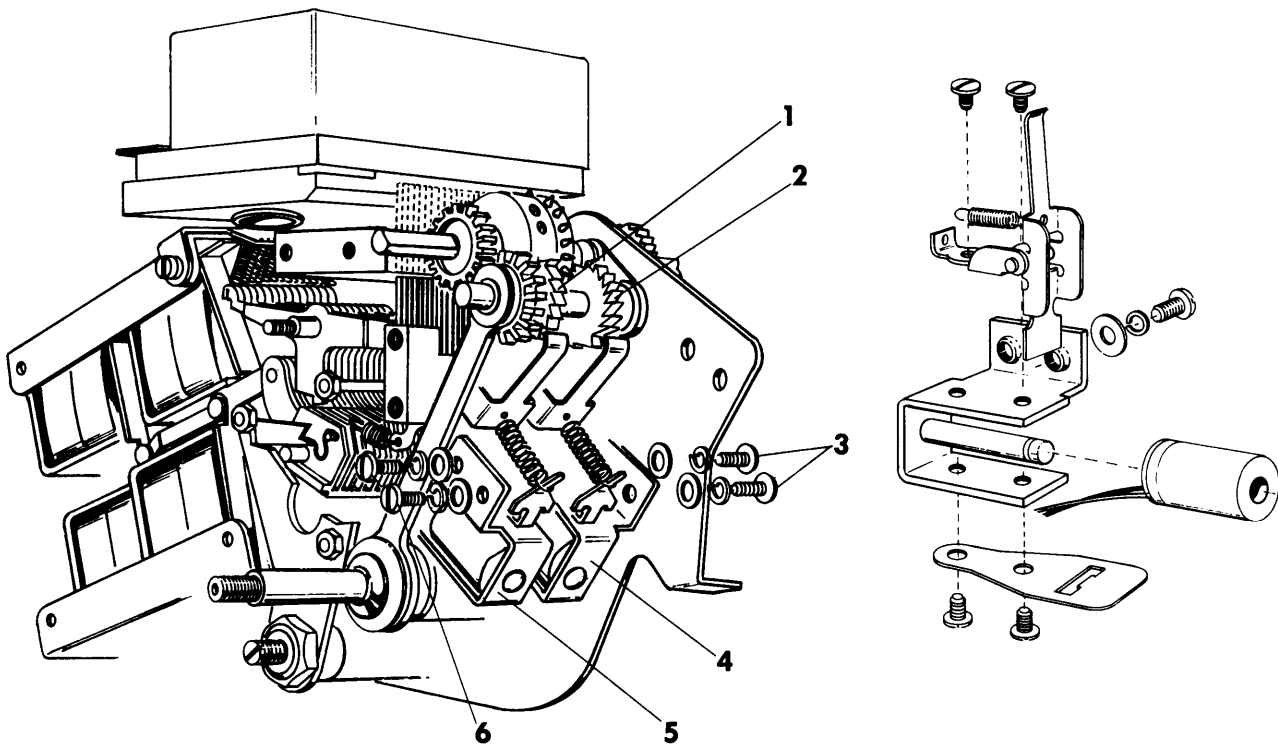
Replacement

Place replacement Winding on the Pole and install but do not tighten Binding Screws (4). Adjust the Punch Magnet Armature as described on Page PBM5-9 and tighten Screws (4).

Reconnect the Leads. Refer to the Schematic Wiring Diagram in the Electronic Section.

Install Plate (2), Spring Anchor (10) and Spacers (7) and (9). Secure with Binding Screws (3). Install but do not tighten Binding Screws (1). Adjust the Air Gap of the Punch Magnets as described on Page PBM5-9 and tighten Binding Screws (1).

Removal and replacement of Punch Magnet Windings, on the bottom of the Punch Unit, is identical to the above description.



