

Field Engineering

Manual of Instruction

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1442

**Card Read Punch
Models 5, 6, and 7**

PREFACE

This manual provides instructional material on the IBM 1442 Card Read Punch, Models 5, 6, and 7. Circuit references are made to the Automated Logic Diagrams (ALD's) for the Models 5, 6, and 7 in chapters III, IV, and V.

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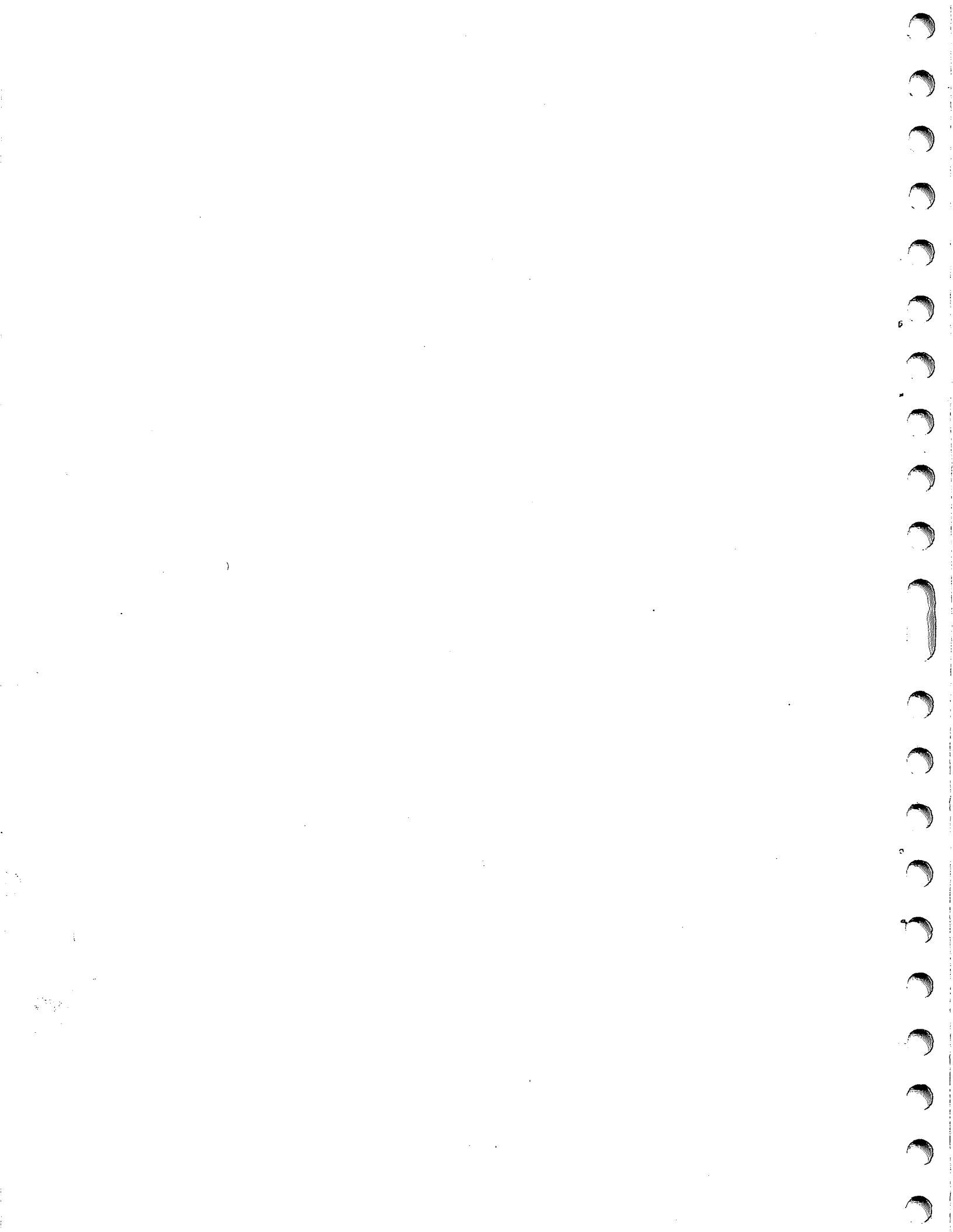
Second Edition

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DESCRIPTION

- The 1442 Models 5, 6, and 7 are similar in construction and function.
- The 1442 Models 5, 6, and 7 use the Serial Reader Punch (SRP) card-handling mechanism.
- The IBM 1442 Model 5 provides punched card output for IBM System/360 Model 20 at 160 columns/second.
- The IBM 1442 Model 6 provides punched card input and output for the IBM 1130 system or the IBM 1800 system. The model 6 reads 300 cards/minute and punches 80 columns/second.
- The IBM 1442 Model 7 provides punched card input and output for the IBM 1130 system or the IBM 1800 system. The model 7 reads 400 cards/minute and punches 160 columns/second.

1442 Model 5

The IBM 1442 Model 5 Card Punch provides punched card output for IBM System/360 Model 20. Cards are serially punched at a rate of 160 columns/second.

The IBM 2020 Central Processing Unit contains the logical circuitry for the 1442-5. The only electronic circuits in the 1442-5 are amplifiers and drivers that condition pulses entering or leaving the 1442-5.

1442 Model 6

The IBM 1442 Model 6 Card Read-Punch provides punched card input and output for the IBM 1130 system or the IBM 1800 system. Cards are serially read at a rate of 300 cards/minute, and serially punched at a rate of 80 columns/second. The use of one card path for both reading and punching permits reading from and punching into the same card.

The IBM 1130 or 1800 system processing unit contains the logic circuits for the Model 6. The only electronic circuits in the Model 6 are amplifiers and drivers that condition pulses entering or leaving the 1442-6.

1442 Model 7

The Model 7 Card Read-Punch is similar in function and construction to the Model 6, but operates at a higher speed. The Model 7 reads 400 cards/minute and punches 160 columns/second.

CARD FLOW

- The 1442 card feed has four card stations; (1) Hopper, (2) Read Station, (3) Punch Station, and (4) Stacker(s).
- Cards are advanced from station to station when the card feed clutch is activated.
- Cards are advanced through the read station by the read clutch, which is activated by the card feed clutch.
- Cards are advanced through the punch station by either the incremental drive unit or the card feed clutch.

The card path of the 1442 (Figure 1-1) has four basic card stations:

1. Hopper. Cards are placed in the hopper by the operator, and feed from the hopper one at a time.
2. Read Station. Cards are moved from the hopper and registered at column zero in the read station. The Model 5 does not read cards; it uses a dummy read station (referred to as the sense station) in place of the normal read station.
3. Punch Station. Cards are moved from the read station and registered at column one in the punch station.
4. Stacker(s). Cards are moved from the punch station to the stacker where they remain until removed by the operator. The Model 5 has one stacker; Models 6 and 7 have two stackers, either of which can be selected by programming.

Card movement from station to station is controlled by the card feed clutch. Each time the card feed (CF) clutch is activated, it operates mechanisms which advance each card in the feed one station.

Card movement through the read station is controlled by the read clutch. The clutch operates a feed wheel that advances the card through the station.

The read clutch is mechanically activated each time the card feed clutch is activated: the read clutch cannot be activated independently. Thus, card reading must always occur in conjunction with card feeding.

Card movement through the punch station takes place at one of two times:

1. During Punch Cycles. A card is moved intermittently through the punch station by an incremental drive unit and a pair of punch feed wheels. Card movement occurs only between punch cycles; a card moves only one column at a time.
2. During a Feed Cycle. The punch feed wheels are disengaged from the card, and the card is fed from the punch station (ejected) by the read eject and the punch eject rolls.

A detailed description of card feeding, including all feed devices and timings, is in Chapter II.

CARD READING

- Cards are read serially by the 1442 Models 6 and 7.
- Cards are fed through the read station under control of the read clutch.
- Punches in the card are sensed by phototransistors.
- A read emitter signals the processing unit about midpoint of the read time for each column.

The Models 6 and 7 read cards serially (column by column) beginning with column one. Cards move continuously during the reading. The read clutch controls card movement and is mechanically activated by the card feed clutch.

The read station has 13 phototransistors and 13 light sources. The light sources are the ends of glass fiber bundles that transmit the light from a central source.

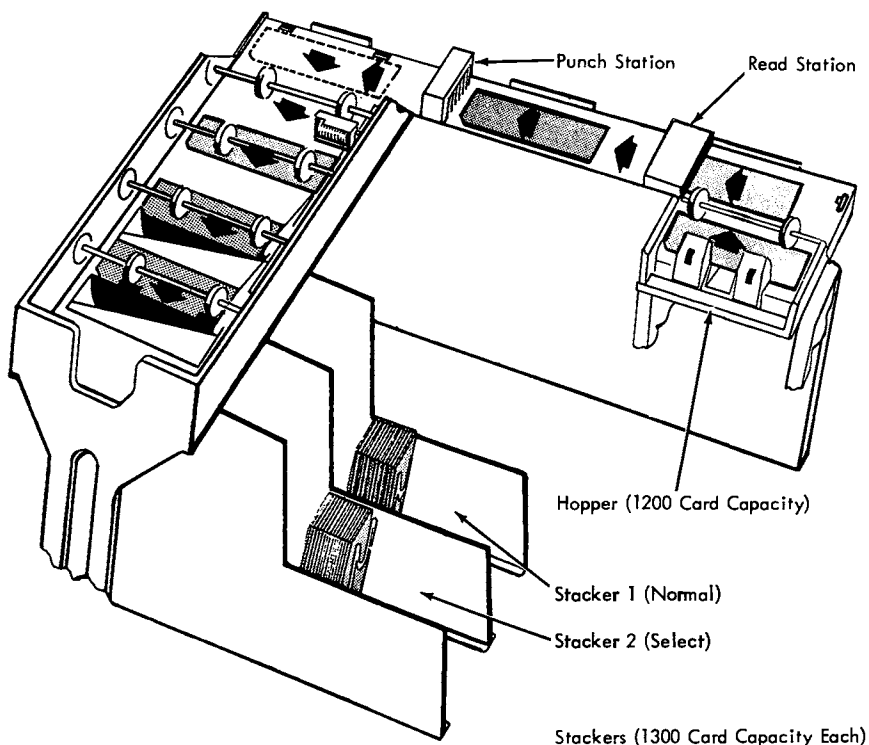


Figure 1-1. Card Path

Twelve of the phototransistors and light sources sense holes in the card (Figure 1-2). When light passes through a hole, the corresponding phototransistor emits a data pulse. The data pulse is amplified, shaped into a square wave, and transmitted to the processing unit. The thirteenth phototransistor detects cards at the punch station, and checks for jams.

A read emitter emits an impulse at about the center point of the data pulse for each column. This impulse is amplified, shaped, and sent to the processing unit where it develops two read sampling pulses about 100 usec apart.

Reading accuracy is checked by comparing the data read at two read sample times. If the data read at the second sampling differs from the first, the processing unit turns on the 1442 Check and Read Reg indications, and the 1442 is removed from its ready condition.

CARD PUNCHING

- Cards are punched serially at a rate of 80 columns/second in the Model 6; 160 columns/second in Models 5 and 7.
- Cards are moved one column at a time by the incremental drive and punch feed wheels.

- Emitters signal the processing unit when to energize the punch and incremental drive magnets.
- Punch echo pulses are sent to the processing unit to check punching accuracy.

Twelve card punches, controlled by 12 punch magnets, do the card punching in the 1442. Cards are punched column-by-column, beginning with column 1. A hole is punched when the processing unit energizes the required punch magnet.

The 1442 checks punching accuracy. After a hole is punched and the punch restored, a punch echo pulse is emitted by the punch magnet. The punch echo pulse is amplified, shaped, and sent to the processing unit where it is compared to what should have been punched.

Cards are moved by the punch feed wheels, which are driven by the incremental drive unit, one column at a time between punching strokes. The processing unit controls the incremental drive unit by impulsing an incremental drive magnet each time a card is to be moved to the next column.

A punch emitter and an incremental drive emitter are part of the punch unit. These emitters tell the processing unit when to impulse the incremental drive magnets and the punch magnets, and when to test the punch echo pulses.

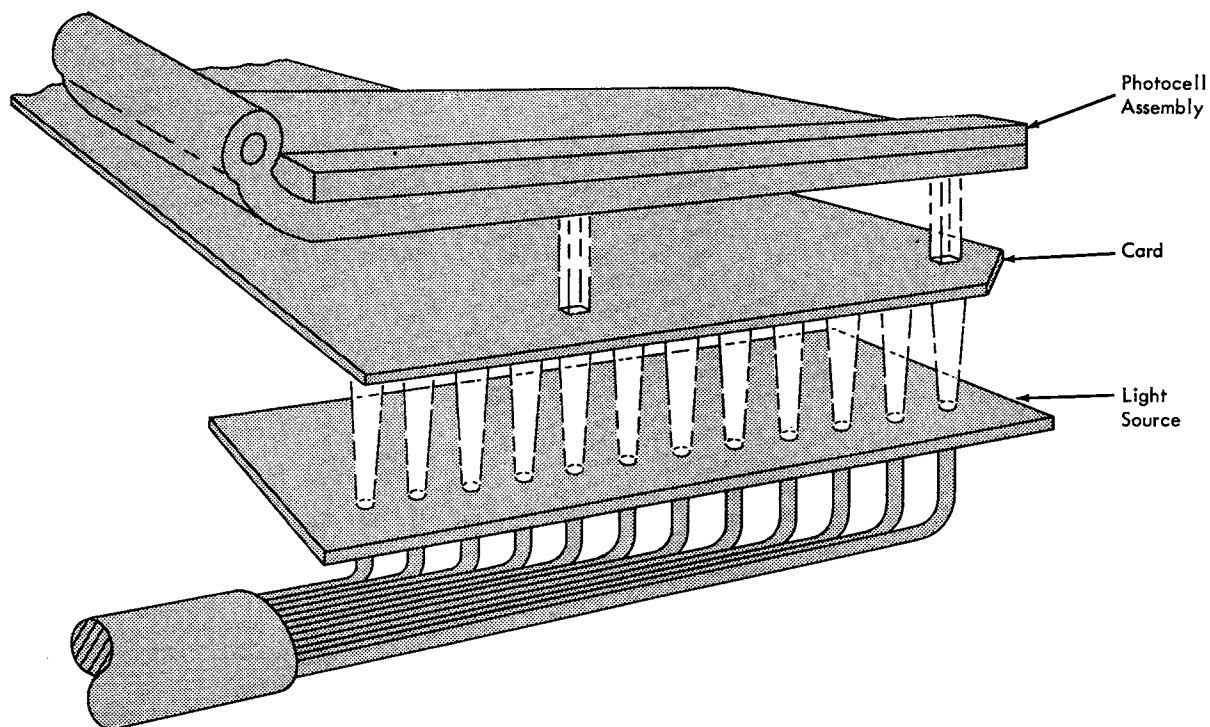


Figure 1-2. Read Station Operation

DATA FLOW

(Refer to Figure 1-3)

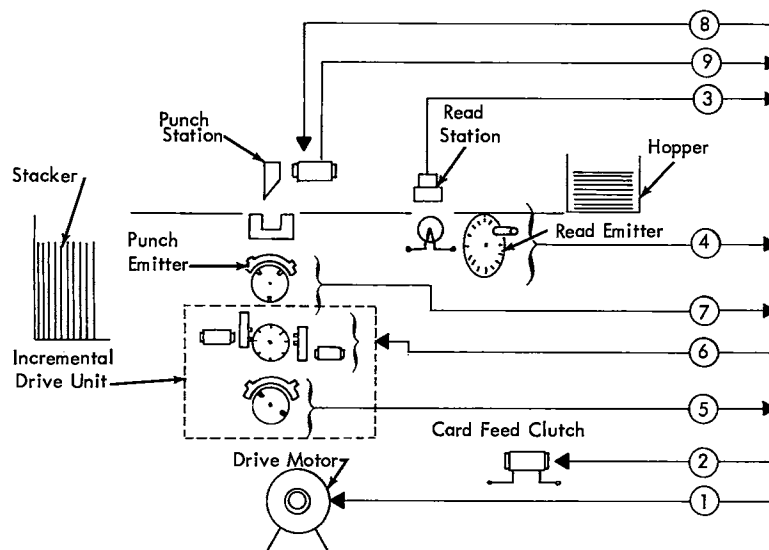
CE DIAGNOSTIC AIDS

- Diagnostic programs assist the CE in analyzing 1442 failures.
- A CE switch on the 1442 removes power from the motor and power supply during maintenance.

- A lamp test line, in the 1442 Model 5, activates all indicators on the 1442-5.

Additional information on diagnostic programs is given in the maintenance or programming manual for the using system. More information on the CE switch is given in Chapter IV of this manual.

The lamp test line provides a quick way of checking for burned out indicator lamps. When this line is activated all operator console indicators on the Model 5 are lighted (see Chapter III).



Read Data Flow (1442 Mods 6 & 7 Only)

Punch Data Flow

- ① Processor starts drive motor.
- ② Processor activates card feed clutch.
- ③ Data read by photocells is sent to processor.
- ④ Read emitter signals processor that data is available.

NOTE: Data from each column is sampled twice and compared in processor. If both samplings are not equal an error is indicated.

- ① Processor starts drive motor.
- ⑤ Incremental drive emitter signals processor correct time to activate incremental drive magnets.
- ⑥ Processor activates incremental drive magnets (card does not yet move because of mechanical delay).
- ⑦ Punch emitter signals processor correct time to activate required punch magnets.
- ⑧ Processor activates required punch magnets.
- ⑨ Punch unit sends echo pulses to processor. Card advances to next column. Punch emitter signals processor that echo pulses are available.

Figure 1-3. 1442 Models 5, 6, and 7 Data Flow

INTRODUCTION

The mechanical components of this machine, which feed, read, and punch cards, are located above the base plate in a unit referred to as the serial reader punch (SRP). The SRP is used in a variety of IBM products.

The first part of this chapter describes the SRP functional units and is written in such a way that it can be used in the manuals of instruction for the various products using the SRP. Because of this references may be made to the punch or read unit even though the machine described in this manual may not be equipped with the unit. When these references occur, and the machine described does not have the unit installed, assume the reference to be to the dummy stations used on machines not equipped with the units.

SRP DRIVE

- The mechanical units of the SRP are driven by a 1/4 horsepower motor through timing belts.
- The card feed clutch transfers power to mechanisms which move cards from station to station.
- The read clutch transfers power to the read feed wheels which move the card through the read station.
- If the machine is equipped with a punch unit, the incremental drive mechanism transfers power to the punch feed wheels which advance cards being punched through the punch station.

Figures 2-1 and 2-2 illustrate the transmission of mechanical power in the SRP.

Continuous Running Mechanisms

The continuous running (not clutch controlled) SRP mechanisms are:

1. Punch unit and incremental drive unit cams (if machine is equipped with a punch unit).
2. Card feed clutch drive input pulley.
3. Read clutch input pulley.
4. Hopper feed rolls.

5. Hopper nudge roll.
6. Read eject roll.
7. Punch eject roll.
8. Stacker transport rolls.
9. Stacker joggers.

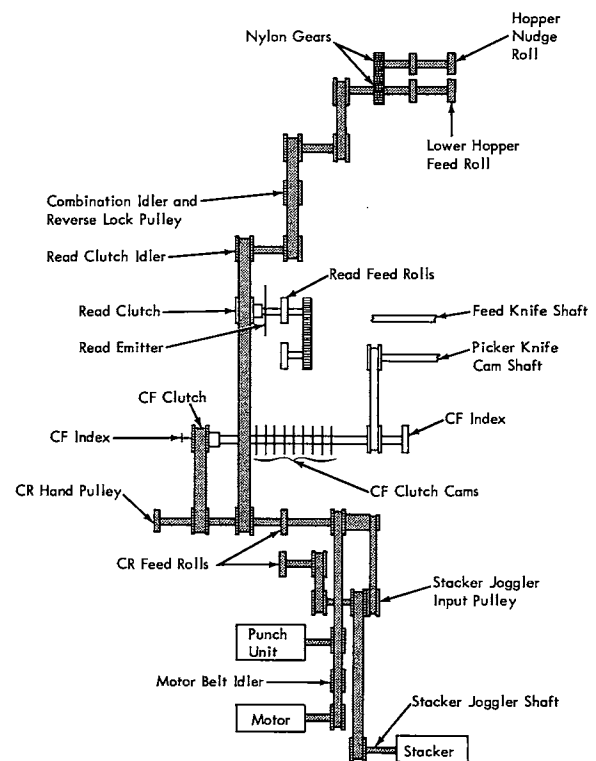
Card Feed Clutch Controlled Mechanisms

The following mechanisms, which control the movement of cards from station to station, are under control of the card feed (CF) clutch:

1. CF clutch cams.
2. CF emitter.
3. Pickerknife cams and pickerknives.

Read Clutch Controlled Mechanisms

The read feed wheel, read nudge roll, and read emitter are under control of the read clutch. The read clutch is mechanically activated by one of the CF clutch cams.



Note: Shaded parts are continuous running.
Non shaded parts are clutch controlled.