INDEX MAGNET - REMOVAL AND REPLACEMENT

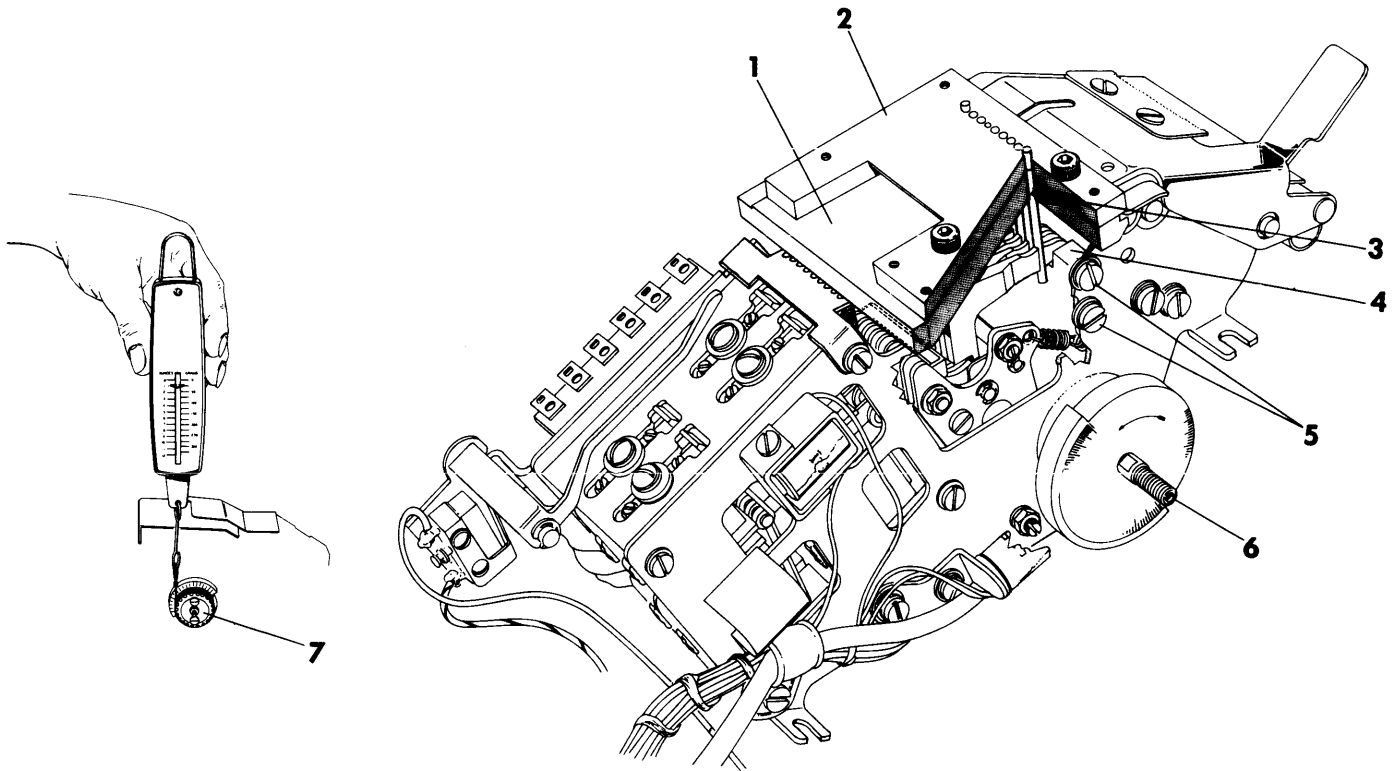
The Forward or Reverse Index Magnets (5) or (4) may be removed by removing Binding Screws (3) or (6) and disconnecting the respective Leads.

Once removed from the Unit, the Magnet Assemblies can be further dismantled as illustrated, for individual part replacement purposes.

Replacement

Position the Assembled Index Magnet in the Unit, in alignment with Feed Ratchets (1) or (2) and Base Side Holes. Install Binding Screws (3) or (6) and connect the Leads.

Adjust Index Magnets as described on Page PBM5-10 and tighten the Mounting Screws upon completion of the adjustment.



PUNCH - ADJUSTMENTS AND TIMING

Punch Position at Rest

Remove the Lucite Punch Cover and remove all Chad from Plate (2). Insert two Punch Pin Set Gauges 1B9-1031 (.203 length) in the number 1 and number 8 Die Plate Holes. Loosen Screws (5) on both sides of the Unit, and move Punch Driver Arm Guide (4) up or down until the Pins in the number 1 and 8 Holes are flush with the surface of Plate (2) and secure Screws (5).

Prior to performing the following calibration, check the Main Shaft Torque by winding a string around Pulley (7) and attach the Pull Scale to the String as shown. Pull the Scale rotating the Main Shaft. The Main Shaft Torque is correct when the Scale reads 5 to 7 ounces.

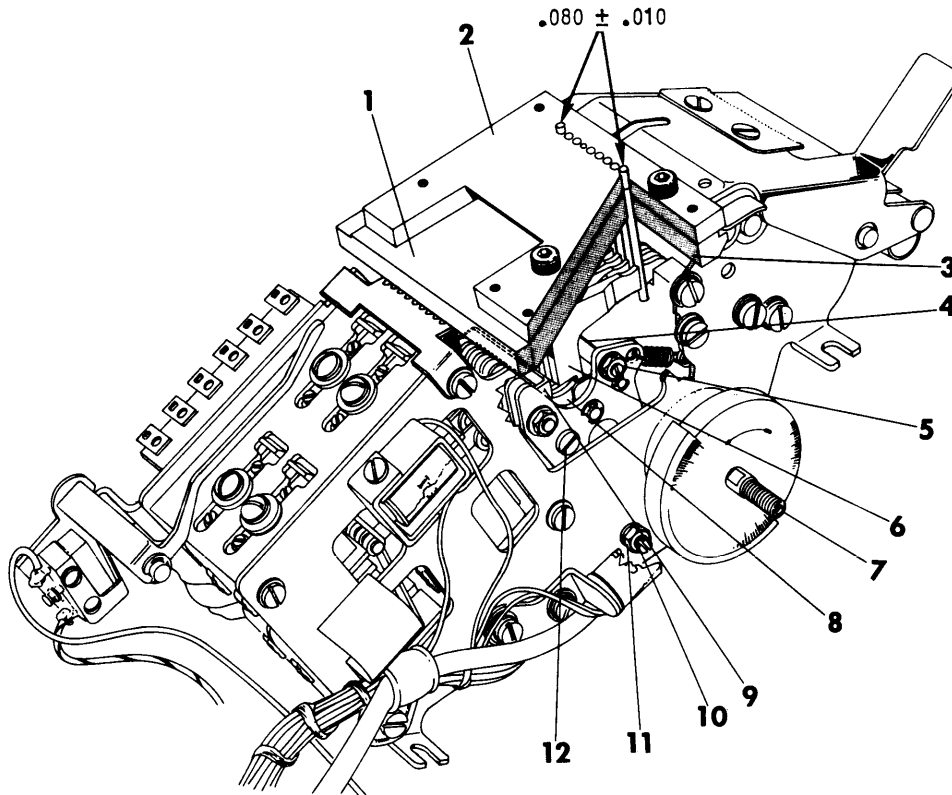
Calibration of the Timing Dial to the Main Shaft

Rotate Main Shaft (6) counter-clockwise while driving a selected Punch (3) to the Platen Level. To check that the Punch is

at the Platen Level, insert a feeler gauge between the Punch Die (1) that is the same dimensions as the Slot. When the Punch reaches the Platen Level, the feeler gauge will bind.

When Punch (3) is at the Platen Level, note the reading of the Timing Dial referenced to the center of the Pulse Generator Pole. Remove the feeler gauge and continue to rotate Main Shaft (6) until the Selected Punch has reached its maximum throw and has returned to the Platen Level. At this point, calculate the difference between this reading and the previous reading. Divide this difference by two and add the result to the first reading. Rotate Main Shaft (6) until the Timing Dial reads this total figure. The Timing Dial must now be loosened and adjusted to read 307° .

CAUTION: Do not rotate Main Shaft (6) during this final Stage of Timing Dial Calibration.



PUNCH - ADJUSTMENTS AND TIMING- Continued

Punch Pawl Limit Adjustments (Old Style Units)

Loosen Screws (12) and move Punch Pawl Limit (9) so it limits the movement of the actuated Pawls (8) .002 before bottoming against Driver Arms (6).

Punch Drive Adjustment

Remove the Lucite Punch Cover and install Gauges 1B9-1031 (.203 length) in the number 1 and 8 Holes in Die Assembly (1). Select the number 1 and 8 Punches and rotate Main Shaft (7) until the high point of Shaft (7) is fully rearward (307° on the Timing Dial). The previously inserted Pins must raise $.080 \pm .010$ above the surface of Plate (2).