Figure 2-1. Mechanical Power Distribution Schematic

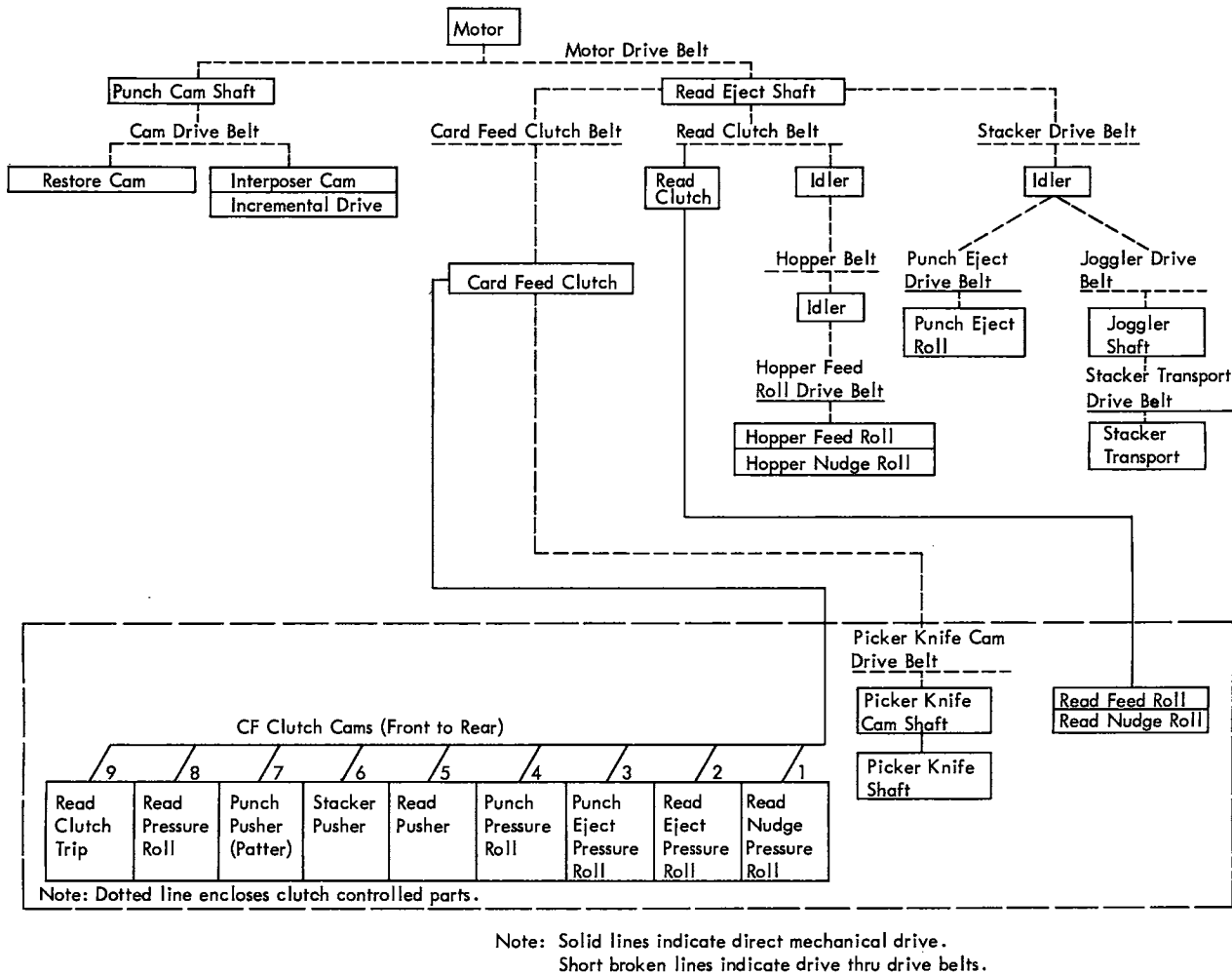


Figure 2-2. Mechanical Power Distribution Chart

FEED MECHANISMS

- SRP feed mechanisms move the cards from station to station, accurately registering them at each station.
- Clutches control the transfer of mechanical motion in the SRP.

Description

The SRP feed mechanism includes a parallel and a serial feed path (Figure 2-3). Three card cycles are required to move a card from the hopper, through the feed, and into a stacker.

First Card Feed Cycle: During the first card feed cycle the card is registered at the read station in the following sequence:

1. Pickerknives move card into hopper feed rolls.

2. Hopper feed rolls deliver card to hopper nudge rolls.
3. Hopper nudge rolls deliver card to pre-read card bed.
4. Read clamping rail forces card against forward guide rail.
5. Card is moved serially into read station by read pusher and is registered at column zero.
6. Read pusher activates read drag button which drags on card and prevents overshoot when read pusher stops.
7. As card approaches read station, read pressure roll is cammed out of the way.
8. When card has been properly registered, read pressure roll is permitted to close on card.

Second Card Feed Cycle: During this cycle the card is registered at the punch station in the following sequence:

1. Read clutch is activated by a CF cam.

2. Read clutch drives read feed wheel which moves card through read station.
3. Near end of feed cycle, read nudge pressure roll closes on card.
4. Read pressure roll opens, permitting read nudge roll to deliver card to pre-punch station.
5. Punch pusher pushes card into punch station, registering it at column one.
6. Punch pusher activates card patter which forces card against front guide rail.
7. Punch pusher activates punch drag button which drags on card to prevent card overshoot when punch pusher stops.
8. As card approaches punch station, punch pressure rolls are cammed out of the way to permit entry of the card.
9. After card has been registered at column one, punch pressure rolls are permitted to close on card.

If the machine is equipped with a punch unit, the card can now be punched. While the card is being punched, it is advanced through the punch station by the punch feed wheels which are driven by the incremental drive unit.

Third Card Feed Cycle: During this cycle the card is ejected from the punch station and stacked in the following sequence:

1. Punch pressure rolls are cammed open.
2. Read eject pressure roll is permitted to close on card, feeding card out of punch station to punch eject rolls.
3. Punch eject pressure roll closes on card and feeds card to stacker cornering station.
4. Stacker cornering pusher moves card into first set of stacker transport rolls.
5. Stacker transport rolls deliver card to stacker.

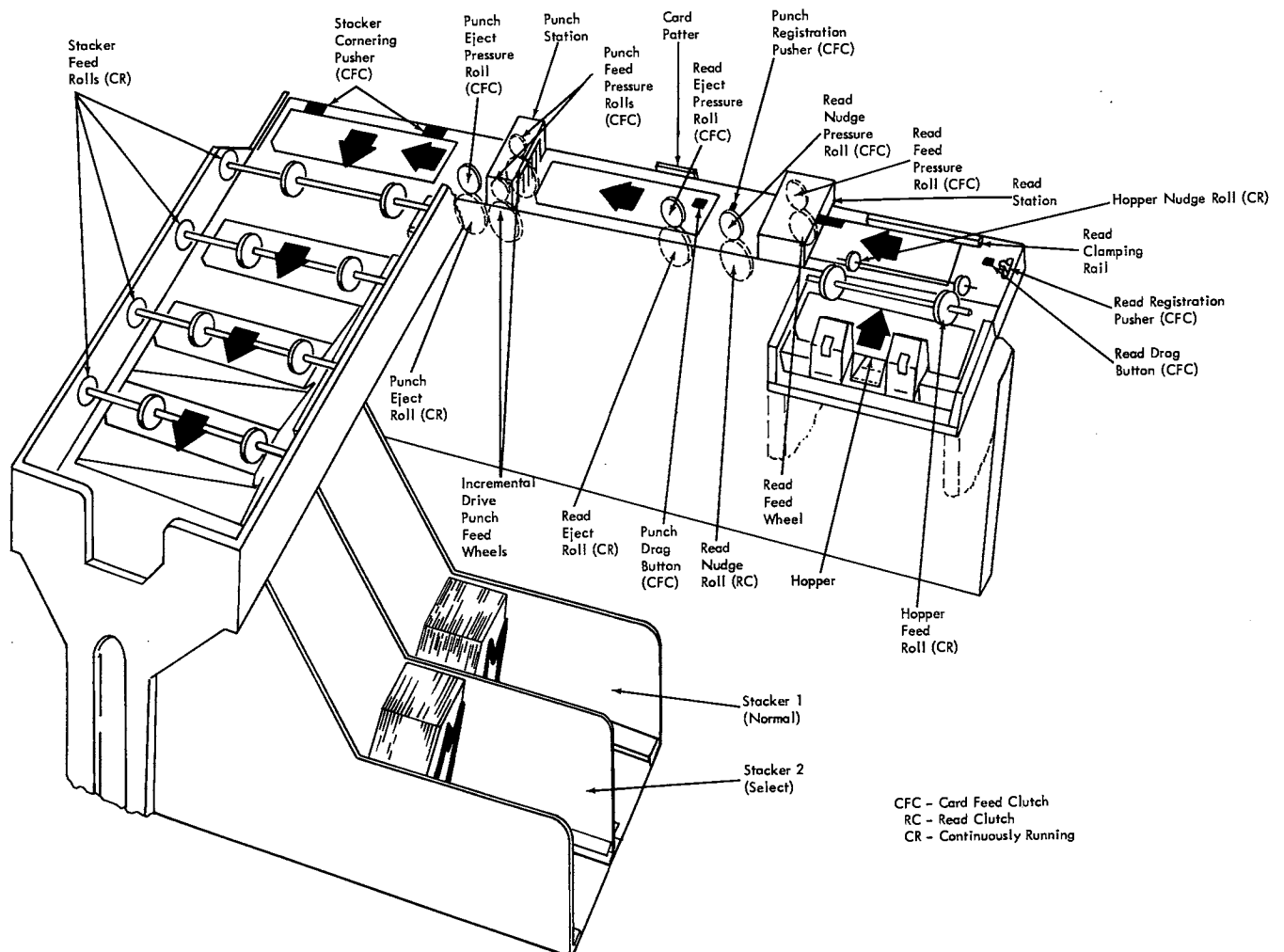


Figure 2-3. SRP Card Feed Mechanism

Timing

Figure 2-4 illustrates the timing of the card feed operations for the initial three cycles of an operation. Shaded lines on the timing chart indicate that the mechanism operates during that period of time but that the card has not yet reached it. Black lines indicate that the mechanism is acting on the card for the time indicated.

Clutches

The card feed and read clutches control the transfer of mechanical motion to certain SRP mechanisms. The card feed clutch is activated by a functional magnet and mechanically activates the read clutch through a cam on the CF camshaft. The card feed and read clutches both use helical springs to couple their input to their output.

Card Feed (CF) Clutch

Figure 2-5 illustrates the construction and operation of this clutch. When the clutch is disengaged, the clutch pawl -- pinned to the output shaft -- is held between the tips of the clutch latch and the keeper and cannot rotate. The clutch-spring control sleeve is also held between the tips of the clutch latch and keeper; consequently, the clutch spring is held unwound and cannot grip the input pulley hub and clutch pawl flange.

When the clutch magnet is energized, the following sequence of events occurs:

1. Clutch magnet attracts clutch latch, releasing clutch pawl and clutch-spring control sleeve.
2. Clutch-spring control sleeve rotates clockwise, permitting clutch spring to grip both the input pulley hub and the flange on the clutch pawl.

3. Clutch pawl rotates with input pulley hub, causing output shaft to rotate.

The clutch continues to operate in this manner until the CF clutch magnet is de-energized, causing the clutch to disengage in the following sequence:

1. De-energized magnet releases clutch latch, permitting latch to move up into path of clutch pawl and clutch-spring control sleeve.
2. Clutch-spring control sleeve contacts clutch latch, unwinding clutch spring. Clutch spring releases input pulley hub, thus disengaging clutch.
3. Momentum of driven mechanism continues to turn output shaft until clutch pawl contacts clutch latch, stopping output shaft.
4. Clutch pawl and clutch-spring control sleeve are held between clutch latch and keeper.

Read Clutch

Figure 2-6 illustrates the construction and operation of the read clutch. When the clutch is disengaged, both the clutch-spring control sleeve and the clutch pawl (pinned to the output shaft) are held between the tips of the clutch latch and the keeper; consequently, the clutch spring is held unwound and cannot grip the input pulley hub and clutch pawl flange.

At 10° of the card feed cycle, a cam on the CF camshaft operates linkage which releases the read clutch latch and the following sequence occurs:

1. Clutch latch moves out of the way, releasing clutch pawl and clutch-spring control sleeve.
2. Clutch-spring control sleeve rotates clockwise, permitting clutch spring to grip both the input pulley hub and the flange on the clutch pawl.
3. Clutch pawl rotates with input pulley hub, causing the output shaft to rotate.

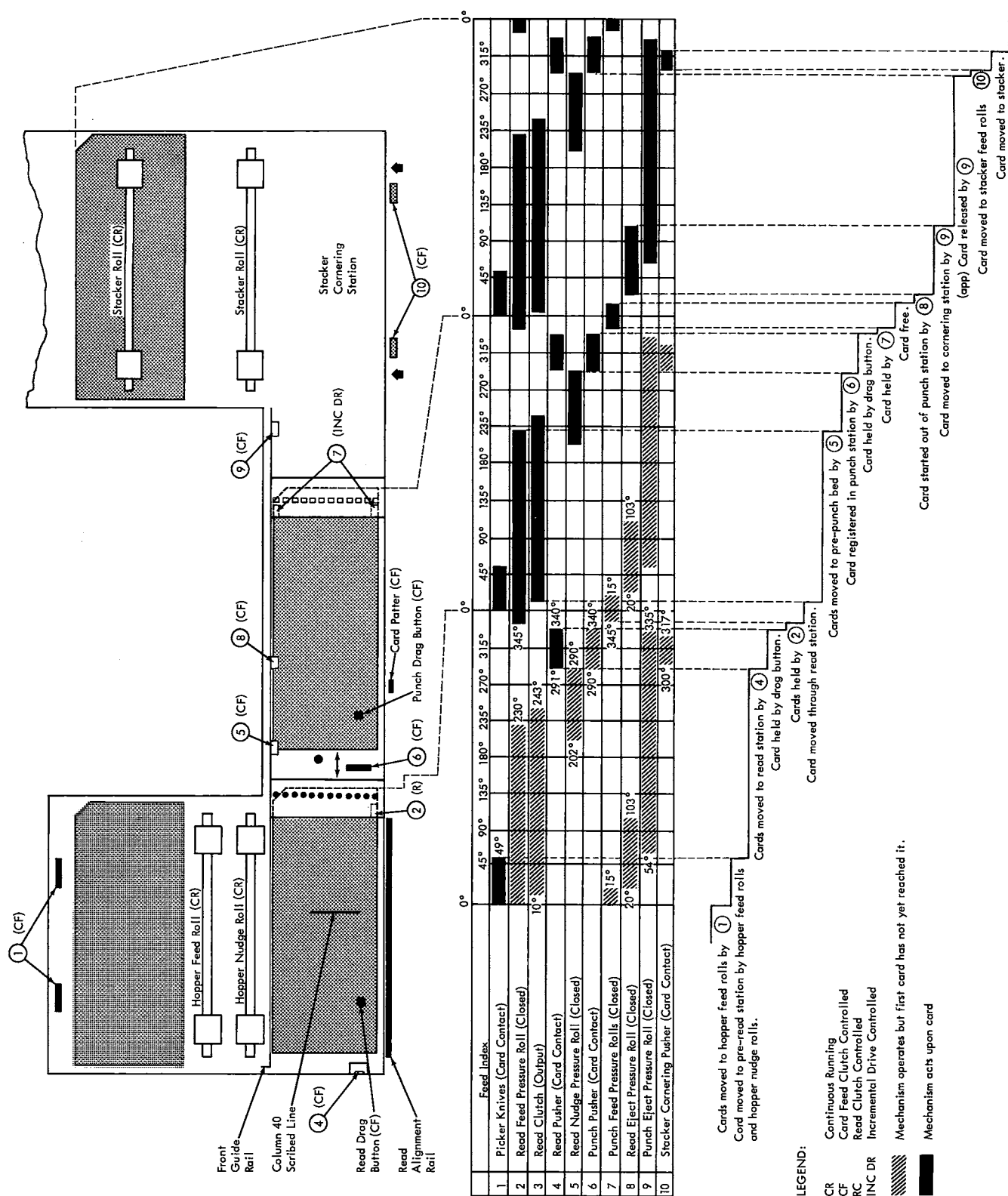


Figure 2-4. SRP Feed Timing

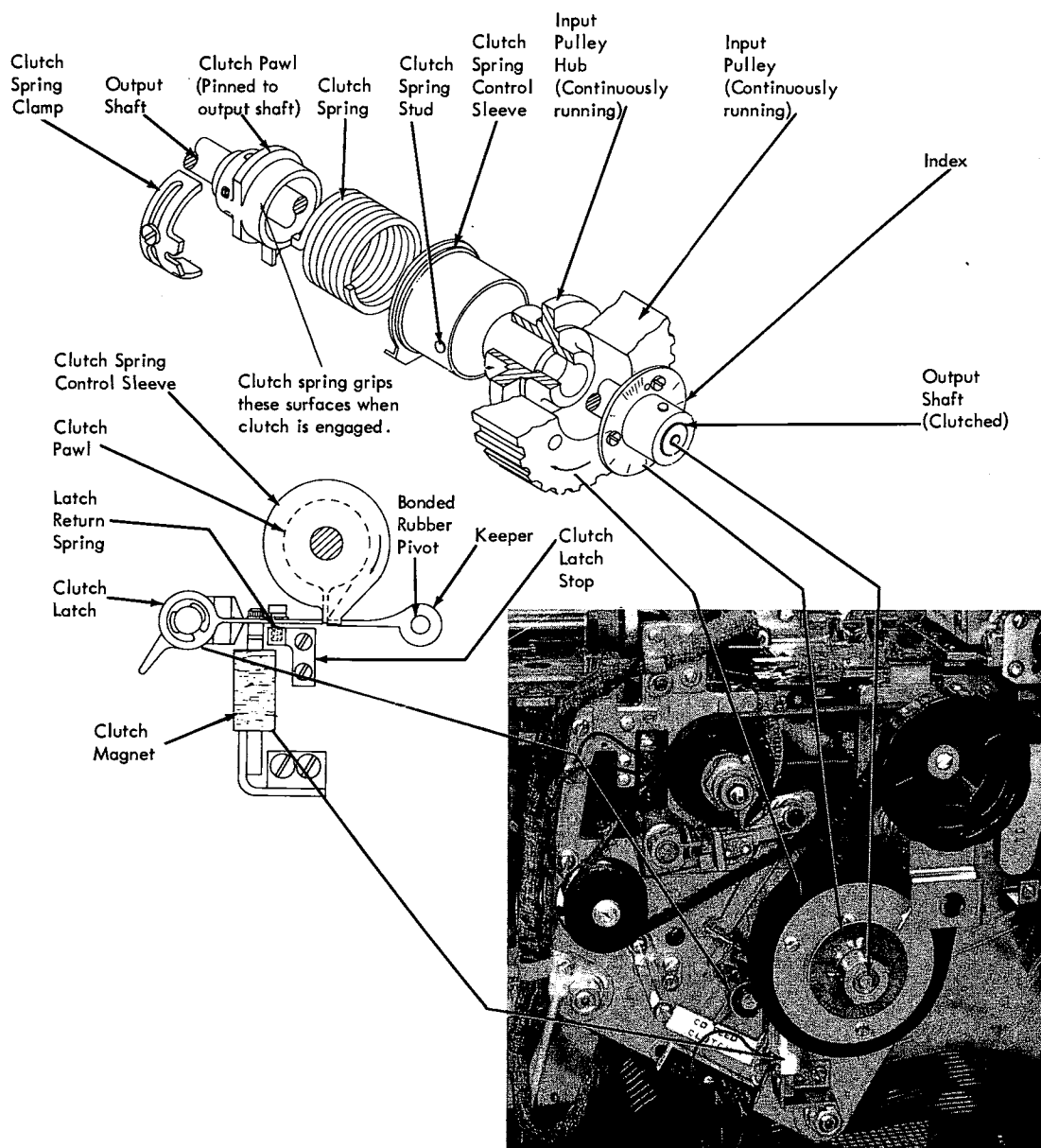


Figure 2-5. Card Feed Clutch

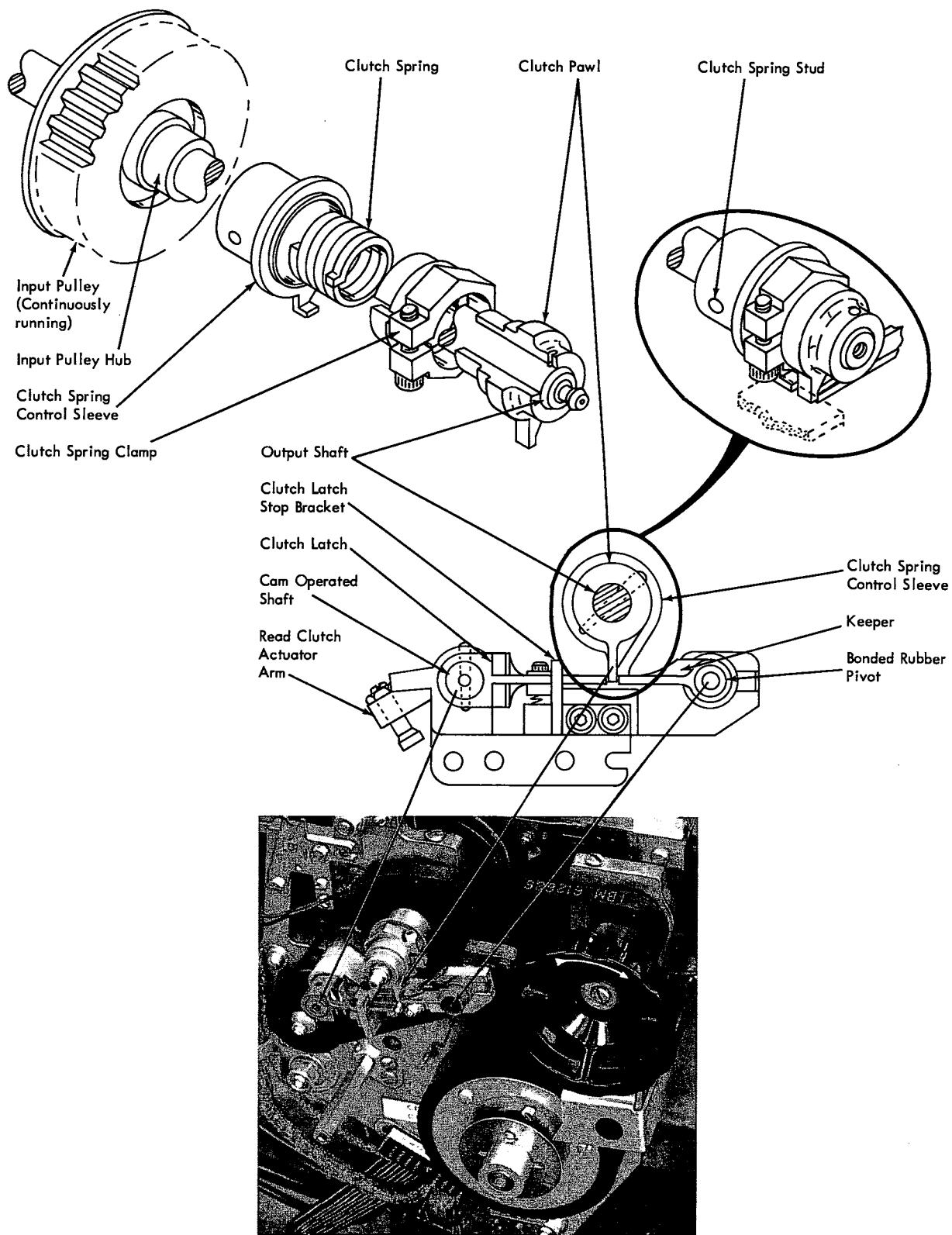


Figure 2-6. Read Clutch

Later in the card feed cycle, the clutch latch is permitted to return to its original position in the path of the clutch pawl. As the read clutch completes one revolution, the clutch pawl and clutch-spring control sleeve contact the clutch latch, resulting in the following sequence:

1. Clutch-spring control sleeve contacts clutch latch, unwinding clutch spring which releases input pulley hub, disengaging clutch.
2. Momentum of driven mechanism continues to turn output shaft until clutch pawl contacts clutch latch, stopping output shaft.
3. Clutch pawl and clutch-spring control sleeve are held between clutch latch and keeper.