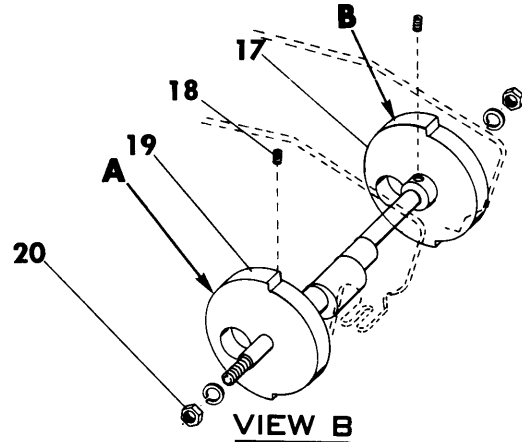
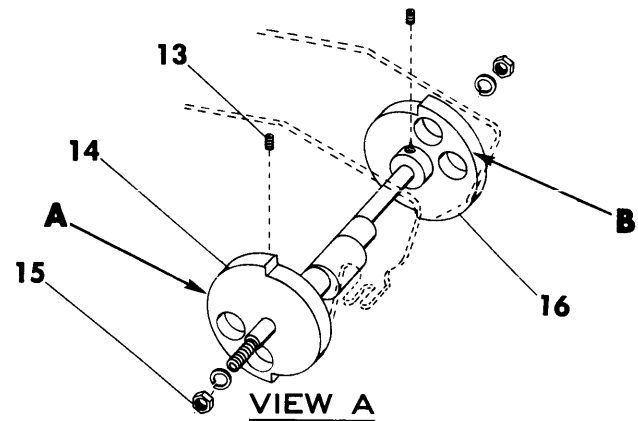
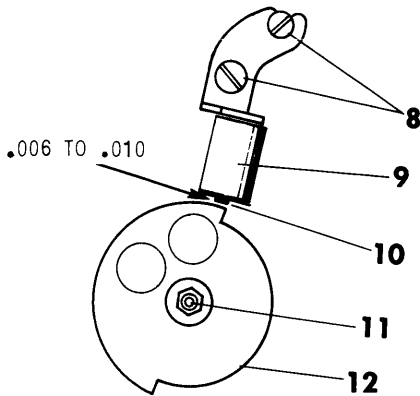
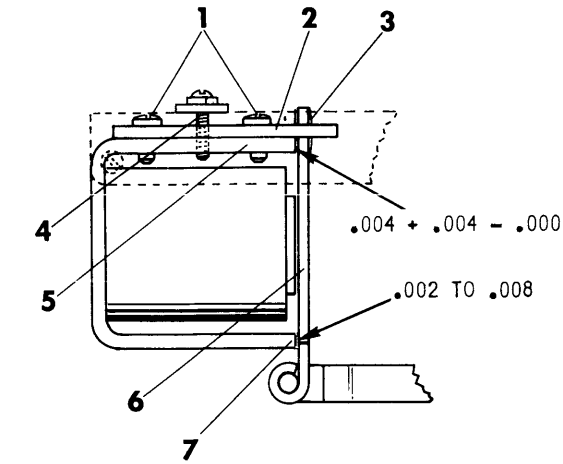
When adjustment is required, loosen Lock Nuts (11) on both sides of the Unit and

turn Pawl Carrier Eccentric Shaft (10) to increase or decrease the amount of movement imparted to the Punches.

Positive Retraction Adjustments

Rotate Shaft (7) until Punch Stripper Rod (4) is fully forward (127° on the Timing Dial). Punch Driver Arms (6) must now have .005 clearance between Driver Arm (6) and Stripper Rod (4). To adjust Stripper Rod (4), loosen Lock Nuts (5) and turn Stripper Rod (4) to obtain the desired .005 clearance.

Turn Main Shaft (7) to 80° . There should be a slight amount of play between Punch Driver Arms (6) and Stripper Rod (4), but Driver Arms (6) when held against Stripper Rod (4) must not allow the Punches to raise above Plate (3) of Assembly (1). Loosen Lock Nuts (5) and readjust Stripper Rod (4) if necessary. Tighten Nuts (5).