Hopper

The hopper (Figure 2-7) has a capacity of 1200 cards. Cards are placed face down in the hopper with their 9-edge forward and are fed individually from the

hopper by the pickerknives. A hopper contact is provided to sense when the last card has been fed from the hopper.

Pickerknives

The pickerknives (Figure 2-7) feed cards from the hopper one at a time. They are mounted on the pickerknife shaft, and are activated by the clutch driven camshaft assembly. The cam follower arm transmits motion from the cam assembly to the pickerknife shaft. Note the idler arm riding on the side of the pickerknife cam opposite the cam follower arm. This applies even spring tension to both sides of the pickerknife cam and prevents wearing of the pickerknife camshaft bearings.

The pickerknives travel in an arc. To obtain the best feeding conditions, the knife blocks must travel evenly through the same arc. The pickerknife blocks are fixed on the knife arms, but the position of the knife arms on the shaft can be adjusted.

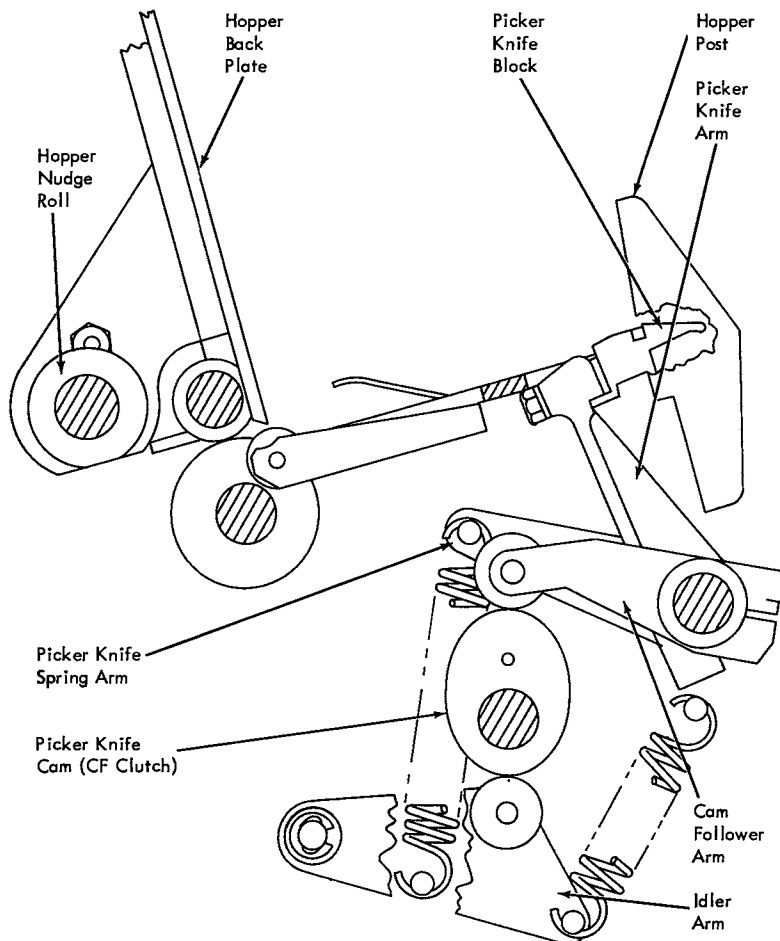
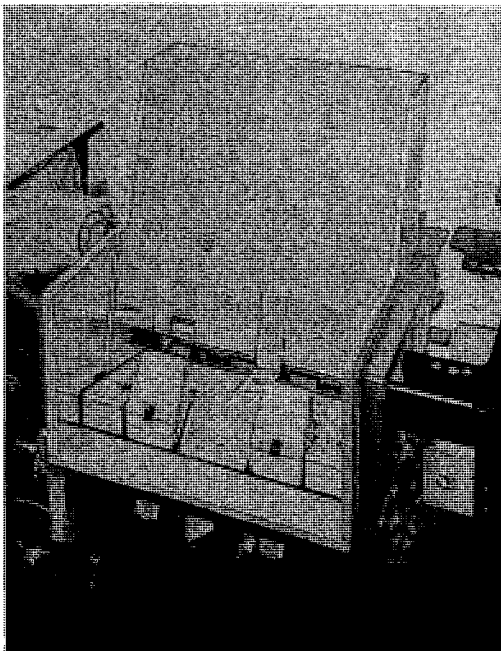


Figure 2-7. Hopper and Pickerknives

Two Carbaloy* pieces are inserted in the block surfaces to resist wear, and are ground to specification for proper knife projection. Replacement of the pickerknife block is required when the insert becomes worn.

*Trade name of Carbaloy Dept. of General Electric Co.

Read Registration Mechanisms

The read registration mechanisms (Figure 2-8) receive the card from the hopper feed rolls, and register it in the read station at column zero. Figure 2-4 illustrates the timing relationships between the various read registration mechanisms.

Hopper Nudge Roll

The hopper nudge roll (Figure 2-8) consists of a continuously running feed roll mounted above a pair of fixed nudge roll shoes. The shoes are spring

loaded toward the roll and are adjusted for a slight clearance to the roll. This prevents the roll wearing when cards are not being fed. When a card is fed into the nudge roll, the shoes push the card against the roll and the card is moved to the pre-read station.

Read Clamping Rail

The read clamping rail (Figure 2-8) forces the card, under spring tension, against the front guide rail which guides the card along the correct card path.

Read Pusher

The read pusher (Figure 2-8) pushes the card into the read station and registers it at column zero. The pusher must be retracted during the time the card is being fed into the pre-read station, and begins registering the card only after the card has had time to come to rest against the front guide rail. The pusher is operated by a CF cam.

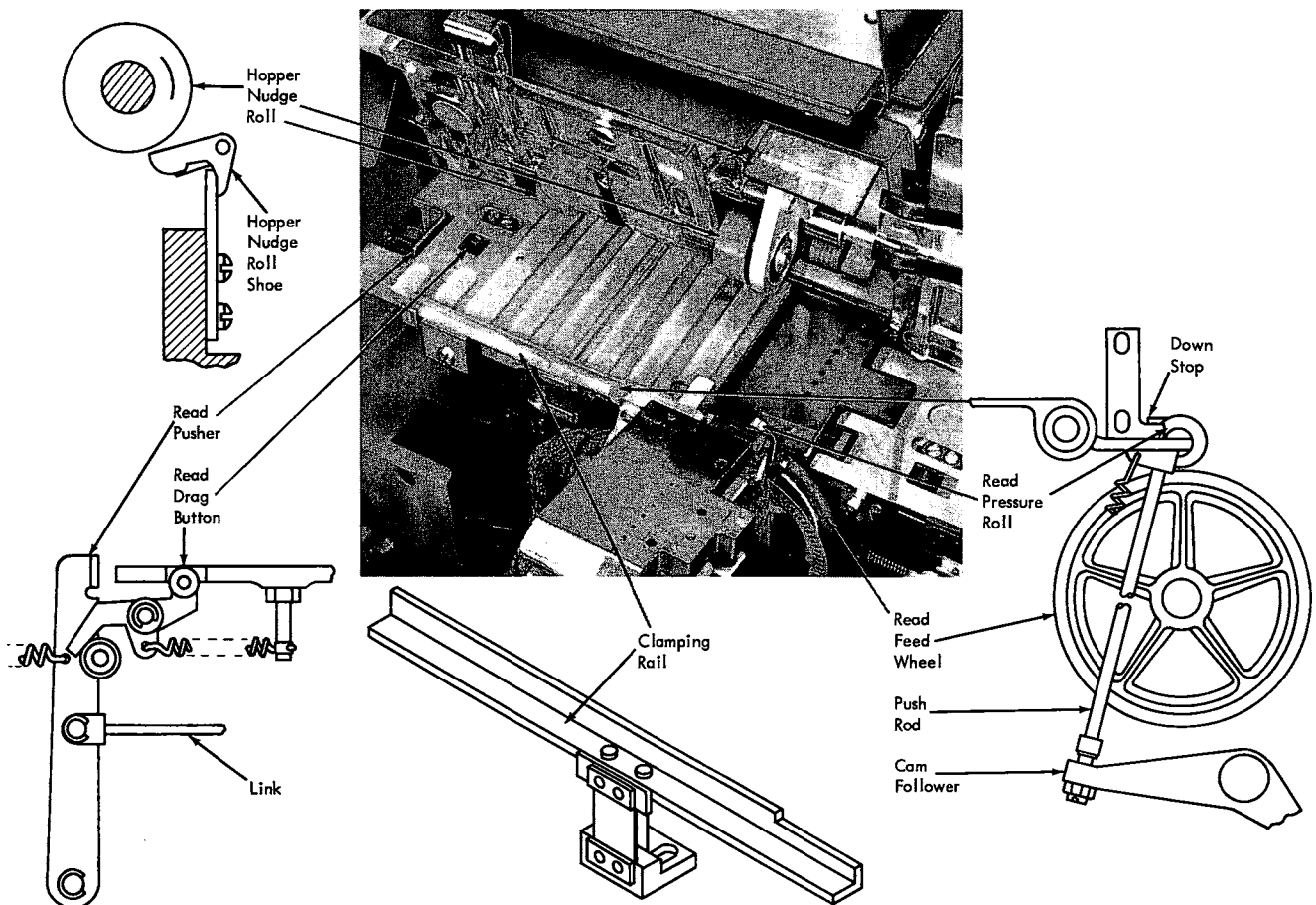


Figure 2-8. Read Registration Mechanism

Read Drag Button

The read drag button (Figure 2-8) is activated by the read pusher. When activated, it presses against the card and applies friction, preventing the card from overshooting beyond column zero when the read pusher stops.

Read Pressure Roll

While the read pusher is registering the card in the read station, the read pressure roll (Figure 2-8) is raised to permit entry of the card. After the card has been fully registered, the read pressure roll is permitted to close on the card, under spring tension, gripping the card between the pressure roll and feed wheel. The raising and lowering of the read pressure roll is controlled by a CF cam.

Read Feed Wheel

The read feed wheel (Figure 2-8) operates in conjunction with the read pressure roll to feed the card through the read station. The read feed wheel is driven by the read clutch which is mechanically operated by a cam on the CF camshaft. The outer circumference of the wheel is constructed of rough material to facilitate gripping the card.

Punch Registration Mechanisms

The punch registration mechanisms (Figure 2-9) receive the card from the read station and register it at the punch station with column one under the punches.

Timing relationships of the punch registration mechanisms are illustrated in Figure 2-4.

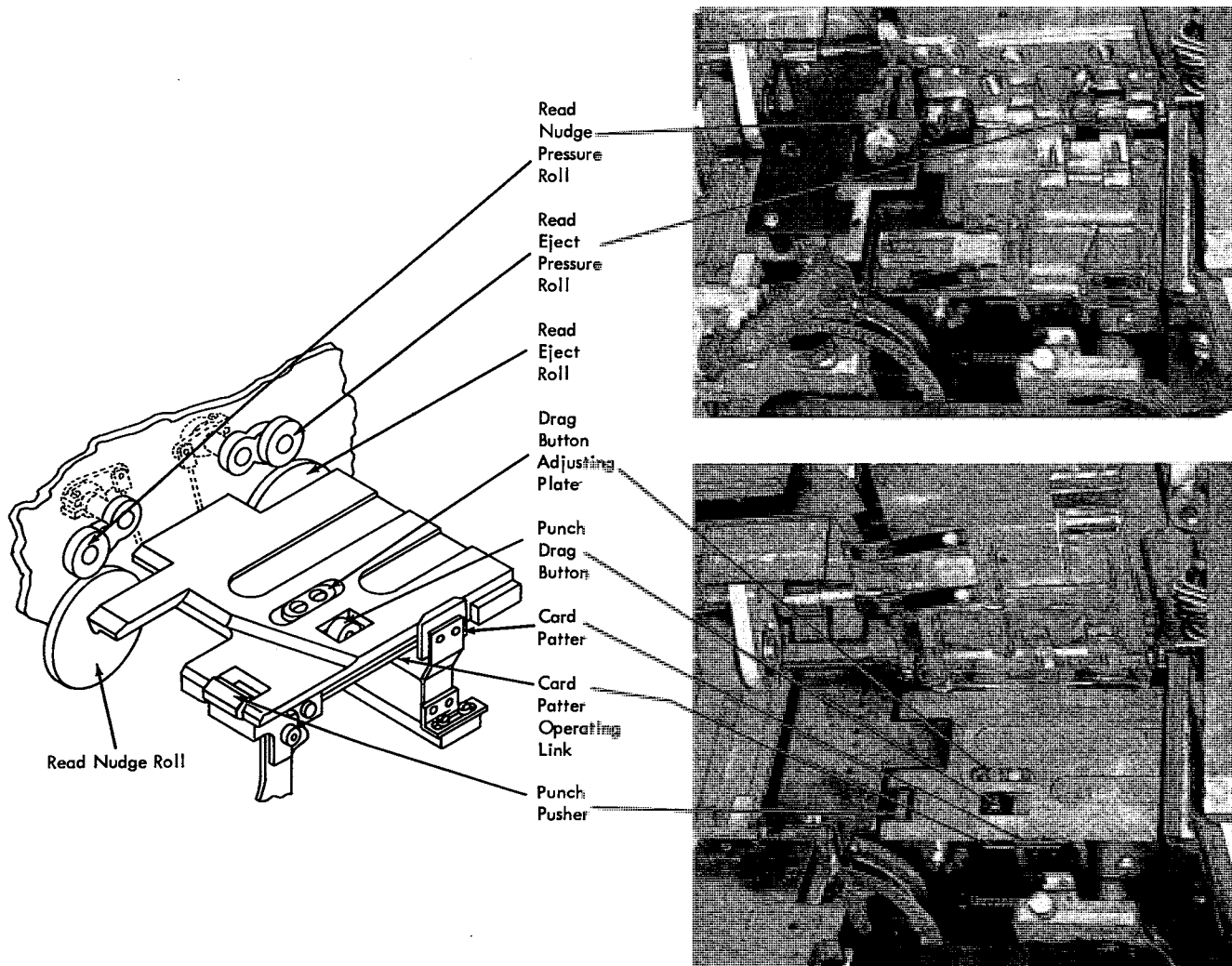


Figure 2-9. Punch Registration Mechanisms

Read Nudge Rolls

The read nudge rolls (Figure 2-9) deliver the card to the pre-punch station after it has left the read station. Just before the read pressure roll is raised, releasing the card, the read nudge pressure roll is permitted to close on the card. At this point the card is being moved by both the read feed wheel and the read nudge roll. Shortly after the read nudge pressure roll closes, the read pressure roll is cammed upward, releasing the card. The card is then delivered to the pre-punch station by the read nudge roll.

Punch Pusher

After the card has been delivered to the pre-punch station by the read nudge roll, the punch pusher (Figure 2-9) pushes the card into the punch station, registering it with column one under the punches. The punch pressure rolls are raised at this time to permit entry of the card. The punch pusher is operated by a CF cam.

Card Patter

While the card is being registered by the punch pusher, the card patter (Figure 2-9) is activated and pushes the card against the front guide rail. The card patter is activated by the punch pusher.

Punch Drag Button

The punch drag button (Figure 2-9) is activated by the punch pusher and drags against the card, preventing it from overshooting the column one registration point when the punch pusher stops.

Punch Pressure Rolls

The punch pressure rolls (Figure 2-10) are opened during the time the card is being registered at the punch station and are permitted to close (under spring tension) after the card is registered. These pressure rolls force the card against the punch feed wheels which move the card during punching operations. When another card feed cycle is initiated, the rolls are again opened to permit ejection of the card. The punch pressure rolls are operated by a CF cam.

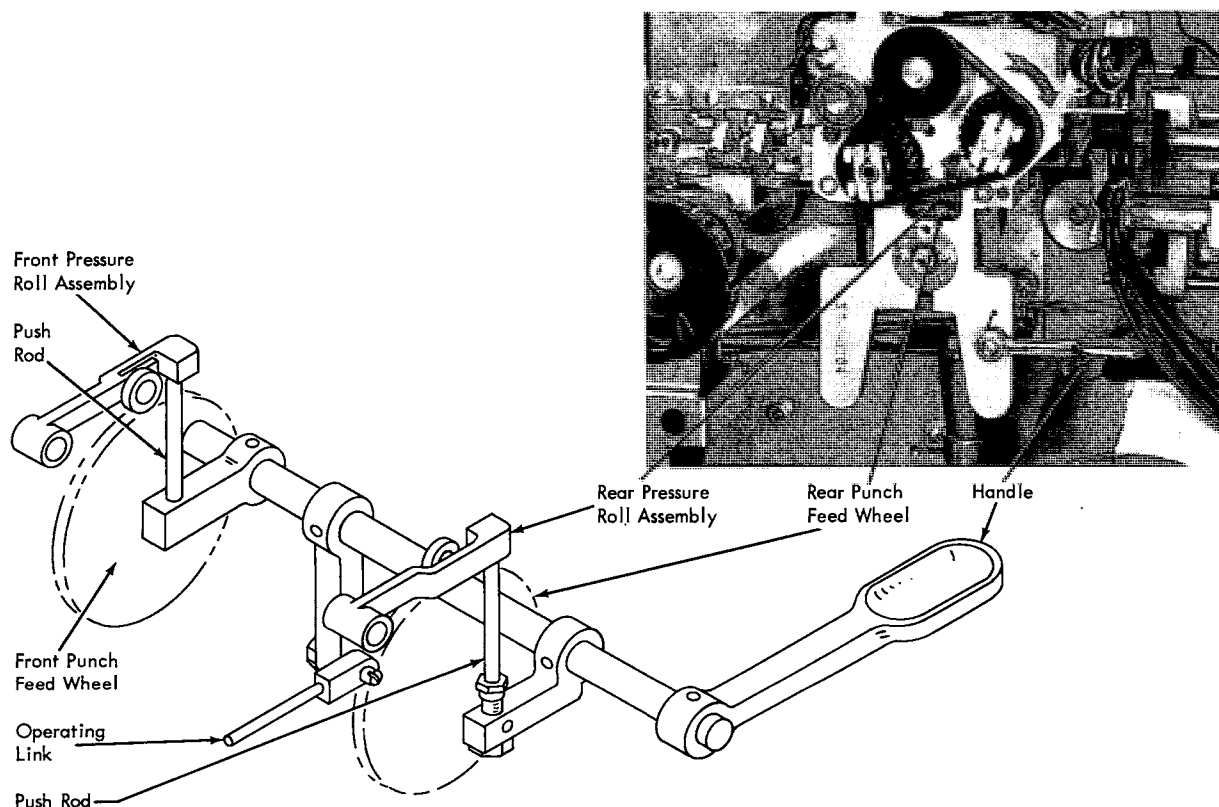


Figure 2-10. Punch Pressure Rolls and Feed Wheels

Punch Feed Wheels

The punch feed wheels (Figure 2-10) operate in conjunction with the punch pressure rolls to advance the card during punching operations. The punch feed wheels are driven by the incremental drive mechanism. The outer circumference of the wheels is constructed of rough material to facilitate gripping the card.

Read Eject Rolls

The read eject rolls (Figure 2-9) move the card from the punch station into the punch eject rolls during card feeding operations. The read eject

pressure roll is permitted to close on the card during the early part of the cycle, causing the read eject roll to eject the card. The operation of the read eject pressure roll is controlled by a cam on the CF camshaft.

Punch Eject Rolls

The punch eject rolls (Figure 2-11) receive the card from the punch station after it is ejected by the read eject rolls. They then deliver it to the stacker cornering station. The punch eject pressure roll is permitted to close on the card after the read eject rolls have had time to deliver it, and remains closed on the card for the major part of the cycle. The time

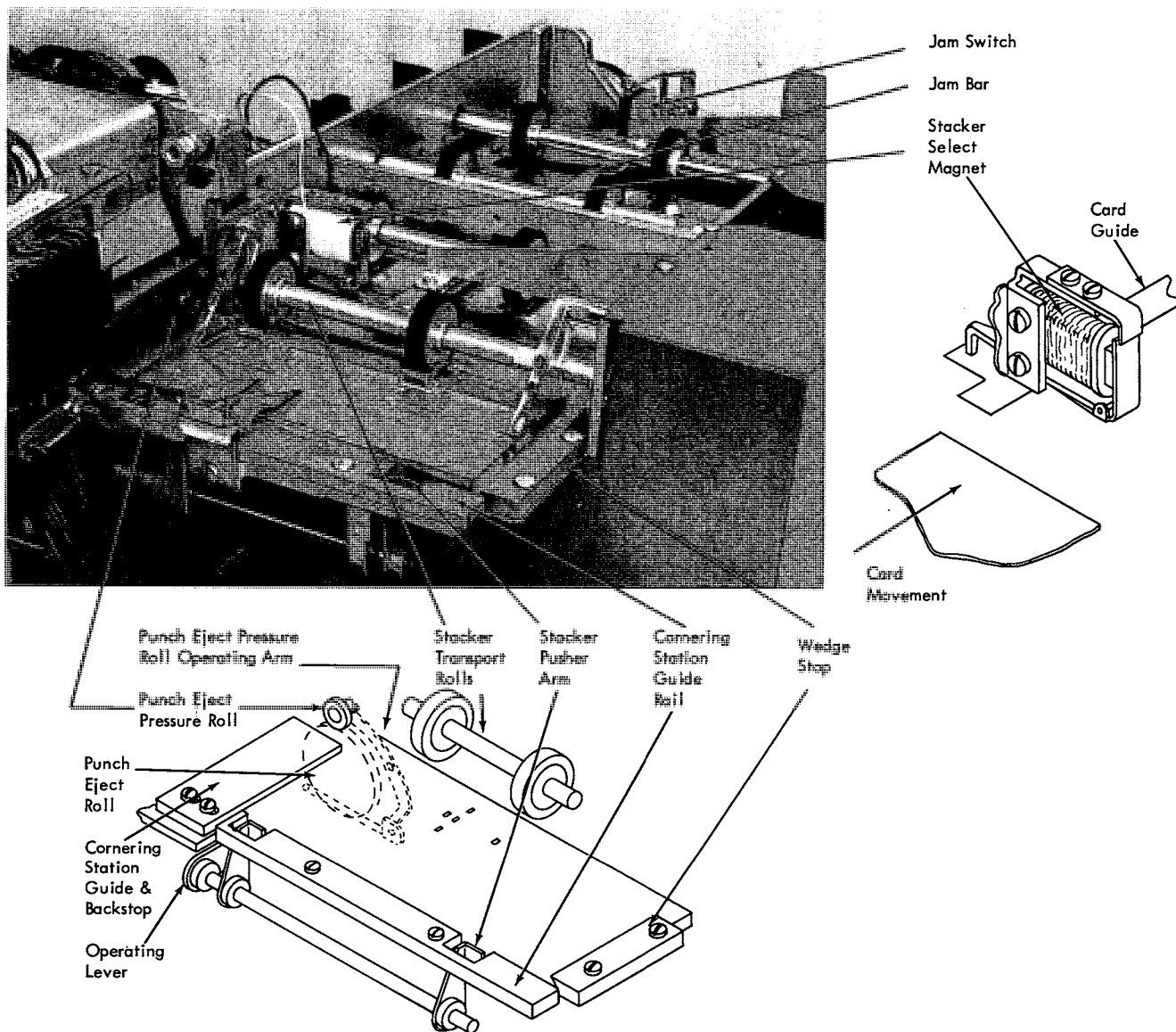


Figure 2-11. Stacker Cornering Station and Transport

at which the card leaves the punch eject rolls depends on the card's position in the punch station when the card feed cycle begins. If the card is not punched at all, the read eject rolls must feed the card for some distance before it reaches the punch eject rolls. If, however, 80 columns of the card have been punched, the card is already well under the punch eject pressure roll when the card feed cycle begins.

The operation of the punch eject pressure roll is controlled by a CF cam.

Stacker Cornering Station

The stacker cornering station (Figure 2-11) receives the card from the punch eject rolls and feeds it into the first set of stacker transport rolls. The stacker transport rolls deliver the card to one of the stackers.

Wedge Stop

The wedge stop (Figure 2-11) stops the card after it is released from the punch eject rolls. When the leading edge of the card enters the v-shaped slot in the wedge stop, the trailing edge of the card falls behind the cornering station backstop, resulting in the card being aligned with the stacker transport rolls. The v-shape of the slot in the wedge stop has a cushioning effect on card motion, reducing card rebound.

Stacker Cornering Pusher

The stacker cornering pusher (Figure 2-11) pushes the card into the first set of continuously running stacker feed rolls after the card has settled in the cornering station. These pushers are operated by a CF cam.

Stacker Transport

The stacker transport mechanism (Figure 2-11) receives the card from the stacker cornering station and delivers it to a stacker.

Stacker Transport Rolls

Four sets of continuously running transport rolls (Figure 2-11) are provided to move the card to the stacker area.

Jam Bar

The jam bar (Figure 2-11) detects jams in the stacker transport area. If a card is deflected from the normal card path, it contacts the jam tape. The jam tape and jam switch are so adjusted that a slight pressure

on the tape will cause the switch to transfer. When the switch transfers it signals a malfunction in the transport area to the machine.

Stacker Select Magnet

The stacker select magnet (Figure 2-11) may be provided on machines equipped with more than one stacker. It selects which of the stackers will receive the card being transported.

Figure 2-11 illustrates the operation of the stacker select mechanism. When the magnet is de-energized, the card passes under the lower card guide into the normal stacker. When the magnet is energized, the extension on the armature pushes the lower card guide below the card line, and the card is sent to the select stacker. To prevent interference with the cards, the armature extension operates against an area of the lower card guide not in the card path.

Stacker

The stacker (Figure 2-12) receives cards horizontally from the transport mechanism. The distance from the top of the radial guide assembly to the lip of the card-pivot ledge assembly is less than the length of a card. One end of the card is held by the card-pivot ledge assembly while the opposite end, guided by the guide assembly, falls.

When the card approaches the radial card guide assembly, the card falls from the lip of the card-pivot ledge assembly. The card stops with one end on the card aligner lever and the opposite end on the card deck support, or on the card previously stacked.

Spring tension supports the card aligner lever until several cards have accumulated. The weight of the accumulated cards overcomes the spring tension supporting the card aligner lever and lowers the group of cards into the card pusher slide.

The card pusher oscillates from front to back by action of the eccentric shaft. The bottoms of the

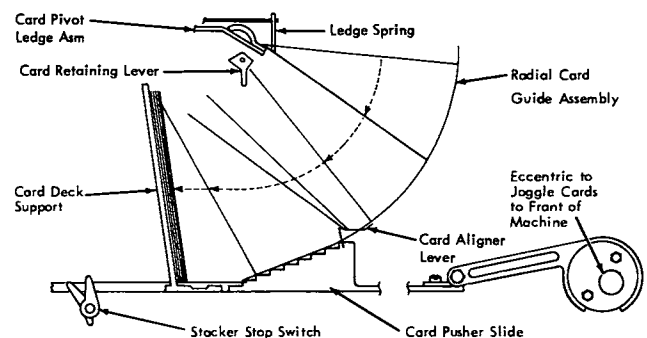


Figure 2-12. Stacker Operation

cards are worked forward and the cards are stacked against the card-deck support. This action continues until the card-deck support moves far enough out to operate the stacker-stop switch.

READ STATION

- The read station reads cards photoelectrically.
- Cards are read serially.

The read station (Figure 2-13) consists basically of 13 photocells and 13 fiber bundles which transmit light from a central light source. Twelve of the fiber bundles and photocells are used to read information from the card and one of the fiber bundles and photocells is used to detect the presence of cards at the punch station.

When card columns in the card passing through the read station are blank, no light from the light source can reach the photocells, but when the card columns are punched, light passes from the light source through the holes in the card to the photocells. When the light strikes the photocells, they emit an impulse (Figure 2-14). The peculiar shape of the pulse from the photocell is caused by the two slots in the photocell mask. When the read station first begins to read a punch in a card, light enters only one of the slots. As the card progresses, light eventually

enters both slots. Near the end of the reading time for that particular column light again enters only one of the slots. These pulses are sent to amplifier circuits in the machine which amplify them and shape them into square waves.

DUMMY READ STATION

The dummy read station is used in place of the read station on those machines utilizing the SRP which do not read cards.

The dummy read station is similar in construction to the normal read station but is not equipped with the read mask and has only one read photocell (in the 11 punch position). This photocell is used to detect the presence of cards in the dummy read station.

LIGHT SOURCE

- One central light source provides light for all SRP photoelectric functions.
- Light is channeled from the light source to the various areas of the SRP by bundles of glass fibers.

The light source (Figure 2-15) consists of a projection lamp and 14 fiber bundles used to transmit the light from the lamp to various areas of the SRP. The

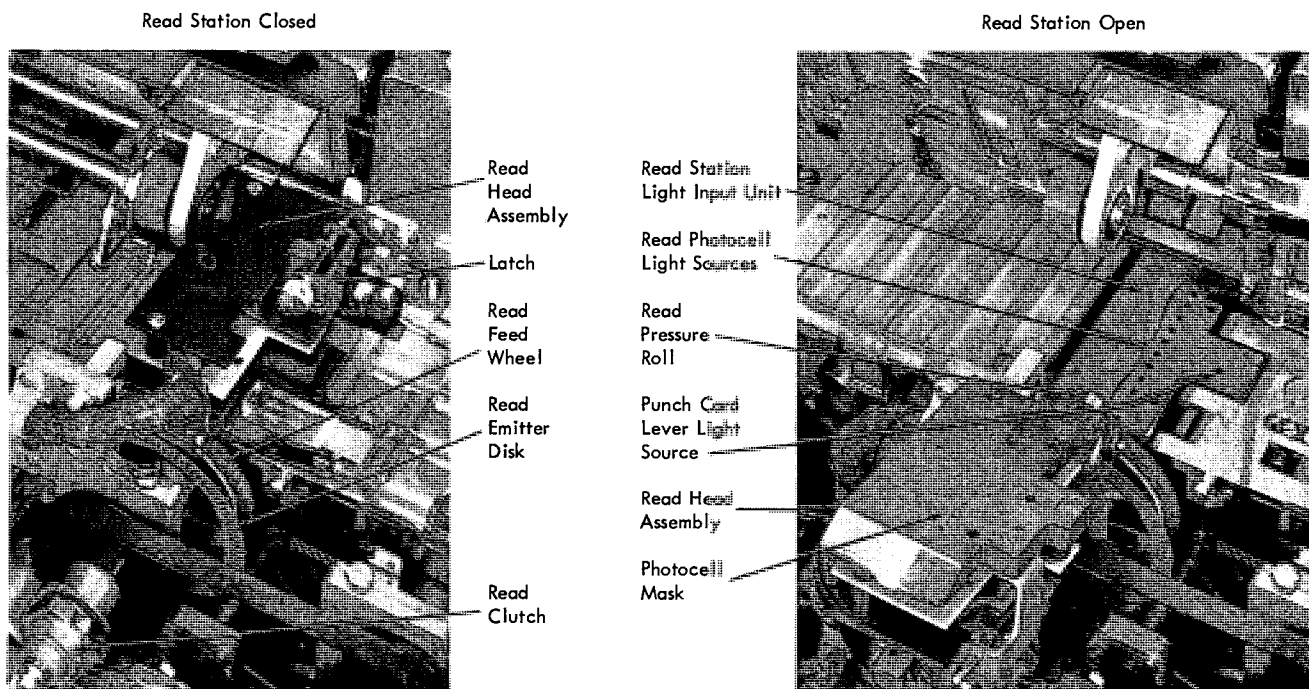


Figure 2-13. Read Station

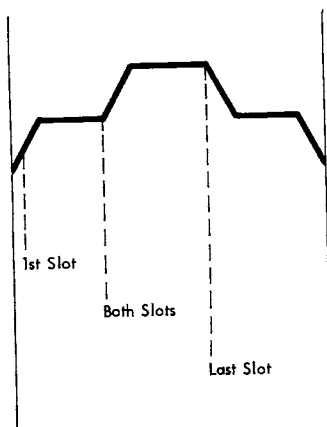


Figure 2-14. Read Data Pulse

14 fiber bundles are made up into two light transmitting cables.

The emitter bundle cable transmits light to the read emitter. The 13-position bundle transmits light to the read station where it provides light for the card reading and punch card lever photocells.

Fiber bundles transmit light through a group of glass fibers which are tightly bundled together. Fiber bundle cables are terminated in metal ferrules.

The position of the fiber bundle ends with respect to the light source lamp is adjustable. The voltage to the light source lamp is also adjustable to compensate for lamp aging.

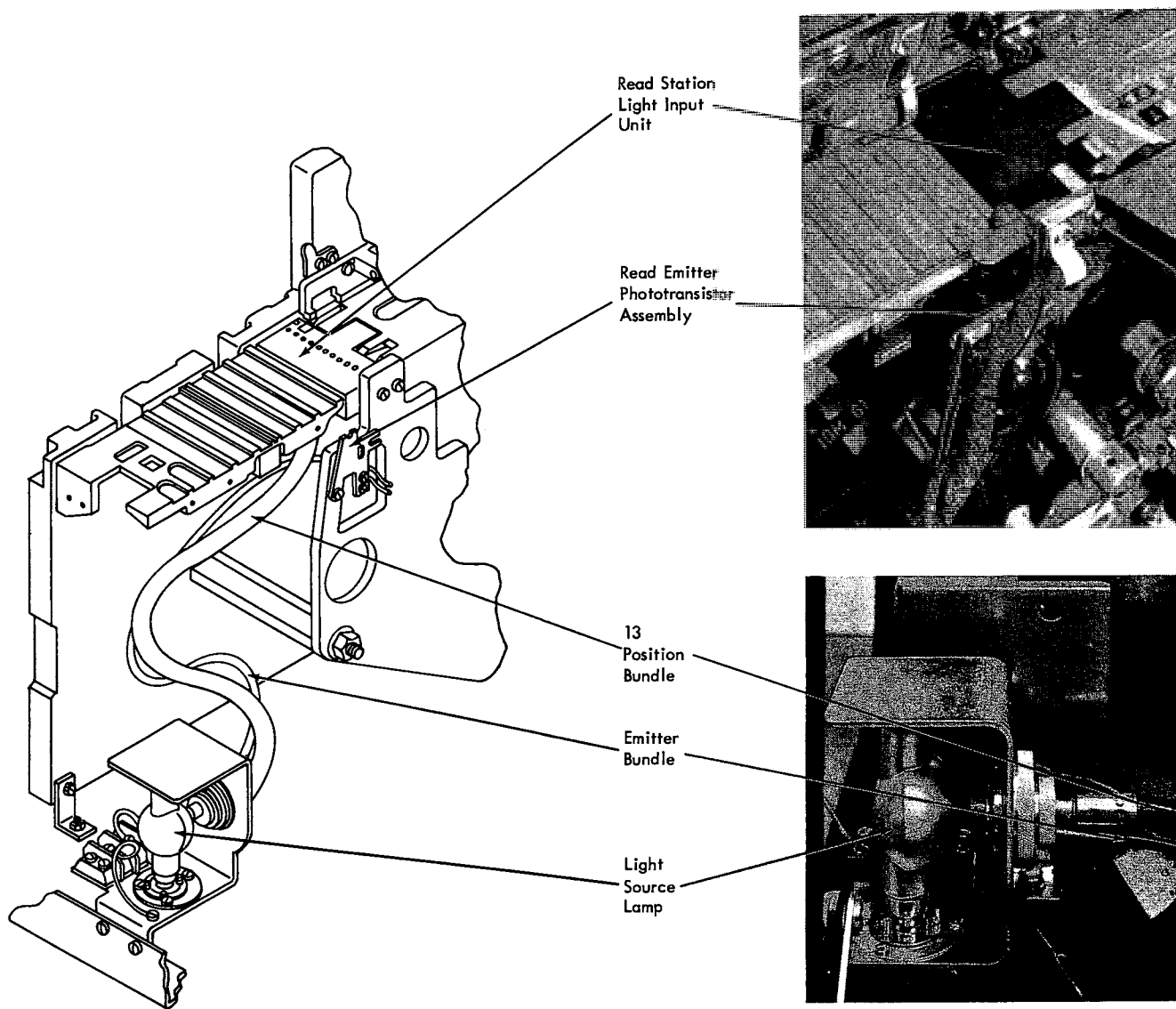


Figure 2-15. Light Source

PUNCH UNIT

- The punch unit is capable of serially punching cards at a maximum rate of 160 columns per second.
- The punch unit consists primarily of 12 punches, 12 interposers, 12 magnets, a hold coil, and three continuously running functional cams.
- A punch emitter is provided to signal the machine when the punch unit is correctly positioned for impulsing the punch magnets.

Figure 2-16 illustrates the operation of the punch unit:

1. Punch cam, restore cam, and interposer cam rotate in synchronism.
2. Hold coil (continuously energized) surrounds all 12 interposer coils and keeps all 12 interposers attracted.
3. Controlling unit energizes required interposer coil(s) at time indicated by punch emitter.
4. Current in selected interposer coils generates magnetic field that cancels field of hold coil, releasing interposer.
5. Released interposer(s) moves between punch bail and punch(es).
6. Punch bail follows punch cam and clamps interposer(s) between punch(es) and punch bail.
7. Interposer coil is de-energized by controlling unit at time signalled by punch emitter.
8. Card is punched.
9. Restore cam and interposer cam restore punch and interposer(s).
10. Interposer(s) returning to interposer coil(s) generates impulse(s) in interposer coil(s).

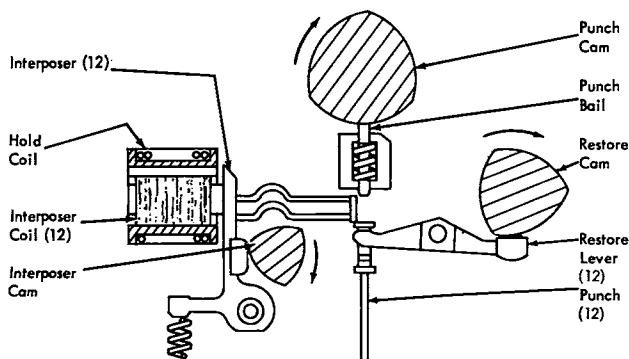


Figure 2-16. Punch Unit Operation

These echo pulses are used by the controlling unit to check punch unit operation.

Figure 2-17 illustrates the punch unit with all component parts in place. The card being punched passes between the die and the upper card guide and is moved by the punch feed wheels. The punch feed wheels are driven by the incremental drive unit. The punch unit and incremental drive unit must be kept in time with each other to ensure that the card will not be moved while being punched.

Figures 2-18a through 2-18d illustrate a typical punching cycle. Punch emitter 1 time indicates to the machine the correct time for impulsing the punch magnets. It also indicates when the punch echo impulse from the previous punch cycle is available. Punch emitter 2 time indicates the end of the period of time in which the punch magnets can be impulsed. The incremental drive emitter is also illustrated to show the timing relationship between the punch unit and incremental drive. The incremental drive emitter timings shown will be more meaningful after reading the "Incremental Drive Unit" section of this manual.

INCREMENTAL DRIVE UNIT

- The incremental drive unit moves the card during punching operations.
- The incremental unit is controlled by latch magnets. These magnets are impulsed by the machine to cause card movement.
- The correct time for impulsing the incremental drive magnets is indicated to the machine by the incremental drive emitter.

The incremental drive unit (Figure 2-19) intermittently drives the punch feed wheels which move the card through the punch station during punching operations.

During punching operations, the card in the punch station must be moved only between punching cycles, and must be held motionless while the holes are being punched. An incremental drive emitter is provided to signal the correct time for impulsing the incremental drive magnets. This emitter is timed to the punch unit to maintain the proper timing relationship between the punch unit and incremental drive.

The incremental drive unit consists basically of:

1. Two continuously running cams, each having two high and two low lobes. These cams are timed 180° out of phase; when the upper cam is on a high lobe, the lower cam is on a low lobe.

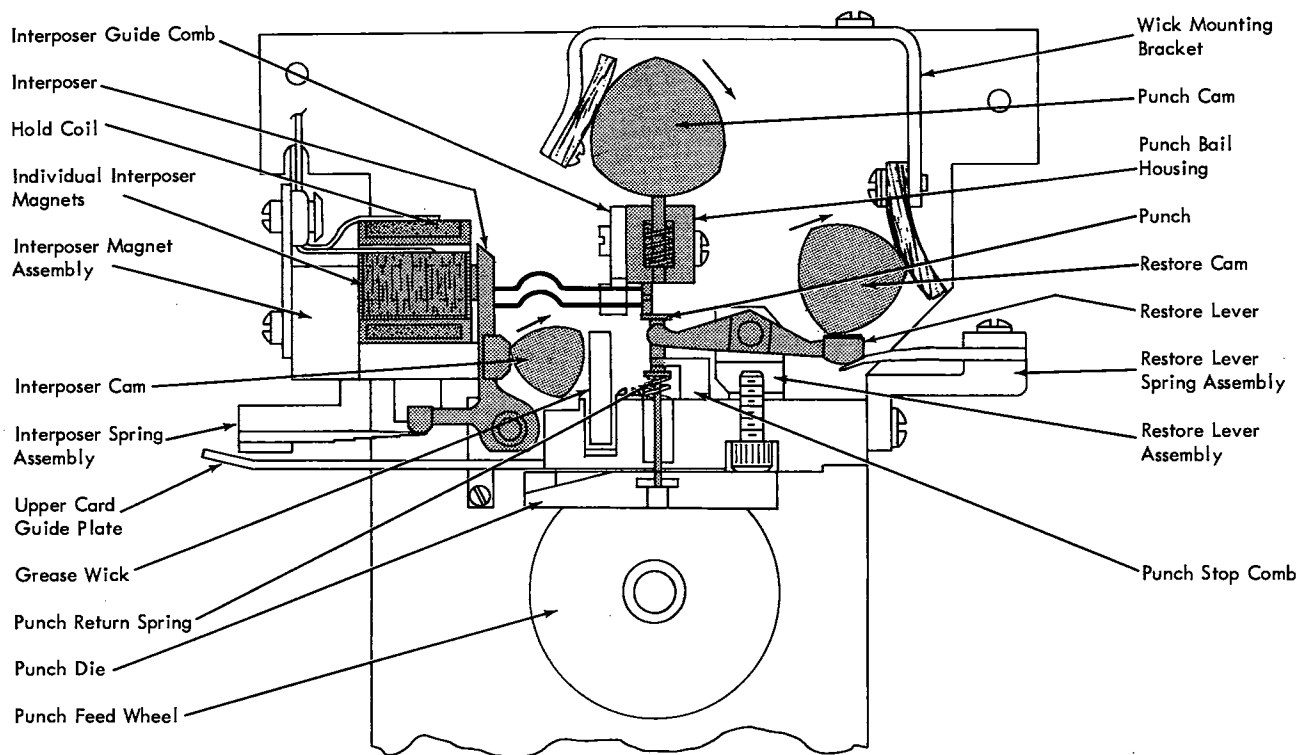
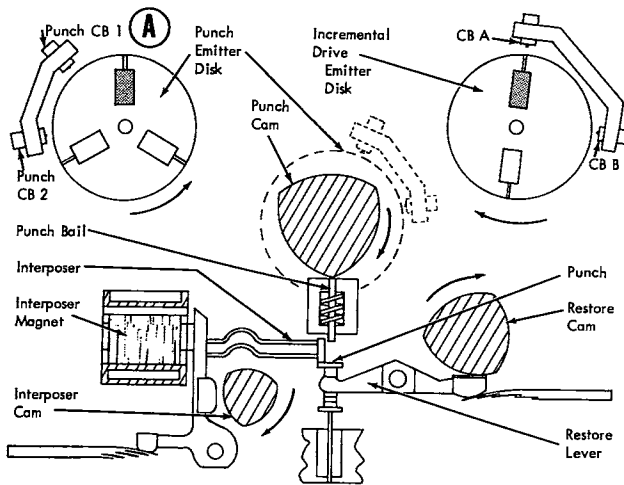
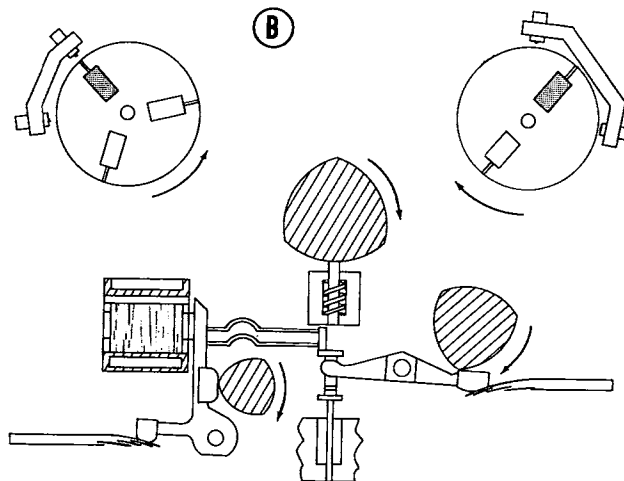


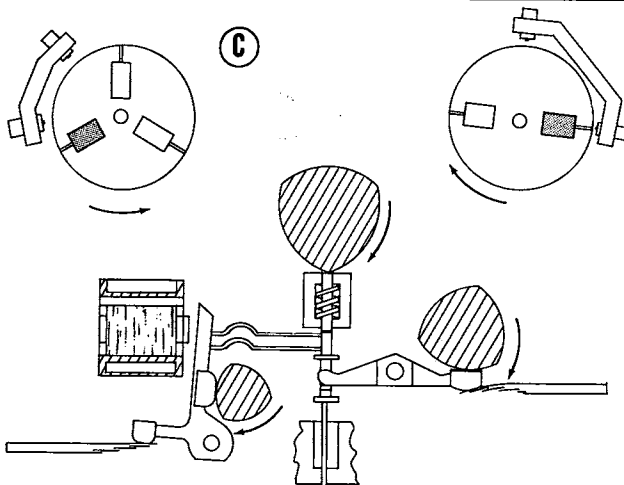
Figure 2-17. Punch Unit Assembly



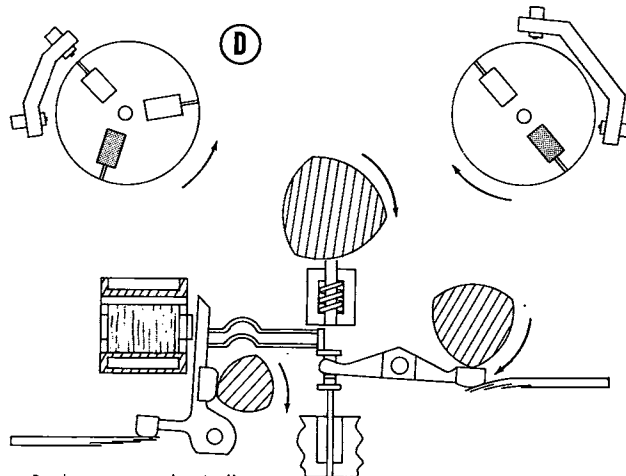
- Incremental drive latch A or B impulsed (illustration assumes B impulsed).
- Punch cam on high dwell.
- No punching occurring.
- Interposer armatures held by hold coil.
- Interposer magnets not yet impulsed.