PUNCH - ADJUSTMENTS AND TIMING - Continued

Punch Magnet Adjustments

Loosen Binding Screws (1) and move Plate (2) so there is $.004 + .004 - .000$ clearance between Armature (6) and Shell (5) as indicated, with Bowed Spring (3) in the position shown.

Set the Timing Dial at 127° . There must be $.002$ to $.008$ air gap between Armature (6) and Point (7) of Shell (5). When required, loosen Screw (4) and move the Magnet forward or rearward to obtain the aforementioned clearance.

Pulse Generator Adjustments

Rotate Main Shaft (11) until Pulse Generator Disc (12) is at the point where the gap between the Pulse Generator Center Pole (10) and the Pulse Generator Disc is increased as shown.

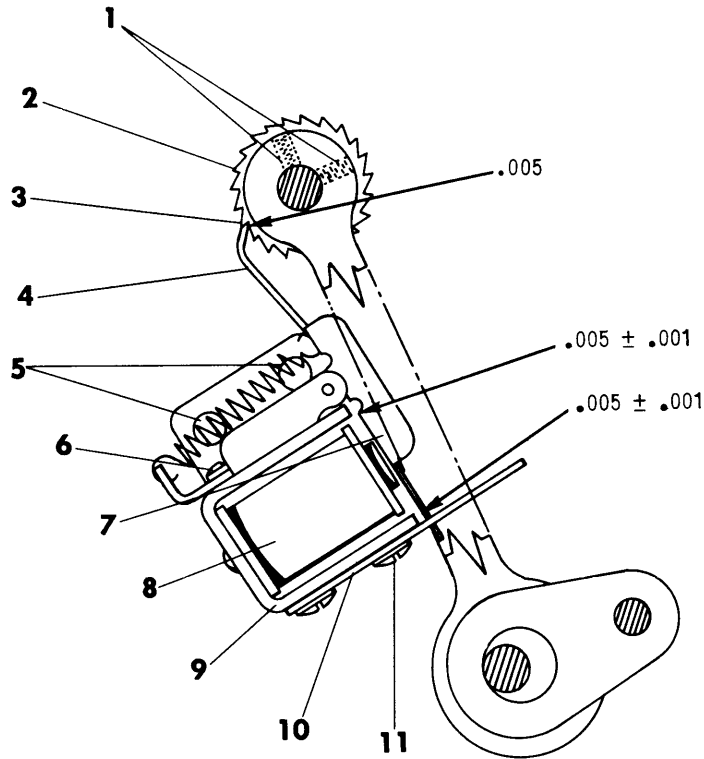
Loosen Screws (8) and move Pulse Generator (9) to within $.006$ to $.010$ of Generator Disc (12) as indicated.

PUNCH COUNTER WEIGHT ADJUSTMENT APPLICABLE TO UNITS BELOW SERIAL NUMBER 500-1978 (View A)

Loosen Nut (15) and Set Screw (13). Rotate Counter Weight (14) so the larger radius A is opposite the larger radius B of Timing Generator Disc (16). Tighten Nut (15) and Screw (13).

PUNCH COUNTER WEIGHT ADJUSTMENT APPLICABLE TO UNITS WITH SERIAL NUMBER 500-1978 AND ABOVE (View B)

Loosen Nut (20) and Set Screw (18). Rotate Counter Weight (19) so the larger radius A is in alignment with the larger radius B of Timing Generator Disc (17). Tighten Nut (20) and Screw (18).



PUNCH - ADJUSTMENTS AND TIMING - Continued

Forward and Reverse Index Magnet Armature Adjustments

Armature Assembly (7), when operated, must have $.005 \pm .001$ gap between Magnet Shell (9) and Armature (7). Adjustment may be made by loosening Binding Screws (6) and (11) and repositioning either Armature Assembly (7) or Plate (10).

Prior to performing the adjustments to the Indexing Ratchets, the Detent Wheel must be secure on the Sprocket Shaft and the Detent Balls must be located in the Teeth of the Detent Wheel.