- Punch Emitter 1 impulse signals interposer magnets ready to be impulsed.
- Selected interposer magnets are energized.
- Interposer cam on high dwell.
- Punch cam on low dwell.
- Restore cam on high dwell.



- Selected interposers follow interposer cam.
 - Interposer moves between punch bail and punch.
 - Card is punched when punch cam reaches high dwell.
 - Restore cam on low dwell.
 - Incremental drive latch A impulsed (no card movement has yet occurred).
- NOTE: Selected interposer magnets were de-energized at Punch CB 2 time.



- Punch cam moves to low dwell.
 - Punches restored by restore cam.
 - Interposers restored by interposer cam and held by hold coil.
 - Card moved to next column by incremental drive.
- NOTE: Punch echo signals are provided when selected interposers are restored. Punch CB 1 signals when echo signals are available.

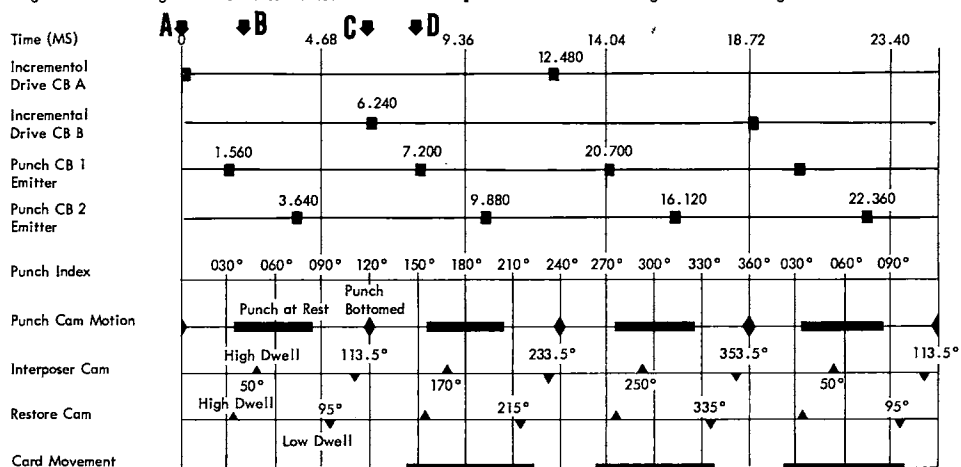


Figure 2-18. Punch Unit Operation

2. Two cam follower arms. When these arms are not latched, they are permitted to follow the continuously running cams and impart motion to the ratchet wheel.
3. A ratchet wheel which is attached to the punch feed wheels. This wheel is moved by the cam follower arms when they are unlatched. When not being moved, the ratchet wheel is held stationary by a detent.

4. A continuously running eccentric cam which moves two incremental drive pawls, attached to the cam follower arms, alternately in and out of the ratchet wheel.
5. Two latch arms which when not attracted to their corresponding magnet assemblies prevent the cam follower arms from following the cams.
6. An emitter which provides timed impulses used to signal the correct time for impulsing the latch magnets.

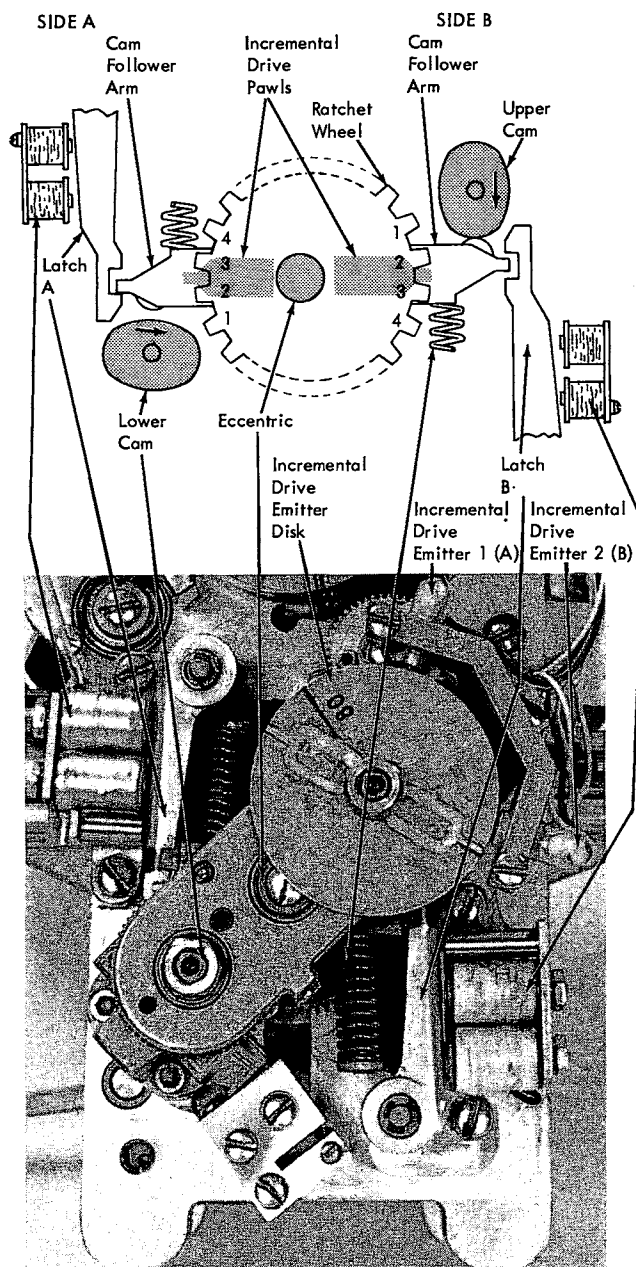


Figure 2-19. Incremental Drive Unit

Figure 2-20 provides a more detailed illustration of the incremental drive unit. Note that the gears which drive the incremental drive cams and eccentric are driven by a gear on the punch unit interposer cam. This ensures that the incremental drive unit will remain in time with the punch unit.

Figures 2-21a through 2-21e illustrate the operation of the incremental drive unit. Note that the card can be moved at three different times during each punch index cycle. This is necessary because it is possible for the punch unit to punch at three different times in each punch index cycle.

DUMMY PUNCH UNIT

The dummy punch unit replaces the punch unit in machines which use the SRP mechanism to read cards only.

Figure 2-22 shows the dummy punch station installed in the SRP. Note that an idler pulley is provided in place of the punch cam drive pulley. This permits using the same motor drive belt for SRP's with the punch unit and SRP's with the dummy punch station.

EMITTERS

- The SRP incorporates three magnetic emitters: card feed emitter, punch emitter, incremental drive emitter.
- Magnetic emitters provide timed impulses used to indicate the position of certain SRP mechanical units.
- The SRP read emitter is a photoelectric emitter.

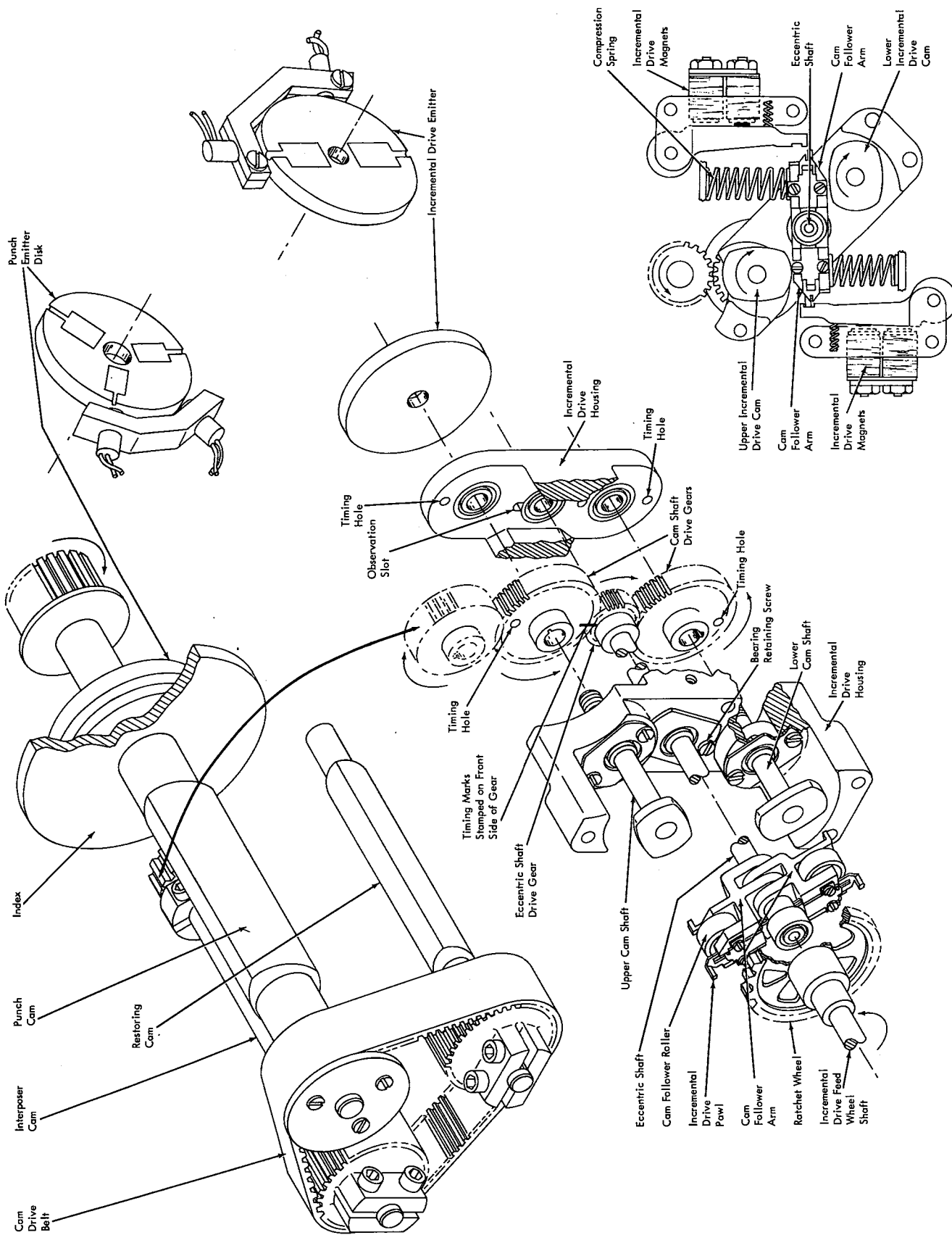


Figure 2-20. Incremental Drive Unit Assembly

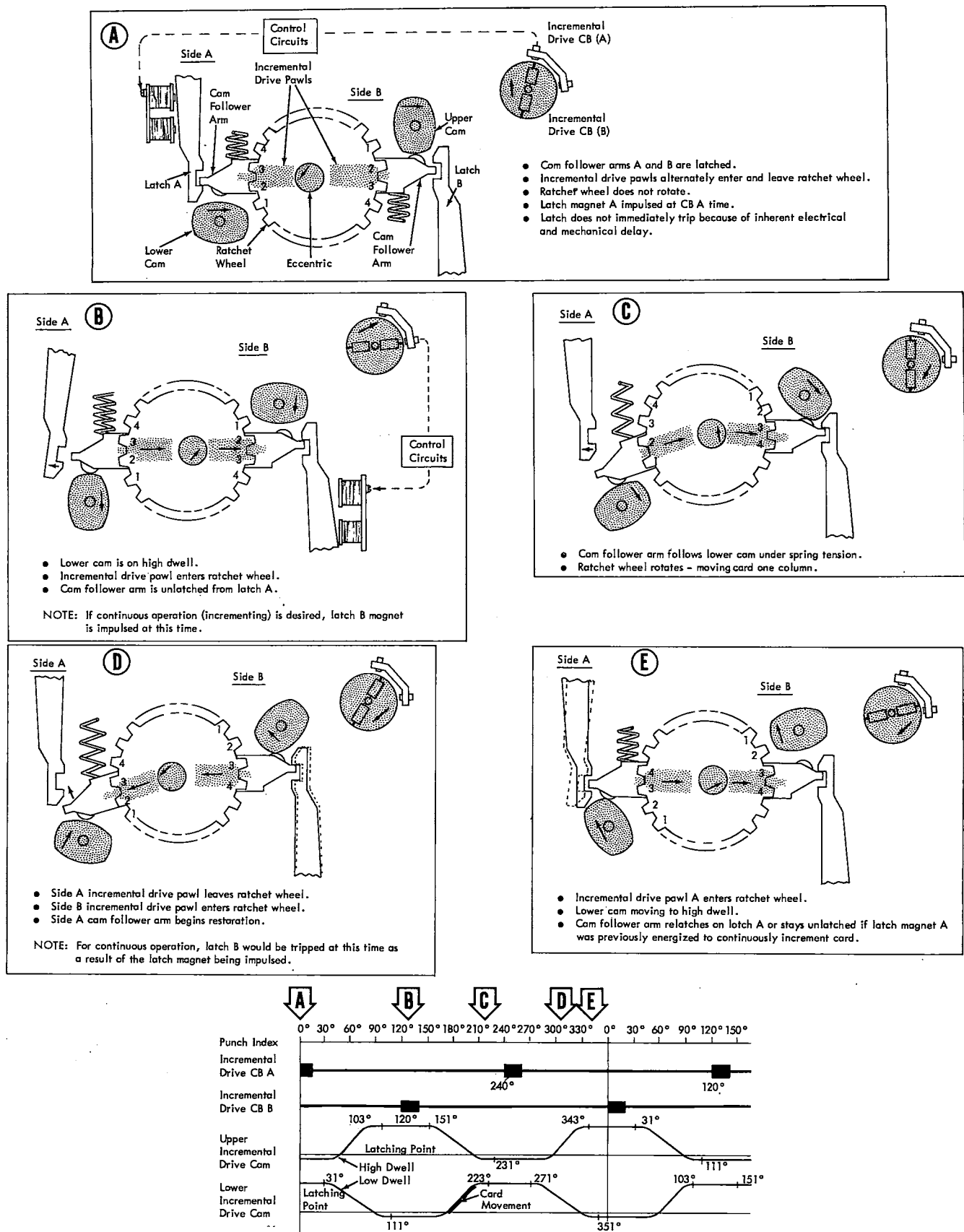


Figure 2-21. Incremental Drive Unit Operation

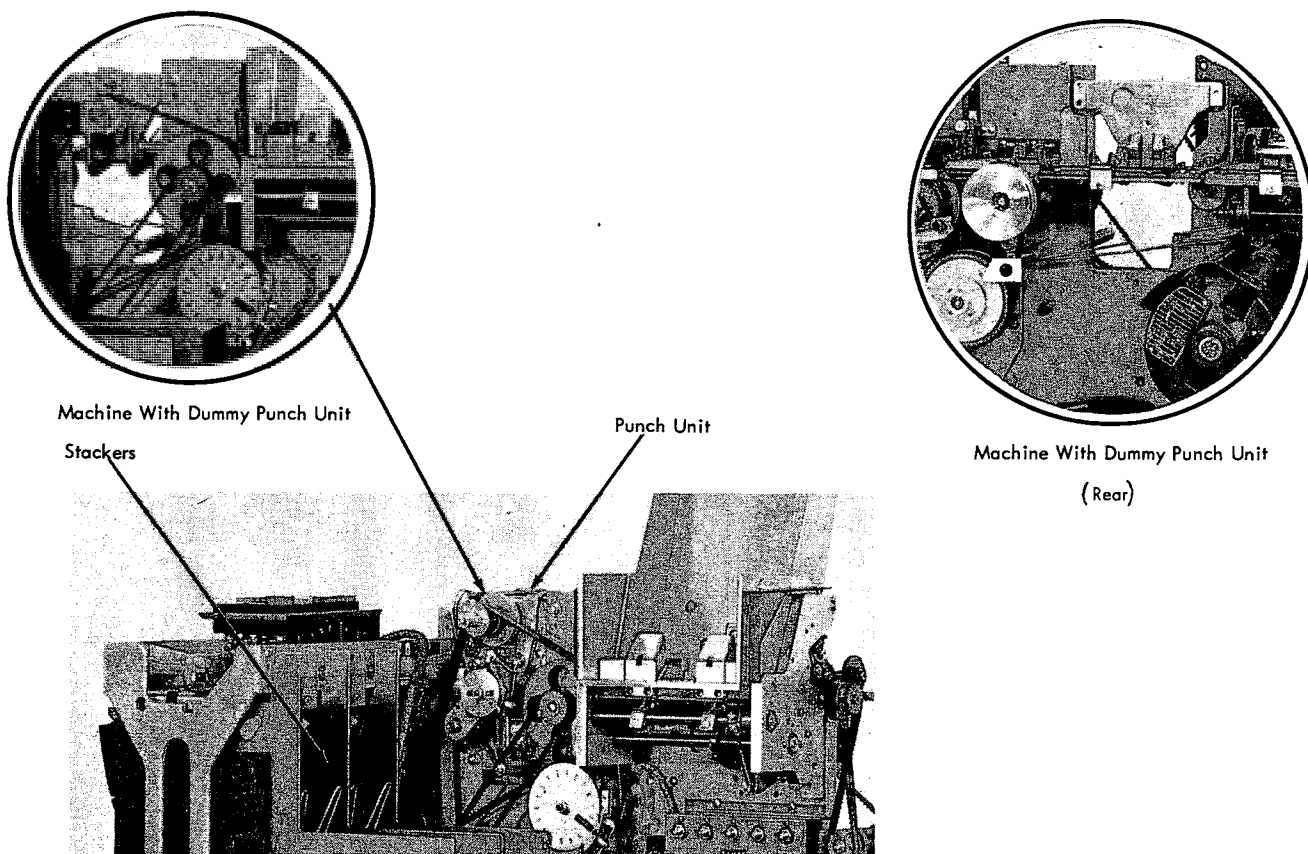


Figure 2-22. Dummy Punch Unit

Magnetic Emitters

Magnetic emitters operate on the principle that current is induced in a coil of wire when a magnetic field passes through the coil. Figure 2-23 illustrates the operation of the type of magnetic emitters used by the SRP. A permanent magnet, mounted in a rotating disk, provides a moving magnetic field. As the permanent magnet passes near a fixed coil, mounted in close proximity to the disk, a pulse of current is induced. This pulse is then amplified, shaped into a square wave, and used by the machine as a timing pulse.

Card Feed Emitter

The card feed emitter (Figure 2-23) provides impulses used by the machine to determine the position of cards within the SRP feed. The term CB, applied to the coils, is a carryover from previous machines that used contact type Circuit Breakers to provide these timed impulses. The card feed emitter disk is attached to the card feed camshaft and is therefore controlled by the card feed clutch.

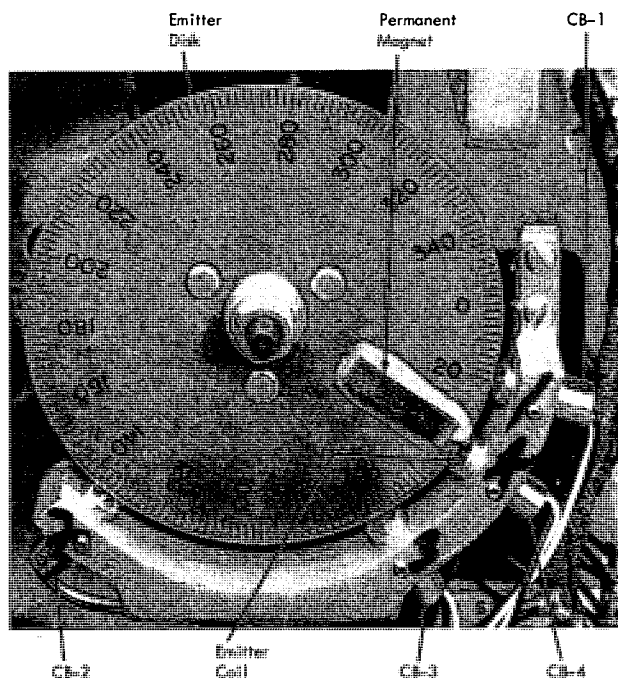


Figure 2-23. Card Feed Emitter

Punch Emitter

The punch emitter (Figure 2-24) is mounted on the punch unit and provides timed impulses that indicate the position of certain mechanisms in the punch unit. Note that the punch emitter disk contains three magnets. This corresponds to the three separate punching times possible for each revolution of the punch cams. The punch emitter disk is attached directly to the punch cam. Impulses provided by the punch emitter signal the beginning and end of the correct time for impulsing the punch magnets and also signal when punch echo impulses are available.

Incremental Drive Emitter

The incremental drive emitter (Figure 2-24) provides timed impulses which indicate to the machine the correct time for impulsing the incremental drive magnets. The incremental drive emitter contains two permanent magnets and is attached directly to the incremental drive upper camshaft.

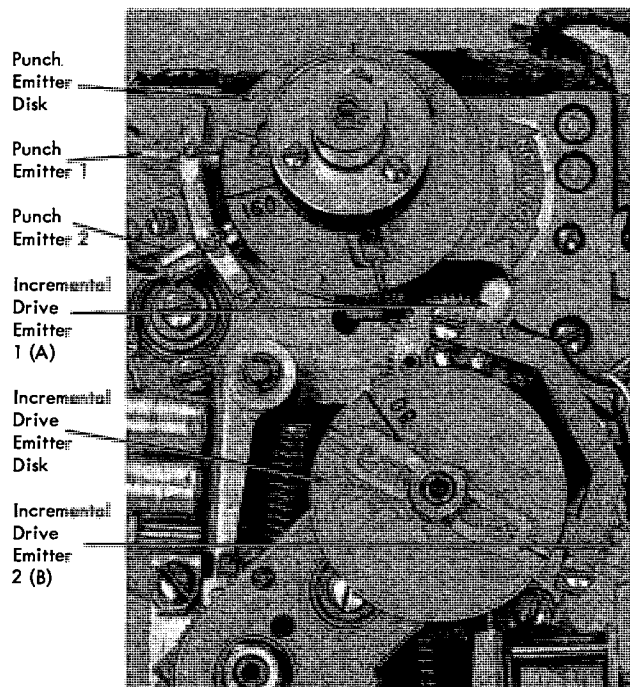


Figure 2-24. Punch and Incremental Drive Emitters

Read Emitter

The read emitter (Figure 2-25) provides timed impulses used to indicate to the machine the correct time for sensing data pulses from the read photocells. The read emitter is not provided on machines unequipped to read cards.

The emitter consists, basically, of a light source (fiber bundle), a photocell, and an emitter disk which is driven by the read clutch. Slots are cut in the disk to correspond to the read time for card columns. The disk is adjusted to cause the first slot to pass between the light source and the photocell halfway through the first column read time. Light then passes through the slot and causes the photocell to emit an impulse. The impulse emitted is shaped, amplified, and used by the machine for timing. Other slots in the disk correspond to other card columns.

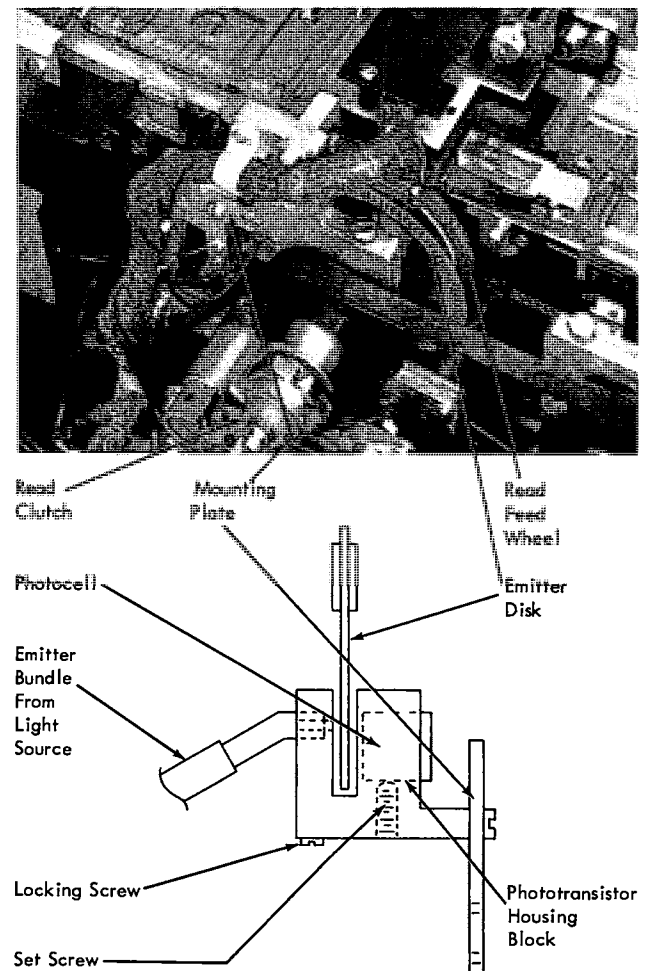
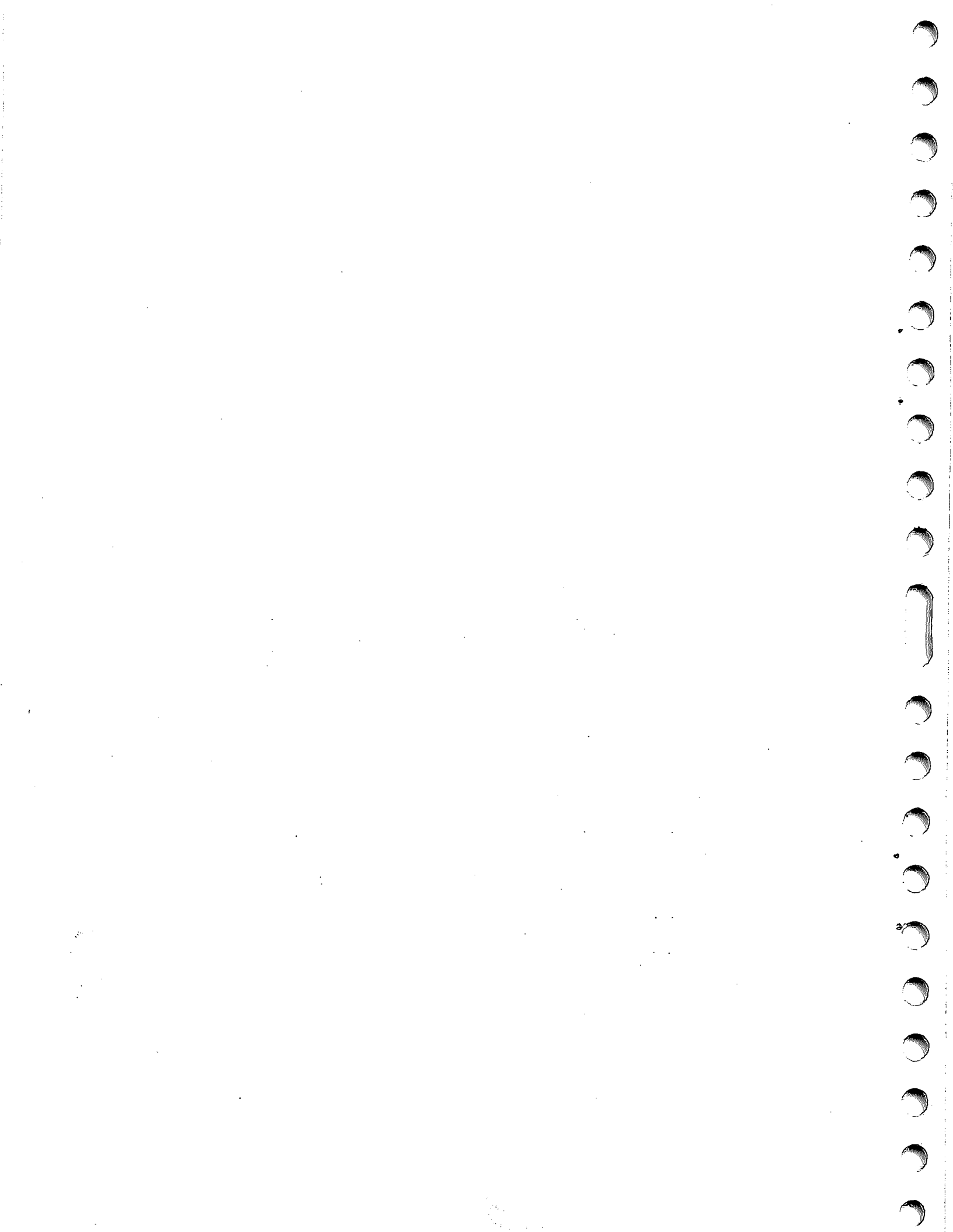


Figure 2-25. Read Emitter



INTRODUCTION

This chapter explains the interface lines between the 1442 and the processing unit. Descriptions of lines are grouped by the function the line performs.

Sequential descriptions of the operations performed by the 1442-5, 6, 7 are not included in this chapter. The sequence of operation depends, primarily, on the using system, because all logic circuits for the 1442 are contained in the processing unit to which the 1442 is attached. Detailed, sequential descriptions are provided in I/O attachment manuals for the using system.

START/STOP CIRCUITS

- Control the 1442 drive motor.
- Place the 1442 in the ready condition.
- Remove the 1442 from the ready condition.

- Permit removing the cards from the feed without processing them.
- Signal error conditions to the processing unit.
- Control the use meter.

1442 Model 5

Output Lines To Processing Unit (Figure 3-1)

+ Start Key N-O indicates that the start key has been operated. This line signals the processing unit that the operator wishes to place the 1442-5 in the ready condition.

+ Stop Key N-C indicates that the stop key is in its normal position. When the stop key is operated the line drops, signaling the processing unit that the operator wants to stop the 1442-5 and remove it from ready condition.

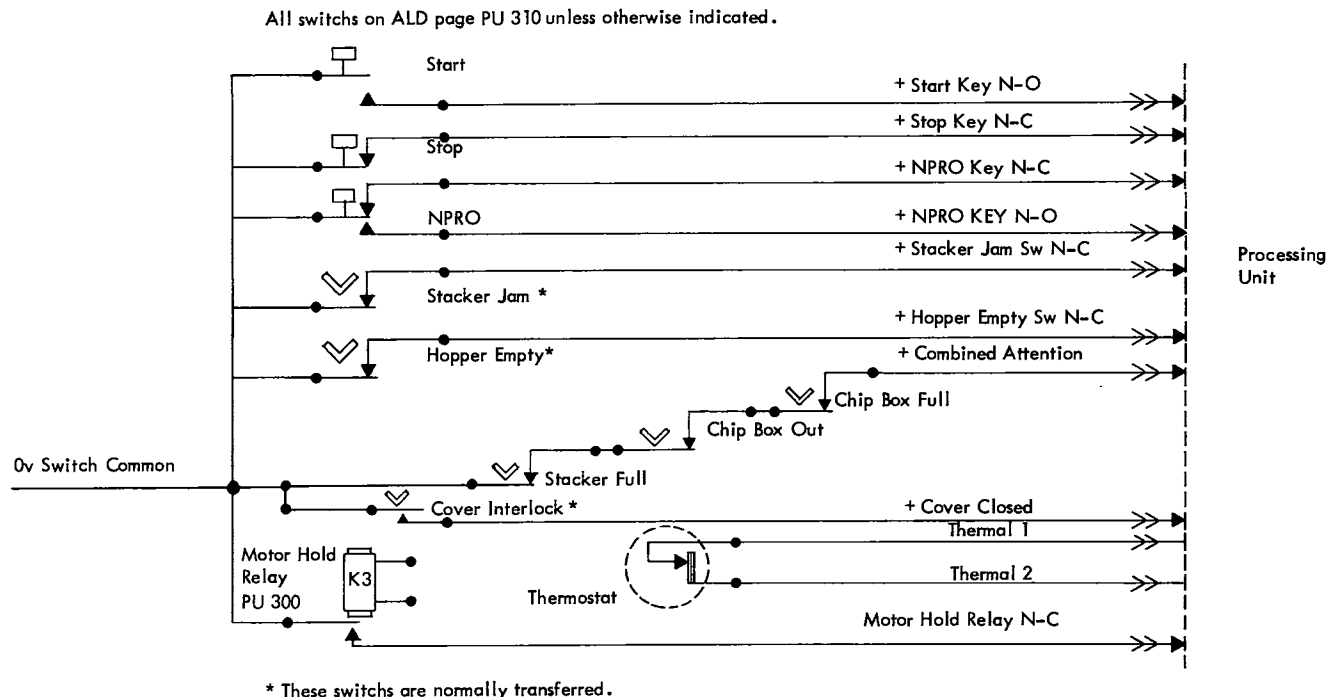


Figure 3-1. 1442 Model 5 Start/Stop Output Signals

+ NPRO Key n-C/+ NPRO Key N-O indicate the position of the NPRO key. When the NPRO key is operated, the lines signal the processing unit that the operator wants to remove the cards in the 1442 feed without processing them. The processing unit requires that cards be removed from the hopper before it will perform the non-process runout.

exceeds 120° F, the thermal switch opens, indicating to the processing unit that the 1442 is overheating.

Motor Hold Relay N-C indicates that the motor hold relay has been de-activated.

+ Stacker Jam Sw N-C indicates that a card jam has occurred in the stacker transport area. The switch is normally held transferred but when a card in the stacker transport moves outside the normal card path, it touches a jam tape, allowing the n/c contacts of the jam switch to close.

Input Lines From Processing Unit (Figure 3-2)

- Motor Relay Select energizes the motor relay.
The motor relay activates the drive motor.

+ Hopper Empty Sw N-C indicates that the hopper is empty. The switch is in the transferred position when the hopper contains cards.

- Execute Command energizes the motor hold relays.
After the line is de-activated, motor hold relay K3 is held for an additional 30 seconds by the discharge of a capacitor through a relay coil and a potentiometer.

+ Combined Attention Sw, when dropped, indicates that one of the following has occurred:

1. The stacker has filled to capacity, causing the stacker-full switch to transfer.
2. The chip box is either full or not correctly positioned, causing the chip box full or chip box out switch to transfer.

The potentiometer is used for adjusting the amount of time the relay remains energized after the execute command line is de-activated. This time period permits the 1442 drive motor to be continuously energized when a series of closely-timed commands is received. Overheating, which would occur if the drive motor had to be restarted for each command, is prevented.

+ Cover Interlock indicates that the cover is closed.

1442 Thermal 1/1442 Thermal 2 lines are normally commoned through the n/c points of the thermal switch. If the temperature in the SLT gate

- 1442 Meter Go energizes the process meter relay.
This relay causes the process meter to run.

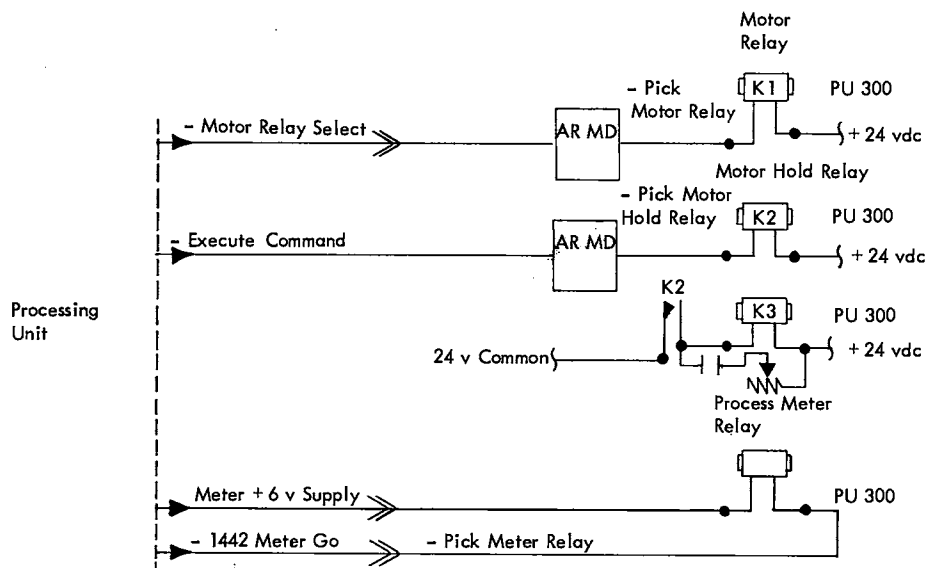


Figure 3-2. 1442 Model 5 Start/Stop Input Signals

1442 Models 6 and 7

Output Lines To Processing Unit

Note that all lines, (See Figure 3-3) except the stacker jam sw line, are active only when the cover interlock switch is closed.

- + Start Switch indicates that the start key has been pressed, and the stop key, stacker full switch, and chip box switches are all in their normal positions. This line signals the processing unit that the operator wants to place the 1442-6, 7 in a ready condition.
- Stop Switch indicates that the stop switch, stacker full switch, or a chip box switch has been operated. This line signals the processing unit to remove the 1442 from the ready condition.
- + NPRO Switch indicates that the NPRO key was pressed, the stop key is in its normal position, and the hopper contact is closed (empty hopper). This line signals the processing unit that the operator wants to remove the cards from the 1442 feed without processing them (non-process runoff).
- + Hopper Empty Sw indicates that the hopper contains no cards.

Idle Relay Contact indicates that the idle relay is activated.

- Stacker Jam Sw indicates a card jam in the stacker transport area. This switch is normally held transferred. If a card in the stacker transport leaves the normal card path, it contacts a jam tape, which causes the n/o contacts of the jam switch to break contact.

Input from Processing Unit (Figure 3-4)

- Motor Relay activates the motor relay, causing the 1442 drive motor to be activated.
- SRP Busy which works with the idle relay as an idle control circuit, is maintained at a minus level while the 1442 is busy, and returns to a plus level when the 1442 is not busy. When the line goes to a plus level, the idle relay driver circuit is activated and activates the pick circuit of the idle relay.

The idle relay has a built-in delay of 15 seconds. If the SRP busy line remains at a plus level (indicating SRP not busy) for 15 seconds, the idle relay picks, its n/c points open, and an idle relay contact signal is sent to the processing unit. The processing unit responds to this signal by de-activating the motor relay line and the 1442 drive motor.

The idle control circuit controls the drive motor. If the 1442 performs operations within 15 seconds of each other, the drive motor runs continuously; thus, preventing successive re-starts of the drive motor which would cause the motor to overheat.

All switches on ALD page RP 101.

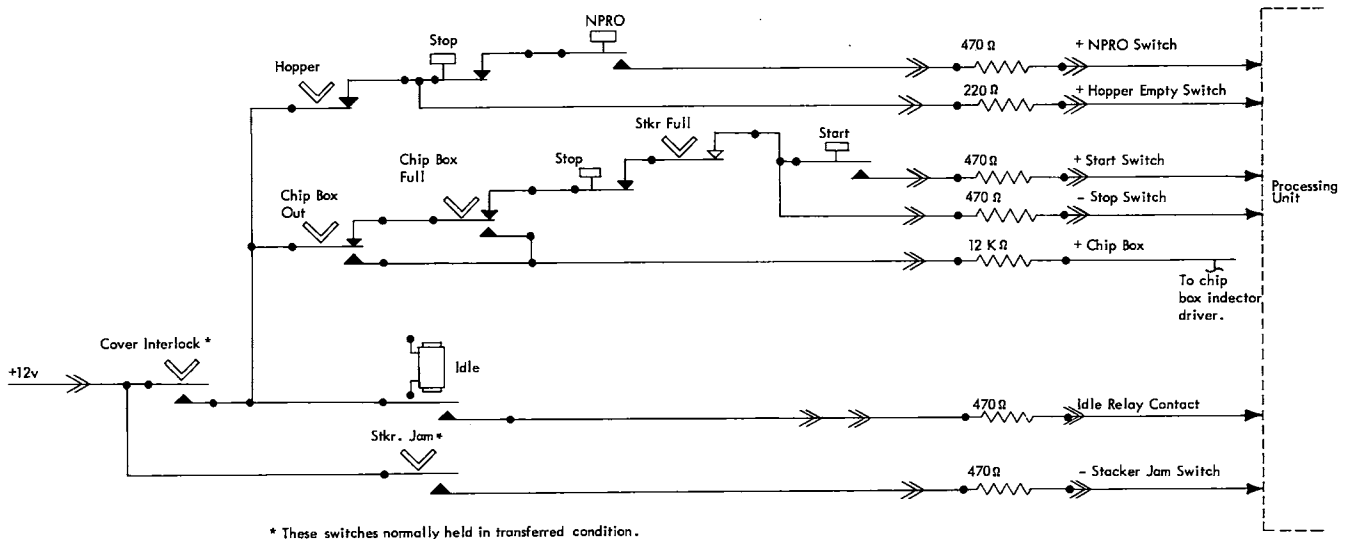


Figure 3-3. 1442 Models 6 and 7 Start/Stop Output Signals

- SRP Process Meter activates the process meter relay, which activates the process meter.

CARD FEEDING CIRCUITS

- The processing unit starts the card feed cycle by activating the 1442 card feed clutch magnet.
- While cards are moving through the feed, the 1442 signals their positions through lines activated by phototransistors and the card feed emitter.

1442 Model 5 (Figure 3-5)

Input Lines From Processing Unit

Feed Clu Select activates the card feed clutch magnet. This causes the card feed clutch to engage and advance all cards in the feed one card station.

Output Lines To Processing Unit

During a card feed cycle the following signals are developed and sent to the processing unit. The processing unit uses them to determine the position of cards in the feed and to detect feeding malfunctions.

FCB 1, FCB 2, FCB 3, and FCB 4 signal the position of the card feeding mechanism at four different cycle points. Pulses are emitted at specified times (Figure 3-5).

Read Station SC 1 Exposed; Activated by the number 11 phototransistor in the sense station, detects the movement of cards through the sense station.

The line is active when there is no card between the light source and phototransistor. If the line is not activated at the right time (230° - 313°), a card feeding malfunction has occurred.

Punch Station SC 2 Exposed is used by the processing unit to detect the proper movement of the card from the dummy read station to the punch station. As cards move from the sense station to the punch station they pass between the punch card lever phototransistor and its light source. When the card has been fully registered at the punch station, the light from the light source strikes the phototransistor and the line is activated (305°). The line then stays active until 50° of the next feed cycle.

1442 Models 6 and 7 (Figure 3-6)

Input Lines From Processing Unit

SRP Feed Clutch activates the card feed clutch magnet, causing the card feed clutch to engage and advance all cards in the feed one card station.

Outputs To Processing Unit

The following signals are developed and sent to the processing unit during a card feed cycle. The processing unit uses these signals to determine the position of cards in the feed, and to detect feeding malfunctions.

Punch Lamp Dark; As cards move from the read station to the punch station, they pass between the punch card lever phototransistor and its light source, and activate the punch lamp dark line. The timing of this line is illustrated on the timing chart (Figure 3-6).