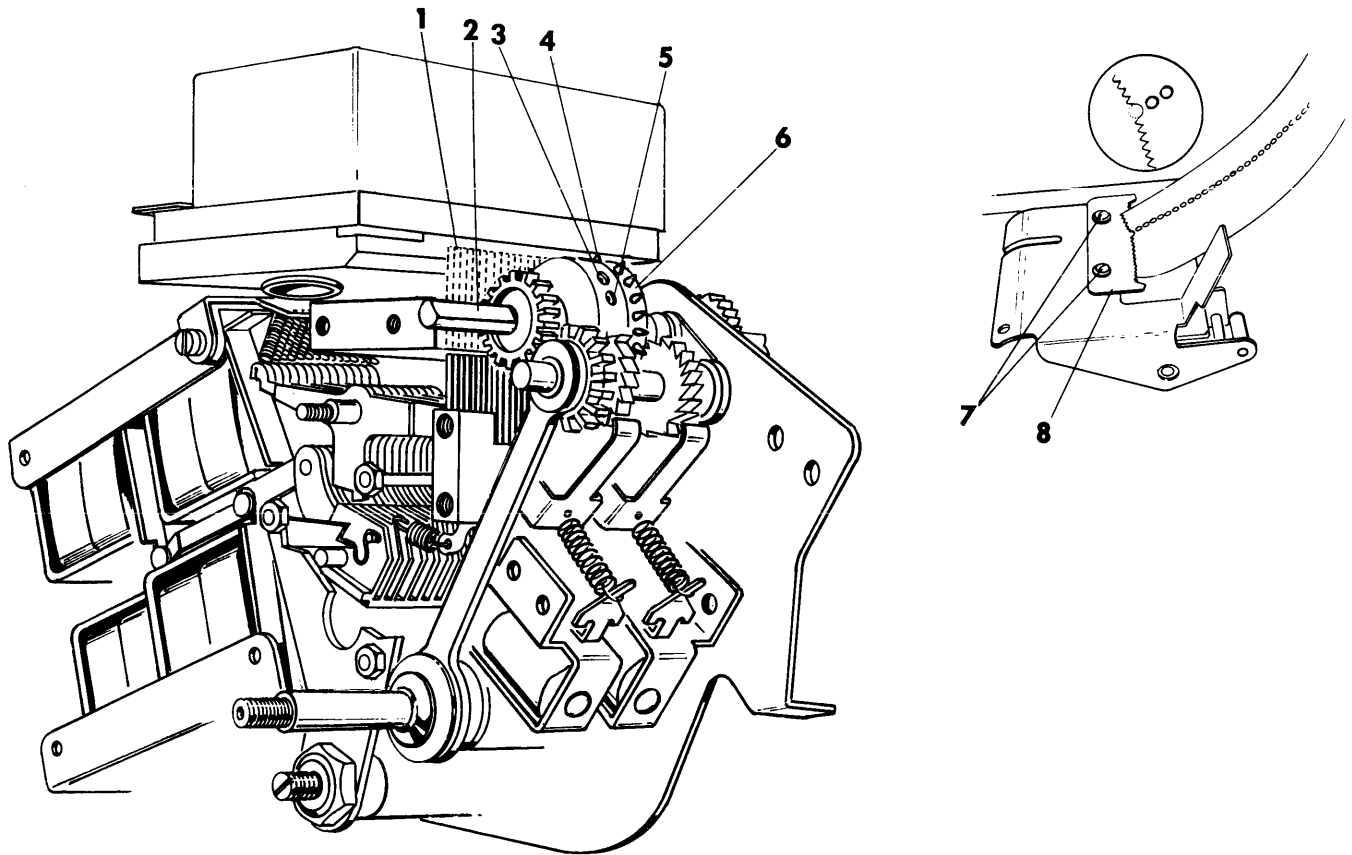
Index Magnet (8), when called, must bring Interposer (4) to within $.005$ of the bottom of Forward or Reverse Feed Ratchets (2).

To adjust the Index Magnets, loosen Binding Screws (5) and move Magnet and Interposer Assembly to obtain the above clearance.

Rotate the Timing Dial to 205° and operate Forward Interposer (4). Interposer (4) must contact Ratchet (2) with no play between the top of Interposer (4) and Ratchet Tooth (3). If adjustment is necessary, loosen Set Screws (1) and reposition Ratchet (2). Check this adjustment on all Teeth of the Ratchet.

On late style Units, the Forward Index Magnet Rear Mounting Screw Hole has been enlarged to permit the Forward Index Magnet adjustment to be made in the following manner: Loosen Screws (5) and pull Magnet (8) to the rear of the Unit so the Rear Screw rests on the edge of the enlarged hole. Rotate Magnet (8) forward until Interposer (4) meets the $.005$ clearance as previously described. Tighten Screws (5).