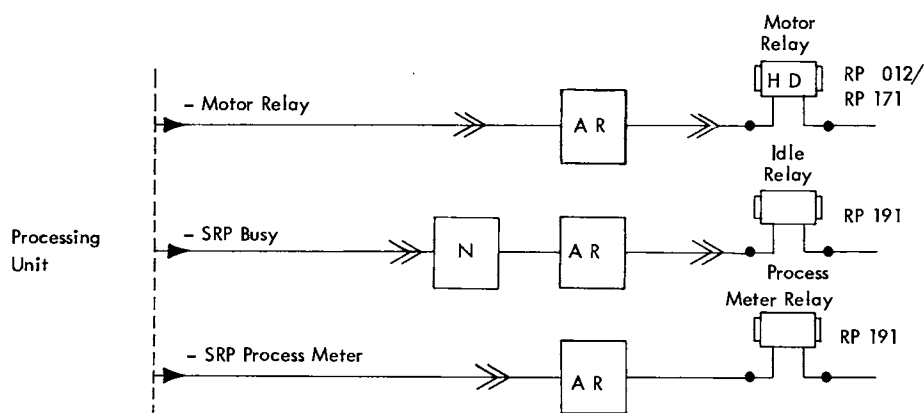


Figure 3-4. 1442 Models 6 and 7 Start/Stop Input Signals

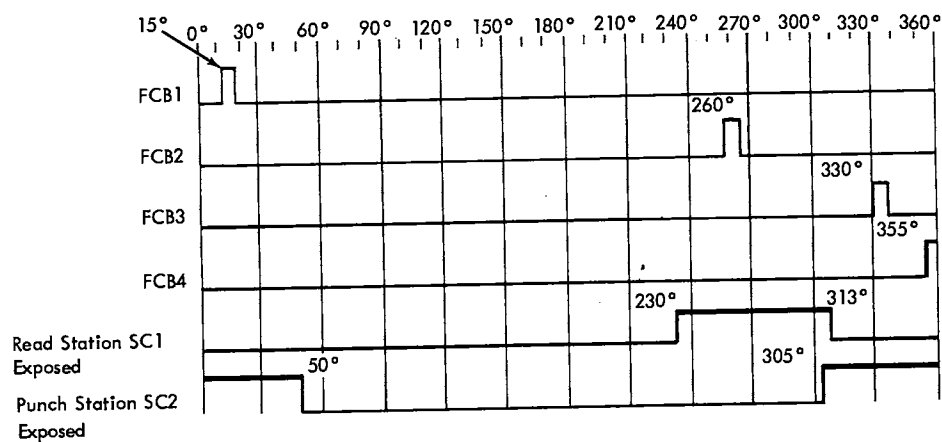
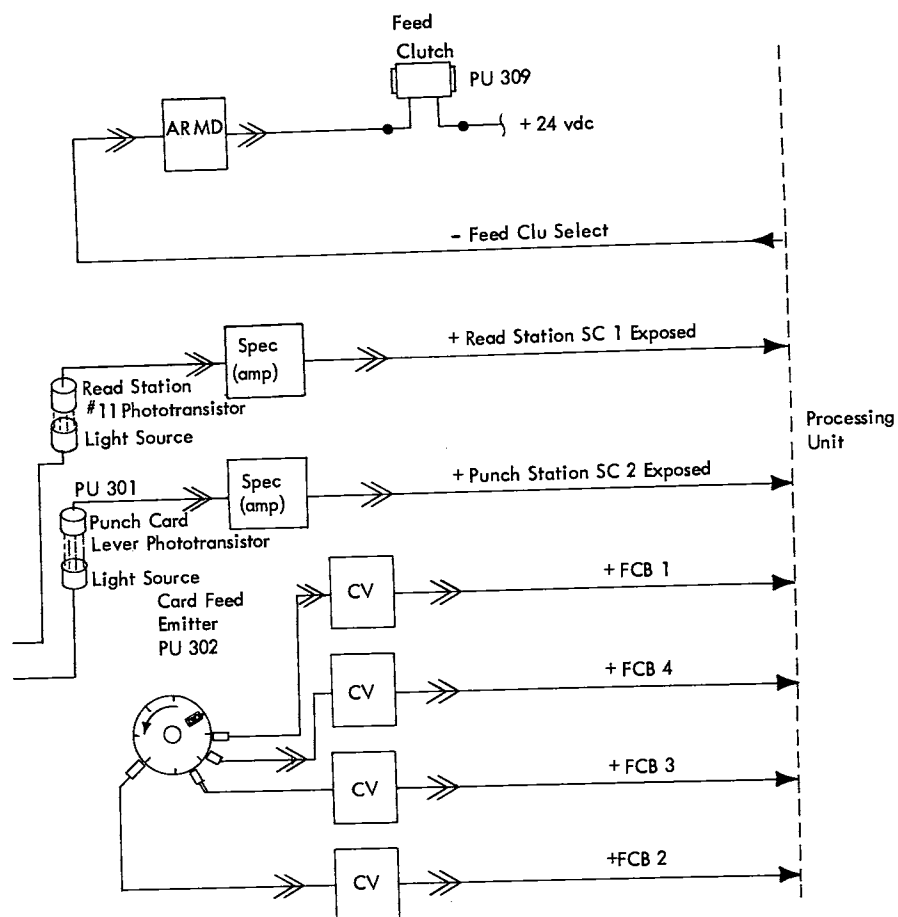


Figure 3-5. 1442 Model 5 Card Feed Signals

Feed CB 1, Feed CB 2, Feed CB 3, and Feed CB 4 lines signal the position of the card-feeding mechanism at four different cycle points. Pulses are emitted at the times shown on the timing chart (Figure 3-6).

CARD READING CIRCUITS, MODELS 6 AND 7

- Punched holes are detected in cards when light shines through the punched holes and activates read phototransistors.

- Outputs from read phototransistors are amplified, shaped, and sent to the processing unit.
- A read emitter produces impulses near the middle of the read time of each card column.
- Read emitter pulses are amplified, shaped, and sent to the processing unit.

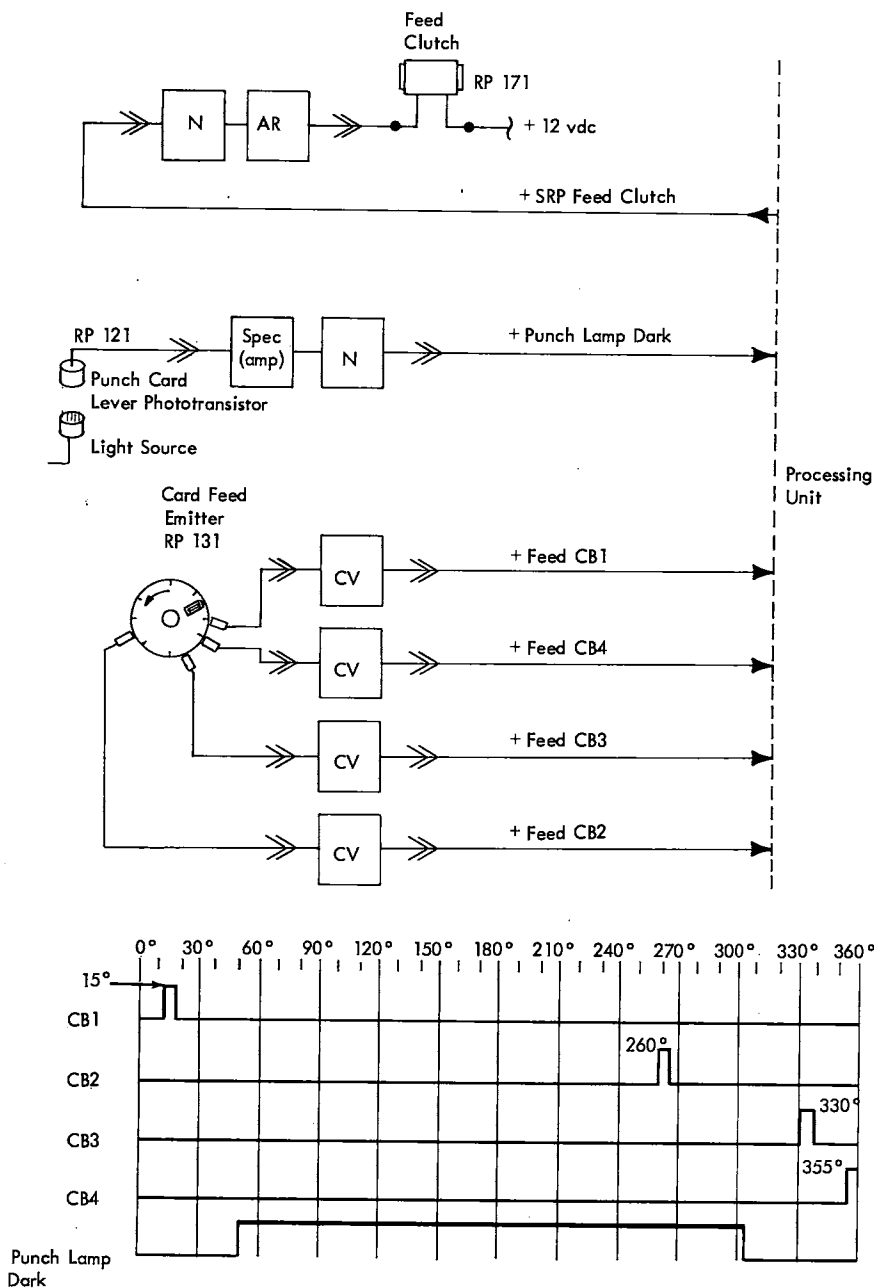


Figure 3-6. 1442 Models 6 and 7 Card Feed Signals

Circuits used to shape and amplify the phototransistor signals (Figure 3-7) are described in Appendix C.

The Model 5 punch circuits (Figure 3-8) are similar to the Model 6 and 7 punch circuits (Figure 3-9). The main difference between the two is in the circuits used to amplify the punch echo pulses. Refer to Appendix C.

The timing chart (Figure 3-10) shows the timing relationship between punch magnet pulses and their respective echo pulses.

CARD PUNCHING CIRCUITS

- Punch CB's tell the processing unit when to impulse punch magnets and when to detect punch echo pulses.
- Processing unit activates punch magnets.
- Corresponding punches punch holes in the card.
- Punch echo pulses are sent to the processing unit.

INCREMENTAL DRIVE CIRCUITS

- The incremental drive emitter tells the processing unit when to impulse the incremental drive magnets.
- The processing unit activates an incremental drive magnet, causing the card to advance one column.

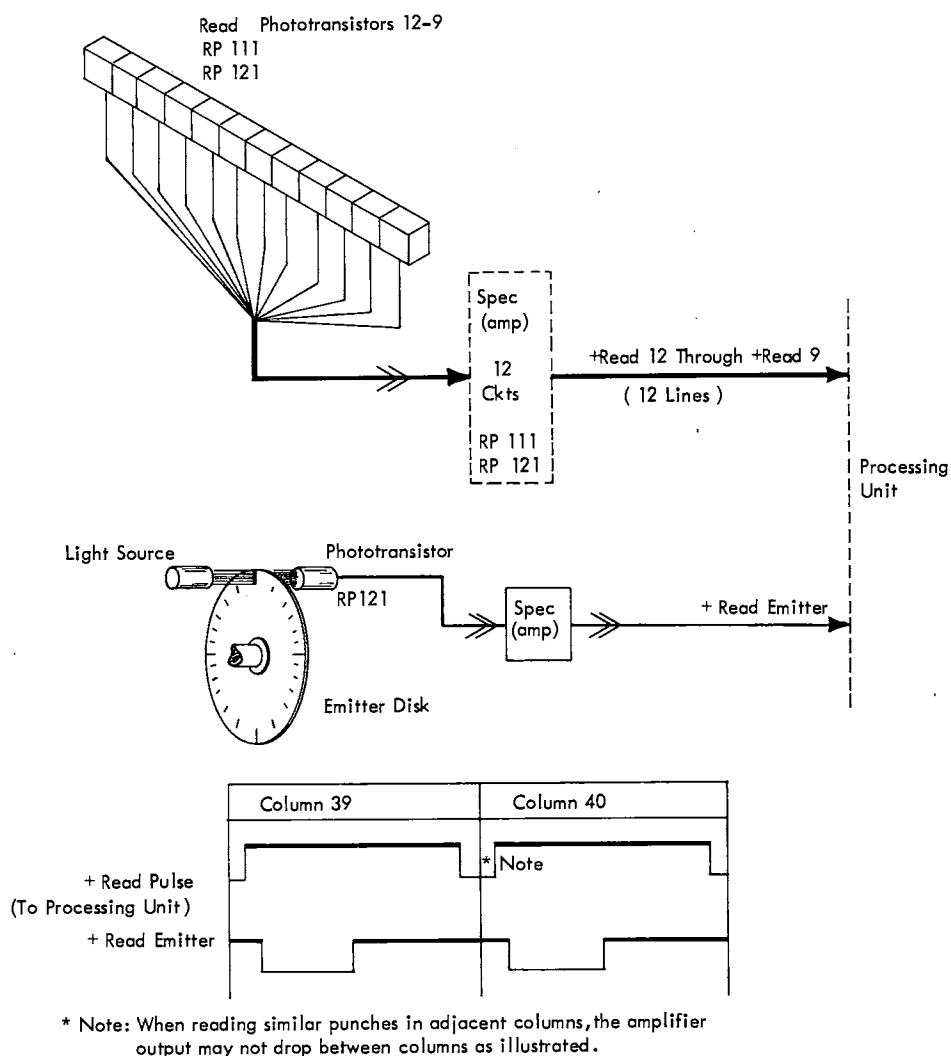


Figure 3-7. 1442 Models 6 and 7 Card Read Signals

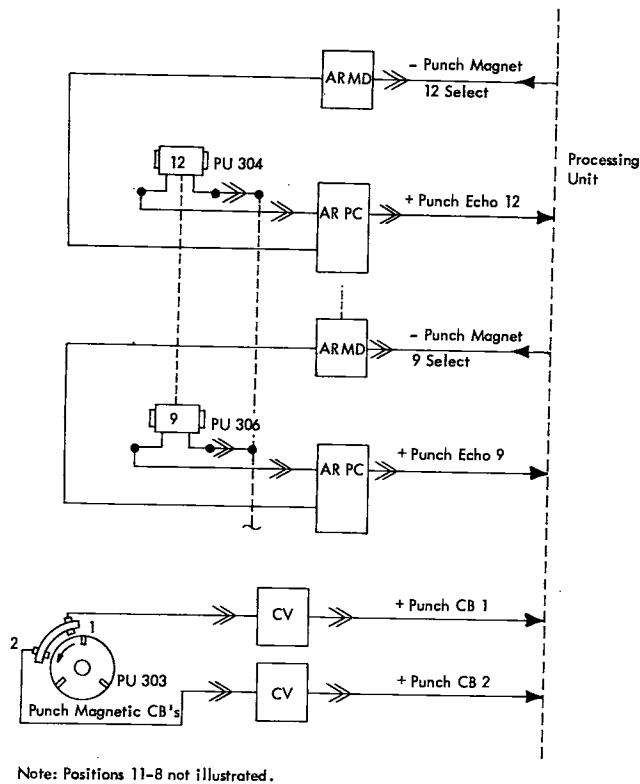


Figure 3-8. 1442 Model 5 Punching Circuits

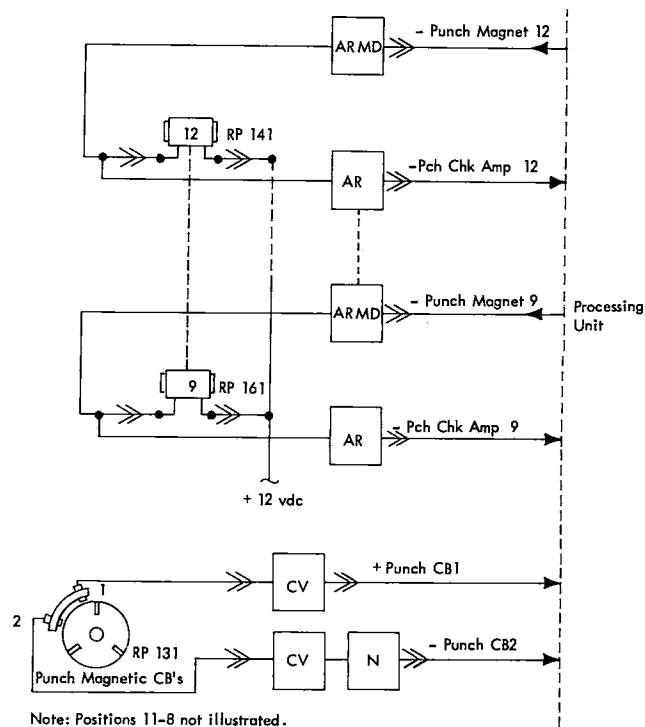


Figure 3-9. 1442 Models 6 and 7 Punching Circuits

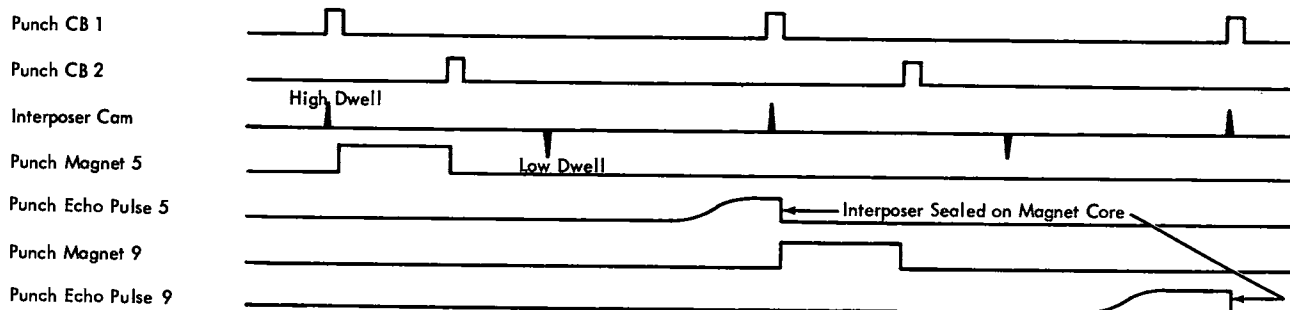
The incremental drive circuits for the Model 5 (Figure 3-11) are similar in design and function to the Models 6 and 7 circuits (Figure 3-12). The main difference is in the driver circuits. See Appendix C.

Timing charts of the incremental drive operation are provided on pages TC002 and TC003 of the 1442 logic diagrams. These charts show the timing relationship between the incremental drive impulses and the incremental drive mechanisms.

STACKER SELECT CIRCUIT, MODELS 6 AND 7

- Processing unit energizes stacker select magnet.
- Stacker select magnet directs card to the alternate stacker.

(Refer to Figure 3-13)



NOTE: This illustration shows a 5 punch in column 1, a 9 punch in column 2, and the punch echo pulses.

Figure 3-10. 1442 Punch Operation Sequence and Timing

INDICATOR LAMP CIRCUITS

- Indicator lamps are controlled by signal lines from the processing unit.

except the chip box (Models 6 and 7 only) and power-on lights, are directly controlled by signal lines from the processing unit.

A lamp test line is included in the circuits for the 1442-5. When this line is activated, the indicator drivers for all lamps are activated, giving the CE an easy method of checking for burned out lamps.

The indicator lamp circuits in the Model 5 (logic page PU311), are similar to the lamp circuits in the Models 6 and 7 (logic page RP181). All lamps,

Driver circuits that activate the indicator lamps are described in Appendix C.

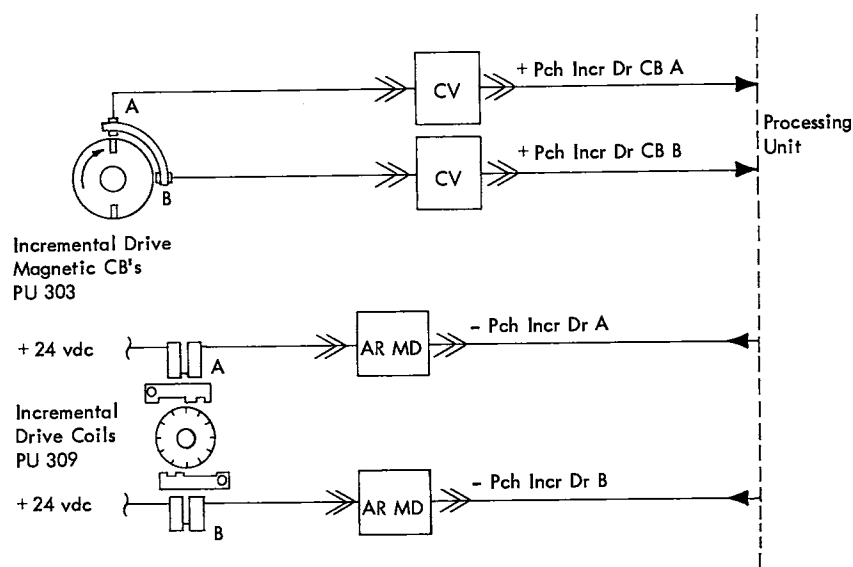


Figure 3-11. 1442 Model 5 Incremental Drive Signals

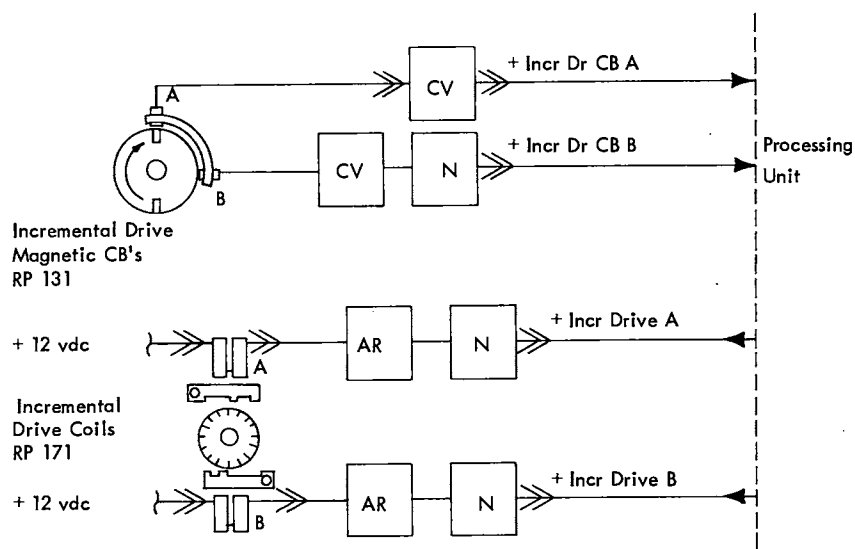


Figure 3-12. 1442 Models 6 and 7 Incremental Drive Signals

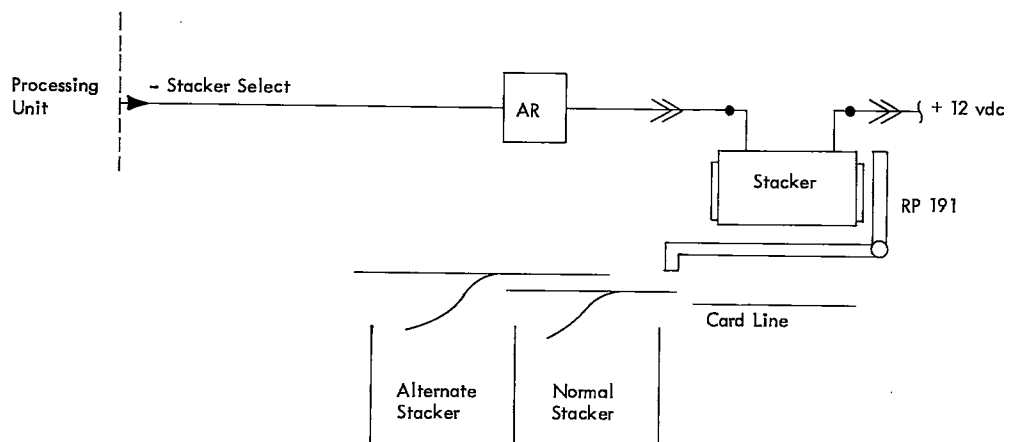


Figure 3-13. 1442 Models 6 and 7 Stacker Select Circuit

1442 MODEL 5

Power Supplied By Processing Unit

Most of the voltages needed in the 1442-5 are supplied by the processing unit through the power connector located in the 1442. Logic page PU300 shows the power distribution of the 1442-5. Voltages supplied by the processing unit are:

1. +3 vdc (for SLT circuits)
2. +6 vdc (for SLT circuits)
3. -3 vdc (for SLT circuits)
4. 208/230 vac (primary power for drive motor, power supplies, and fan)
5. 115 vac (for convenience outlet)
6. 7.25 vac (for indicator lamp circuits.)