NOTE: The Rearward Feed is identical to the Forward Feed; however, the Timing Dial is set at 25° when making the adjustment.



PUNCH - ADJUSTMENTS AND TIMING - Continued

Sprocket Wheel Adjustments

Before adjustments can be made to Sprocket Wheel (6), it is essential to tighten all Screws on Sprocket Shaft (2).

The uppermost Pin (4) of Sprocket Wheel (6) must be positioned .500 away from the center of Punches (1) and in alignment with the Index Punch. To adjust Sprocket (6), loosen Set Screw (3) and tighten Set Screw (5) to move Pin (4) closer to Punches (1). Loosen Set Screw (5) and tighten Set Screw (3) to move Pin (4) further away from Punches (1).

On Units equipped with an Advanced Feed Hole, Pin (4) of Sprocket Wheel (6) must

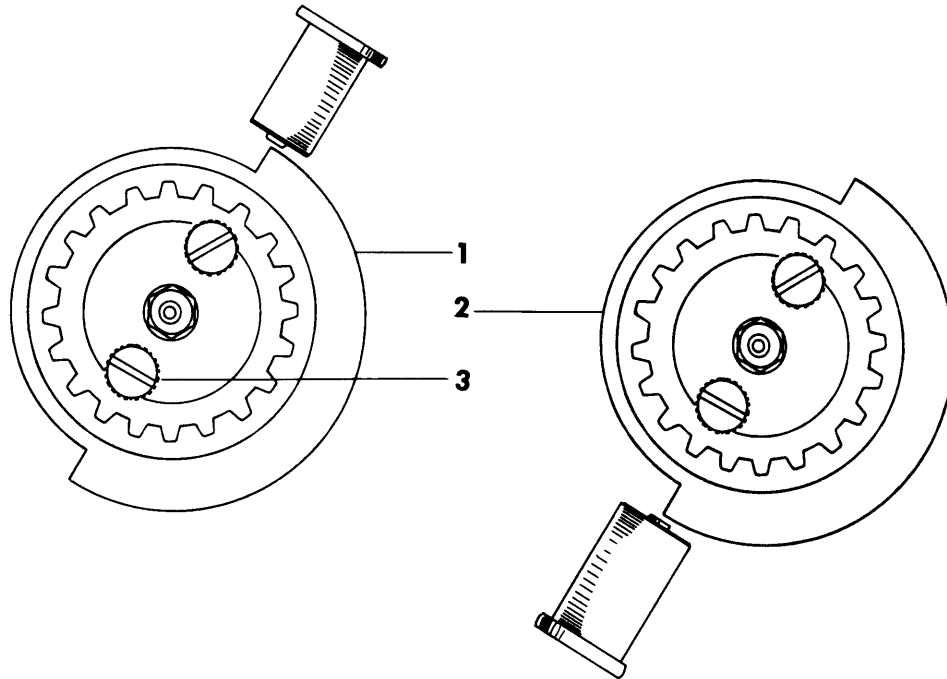
be positioned .513 away from the center of Punches (1).

Final Sprocket Adjustment

Adjust Set Screws (3) and (5) as previously described so the Tape Registration will conform to the Tape Gauge.

Tape Tear Plate

Tape Tear Plate (8) must be adjusted so the operator can tear the Tape directly through the center of an Index Hole, as illustrated. To adjust, loosen Binding Screws (7) and move Tear Plate (8) to the correct position as described.



READER TO PUNCH TIMING - DUAL UNITS ONLY

When adjustments or part replacements are made that will disturb the timing of either the Punch or Reader mechanism, it is essential to retime the Reader to the Punch so the functions of each will occur at the precise moment as indicated by the Timing Chart. This timing will make regenerative punching possible without misinterpretation.

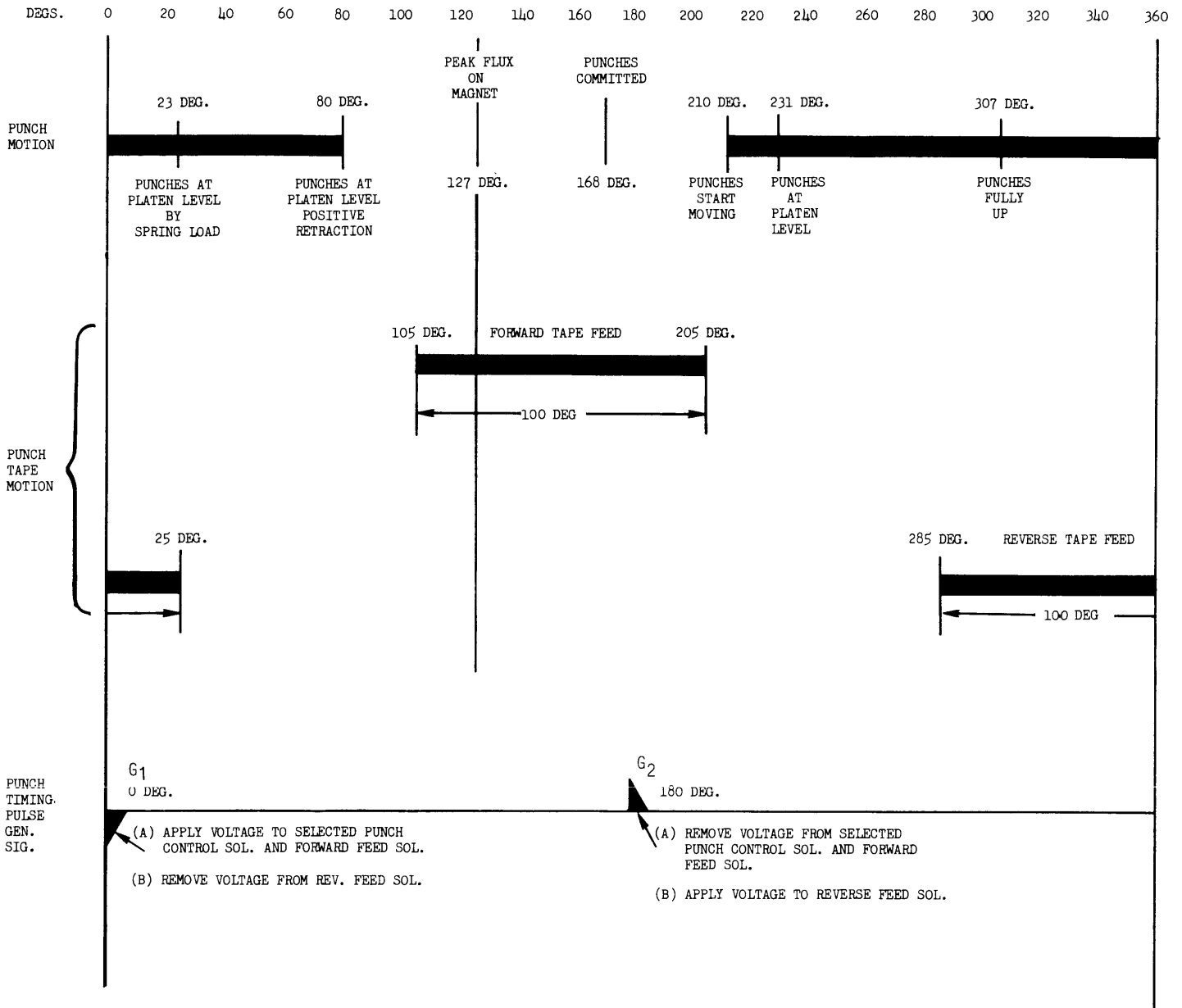
As indicated on the Timing Chart, the Negative Pulse of the Punch Pulse Generator occurs simultaneously with the Negative Pulse of the Reader Pulse Generator.

To time the Reader to the Punch, loosen Pulley Binding Screws (3). Rotate Punch Pulse Generator Disc (2) to coincide with Reader Pulse Generator Disc (1).

While holding Disc (2) in this position, rotate the Reader Pulse Generator Disc (1) to the start of the Reader Positive Pulse, as illustrated. Secure the timing adjustment with Binding Screws (3).

NOTE: A Negative Pulse is produced when the gap between the Pulse Generator Disc and the Electromagnet is suddenly increased.

PUNCH MECHANICAL TIMING CHART



NOTES