Power Supplied By 1442

The 1442-5 has power supply and a transformer that provide power for the functional magnets, light source lamp, and use meter.

Power Supply

Wiring of the power supply is shown on logic page PU300. Two basic voltages are produced:

1. +24 vdc (terminals TB2-1, 3, 6, & 9). This voltage is also available from terminal TB2-5 but is adjustable and will vary from +24 vdc.
2. +3 vdc (TB2-11, 12) used to power the light source lamp.

Transformer T1 regulates through a ferro-resonant winding, and provides two secondary outputs for producing the 24 vdc and +3 vdc outputs. Line voltage fluctuations of $\pm 10\%$ can be absorbed by the transformer. Multiple taps on the primary permit operation with a primary voltage of 208 or 230 vac.

Diodes, connected to transformer terminals 6 and 8, function as a full-wave rectifier for the 24 vdc supply. The output of the rectifier is filtered by the three 10K MFD capacitors and the 25 ohm resistor. Further filtering on the DC lines connected to output terminals on TB 2 is provided as required.

The output at terminal TB 2-5 connects to the punch hold coil, and is adjustable by the 50 ohm potentiometer. The one-henry choke coil in the line reduces the affect of sudden load changes on the power supply.

Diodes connected to transformer terminals 9 and 11 function as a full-wave rectifier for the light source lamp power supply. The output of this rectifier is filtered by two 25K MFD capacitors.

Use Meter Transformer

The use meter transformer (logic page PU-300) supplies 41 vac to the use meter. Multiple primary taps are provided to permit use with 208 or 230 vac primary voltages.

Power Sequencing

(Refer to logic page PU300)

Power On

Power-on sequencing is controlled entirely by the processing unit. Power in the 1442-5 is brought up when the processing unit supplies the 208/230 vac primary power to the drive motor and power supply. The power-on light is activated when power is brought up in the 1442.

Power Off

Power-off sequencing is normally controlled by the processing unit. Power is dropped in the Model 5 when the processing unit removes the 208/230 vac primary power to the drive motor and power supply. The power-on light turns off when 1442 power is dropped.

Power can also be removed from the 1442 by setting the CE switch to CE MODE. This removes power from the drive motor and power supply.

1442 MODELS 6 AND 7

Power Supplied By Processing Unit

Nearly all the voltages required by the 1442-6 and 7 are supplied by the processing unit through the power connector in the processing unit. Logic page RP012 shows power distribution of the 1442-6 and 7. Voltages supplied by the processing unit are:

1. +3 vdc (for SLT circuits).
2. +6 vdc (for SLT circuits).
3. -3 vdc (for SLT circuits).
4. 115/208/230 vac (primary power for drive motor and power supply).
5. 115 vac (for convenience outlet).
6. 115 vac (for fan).
7. 7.25 vac (for indicator drivers).

Power Supplied By 1442

The Models 6 and 7 have a power supply and a transformer that provide power for the functional magnets, light source lamp, and use meter.

Power Supply

The outputs of the power supply are shown on logic page RP012. Two basic voltages are produced:

1. +12 vdc (TB2 terminals 2, 8, 9, and 10). This voltage is also available at terminal TB2-7 but is adjustable and may vary from 12 volts.
2. 4.25 vac (TB2-3, 4). This voltage is adjustable by the use of a potentiometer and a toggle switch.

A wiring diagram of the power supply is provided on logic page RP014.

Transformer VR1 regulates through a ferro-resonant winding, and provides two secondary outputs that produce the 12 vdc and 4.25 vac outputs. Line voltage fluctuations of $\pm 10\%$ can be absorbed by the transformer. Multiple taps on the primary permit operation with primary voltages of 115, 208, or 230 vac.

Diodes CR1 and CR2 function as a full-wave rectifier for the 12 vdc supply. The output of the rectifier is filtered by C2, C3, and R1. Outputs to terminals TB2-8, 9, and 10 are further filtered by C4, C5, C6, R4, R5, and R6.

The output at terminal TB2-7 connects to the punch-hold coil and is adjustable by R3. Choke coil L1 reduces the effect of sudden load changes on the power supply.

The lower secondary winding of transformer VR1 provides the 4.25 vac (maximum) for the light source lamp. This output is adjustable by potentiometer R9 and hi-lo switch SW1. A change from one setting to the other employs fewer or more turns in the transformer secondary winding, thus increasing or decreasing the voltage.

Use Meter Transformer

The use meter transformer (logic page RP 012) supplies 41 vac for operation of the use meter. Multiple primary taps permit operation with 115/208/230 vac primary voltages.

Power Sequencing

(Refer to logic page RP012)

Power On

Power-on sequencing is controlled entirely by the processing unit. Power is brought up in the Models 6 and 7 when the processing unit supplies the 115/208/230 vac primary power to the drive motor and power supply. The power-on indicator is activated when power is applied to the 1442.

Power Off

Power-off sequencing is normally controlled by the processing unit. Power is dropped in the Models 6 and 7 when the processing unit removes the 115/208/230 vac primary power to the drive motor and power supply. The power-on light goes out when power has been removed.

Power can also be removed from the 1442 by setting the CE switch to CE MODE. This removes power from the drive motor and power supply.

APPENDIX A. UNIT CHARACTERISTICS

Speed

Reading

<u>1442-5</u>	<u>1442-6</u>	<u>1442-7</u>
- - -	300 CPM	400 CPM

Punching

<u>1442-5</u>	<u>1442-6</u>	<u>1442-7</u>
160 CPS	80 CPS	160 CPS

CPM - Cards Per Minute

CPS - Columns Per Second

Capacity

Hopper - 1200 cards

Stacker - 1300 cards

Primary Power Requirements

0.46 KVA power at 115/208/230 vac is supplied from using system processing unit.

Heat Dissipation

1500 BTU/hr.

Dimensions

Height - 49"

Width - 43"

Depth - 24"

Weight

525 lbs.

APPENDIX B. UNIT OPERATION

Controls and Indicators

- Keys on the operator control panel send signals directly to the processing unit of the using system.
- Indicator lights (except chip box and power-on) on the operator control panel are directly controlled by the processing unit of the using system.

The following information explains the normal functions of the keys and indicators. The 1442, however, has logical control over only the chip box and power-on lights. The rest of the keys and indicators are controlled by the using system, and described in the manuals for that system.

Keys (Figure 5-1)

Start: Operation of this key sends a start signal to the processing unit signalling the processing unit to start the run-in cycles or restore the 1442 to a ready status after a manual stop or error. Before the start key can initiate run-in cycles, these conditions must be met:

1. Power on.
2. Card path empty.
3. Cards in hopper.
4. No error conditions.

Stop: Operation of this key sends a stop signal to the processing unit. The processing unit responds by stopping the 1442 and removing it from ready status.

Non Process Run Out (NPRO): Operation of this key sends an NPRO signal to the processing unit. The processing unit responds by running cards out of the feed if all cards have been removed from the hopper.

Indicators

Power On indicates that both AC and DC power are applied to the 1442.

Ready indicates that the 1442 is ready to process cards. Before the processing unit activates this light, these conditions must be met:

1. Power on.
2. Cards in hopper, read station, and punch station (except immediately after initial run-in cycles).
3. Stacker not full.
4. No error conditions.

Chip Box (1442 mods 6 & 7 only) indicates that the chip box is either full or improperly positioned.

Attention (Model 5 only) indicates that one or both of the following conditions exists:

- Stacker full.
- Chip box full or improperly positioned.

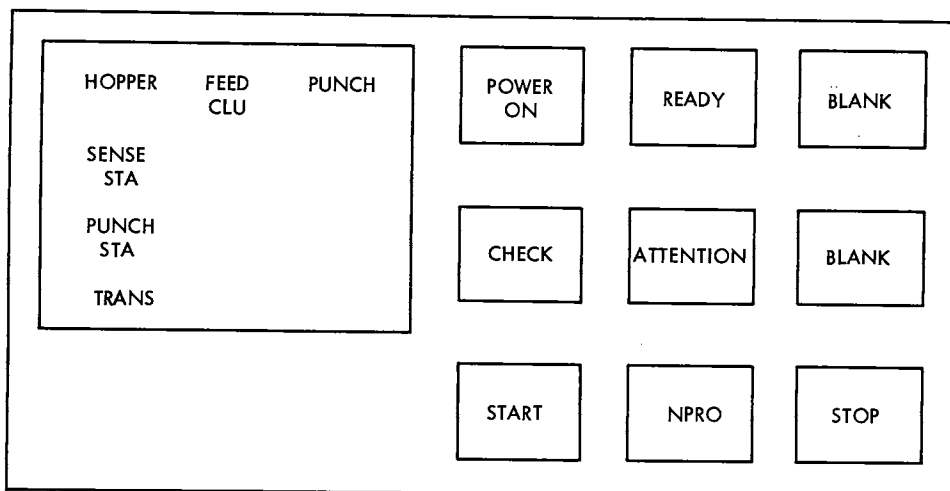
Check is turned on by the processing unit to indicate an error condition. To further define the error, one or more of the back-lighted panel indicators also turns on.

Back-Lighted Panel Indicators

Hopper (or Hopr) is turned on by the processing unit to indicate that a card did not feed from the hopper during a card feed cycle.

Read Sta (or Sense Sta) is turned on by the processing unit to indicate a card jam, or faulty operation of the read station.

Punch Sta is turned on by the processing unit to indicate a card jam at the punch station.



1442 Model 5 Operator Panel

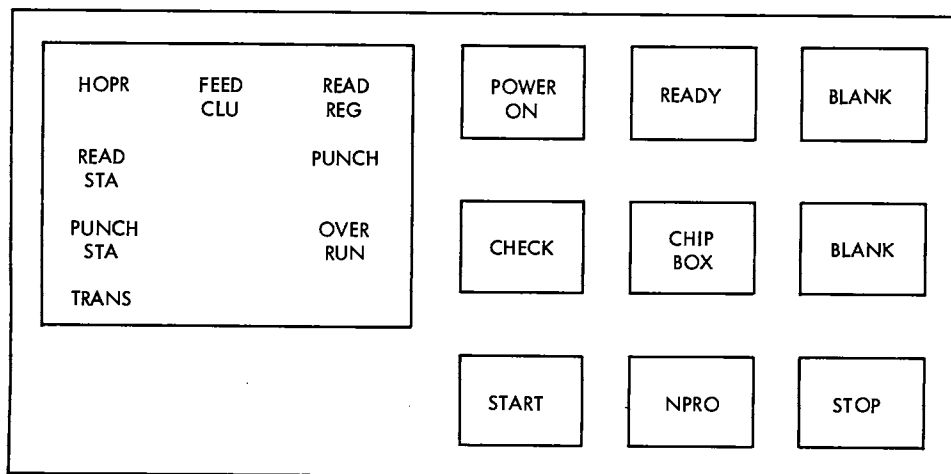


Figure 5-1. Operator Panels

Trans is turned on by the processing unit to indicate a card jam in the stacker transport area.

Feed Clu is turned on by processing unit to indicate that the card feed clutch made an unrequested cycle.

Read Reg (Models 6 and 7 only) is turned on by the processing unit to indicate that data read from a card column during the first sample time was not equal to the data read at the second sample time.

Punch is turned on by the processing unit to indicate that the punch-echo pulses were not equal to the data that was to be punched.

Overrun (Models 6 and 7 only) is turned on by processing unit to indicate a data-handling error.

APPENDIX C. SPECIAL CIRCUITS

This appendix is not intended to give sufficient information for repairing SLT cards or for understanding the electronic theory of the modules. Additional information can be obtained from these publications: SLT Packaging, Tools, and Wiring Change, Form Z22-2800; and SLT Component Circuits, Form Z22-2798.

SPEC 5804715

This circuit functions as a phototransistor amplifier in the 1442. Each SLT card provides eight amplifiers. The amplifiers can operate in either the 30 or the 700 nanosecond family, depending on the voltages applied. In the 1442-5, 6, and 7, the amplifiers operate in the 30 nanosecond family.

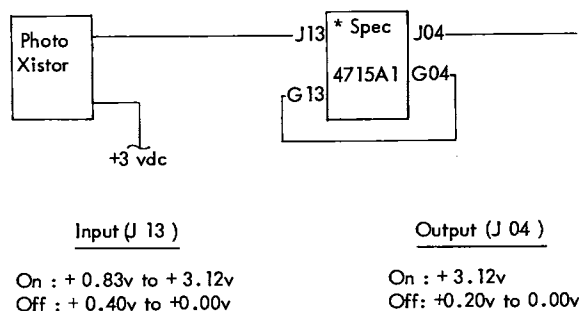


Figure 5-2. Typical SPEC Circuit Application

A typical circuit application diagram (Figure 5-2) illustrates the use of 30 nanosecond circuit. In this example, J13 is the input pin; J04 the output pin. The jumper between pins G04 and G13 connects the required collector voltage to the amplifier transistors.

CV 5803498

This circuit functions as a shaper and amplifier for magnetic emitter signals. Each SLT card provides four circuits.

A typical circuit application (Figure 5-3) shows the use of this circuit.

AR PC 5804294

This circuit is used in the 1442-5 as an amplifier for the punch-echo pulses. When a released punch interposer is returned to the punch magnet, a small voltage is induced in the magnet coil. The AR PC detects and amplifies this voltage. Six amplifier circuits are provided per SLT card.

A typical circuit application diagram (Figure 5-4) illustrates the operation of this circuit. When the -punch magnet line is activated, the AR MD circuit output goes to ground potential, applying 24 volts across the punch magnet and the 47 ohm resistor in the AR PC. When the -punch magnet line is de-activated, the AR MD circuit opens the path to ground. At this time, about +24 volts is reflected at pins B09, D09, and J13. This voltage is not sufficient to activate the AR PC. When the punch interposer armature is restored to the punch magnet, a small voltage is induced, which adds to the +24 v and activates the AR PC.

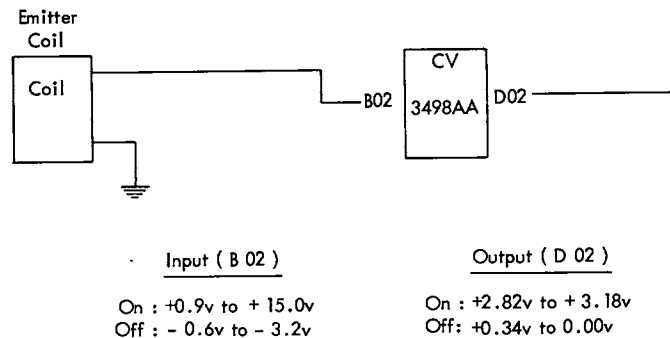


Figure 5-3. Typical CV Circuit Application

AR MD 5804662

This circuit functions as a 0.5 amp driver circuit for the 1442-5 punch magnets. Eight driver circuits are provided per SLT card.

The typical circuit application diagram used to describe the AR PC circuit (Figure 5-4) also illustrates the operation of this circuit.

AR MD 5804297

This circuit functions as a 2.5 amp driver circuit for the 1442. One driver is provided per SLT card.

A typical circuit application diagram (Figure 5-5) illustrates the use of this circuit.

OR ID

The OR ID circuit is a silicon-controlled rectifier (SCR) module that provides power to incandescent indicator lamps in the 1442. These modules (Figure 5-6) are individually packaged and are normally mounted near the indicator lamps they control.

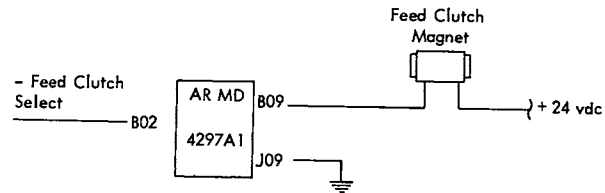
When the SCR conducts, 7.25 vac is applied across the lamp. Two conditions must be satisfied before the SCR goes into conduction:

1. The polarity of the AC voltage must be such

that pin G is minus and the lead to the indicator lamp is plus.

2. A positive control voltage of +0.8 vdc must be applied to pin S through an externally provided 6.2K resistor.

The SCR then stays in conduction until the polarity of the AC voltage reverses. If the voltage to pin S remains positive, the SCR will go back into conduction when the AC voltage reverses again. The negative-going signal at pin S is not enough to immediately extinguish the SCR. The SCR conducts until the AC voltage at the lamp goes negative.



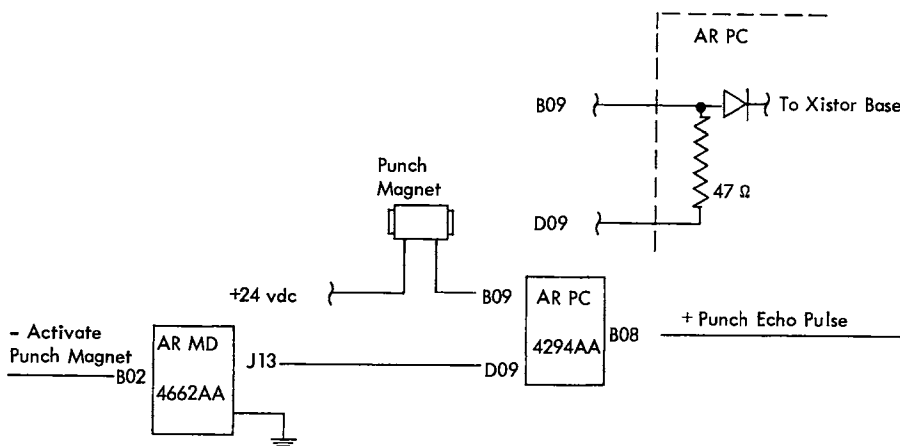
Input (B 02)

On : + 0.4v
Off : 0.0v

Output (B 09)

On : 0.0v
Off : + 24v

Figure 5-5. Typical 2.5 Amp AR MD Circuit Application



AR PC Input (D09 / B09)

Input occurs when AR MD circuit turns off. Punch magnet then produces back EMF of 1.61v minimum to turn circuit on.

AR PC Output (B08)

On : + 3.32v to +4.08v
Off : 0.0v to - 3.18v

AR MD Input (B 02)

On : + 0.4v to 0.0v
Off : Open (app +3 vdc reflected)

AR MD Output (J13)

On : + 1.2v to 0.0v
Off : Open (app +24 vdc reflected in above application)

Figure 5-4. Typical AR PC and AR MD Circuit Application

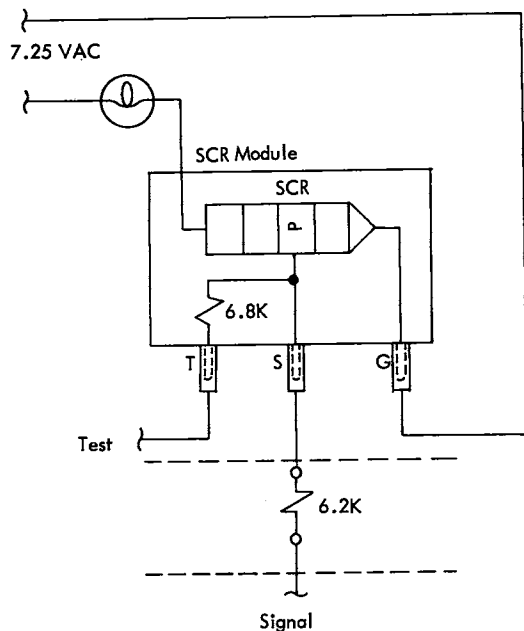


Figure 5-6. OR-ID Circuit

Terminal T is the lamp test terminal. It is normally maintained at ground potential. If a positive voltage is applied to this terminal, the SCR will conduct.

AR MD 5803805

This card provides punch magnet drivers and punch echo pulse amplifiers for the 1442- 6 & 7. Two drivers and two amplifiers are packaged on each SLT card.

A typical circuit application diagram (Figure 5-7) illustrates the operation of these circuits. When the - signal is applied to the T15SL module, the output goes almost to ground potential, applying 12 vdc across the punch magnet. When the - signal is de-activated, the output of the T15SL module is disconnected from ground and reflects the 12 volts through the punch magnet. This 12 volts is applied to pin D05 of the S07SY module, but is not sufficient to activate it.

When the released punch interposer armature is restored to the punch magnet, a small voltage is induced in the magnet coil. This voltage adds to the +12 vdc already applied, and activates the amplifier module.

AR 5803806

This circuit functions as a 1.5 amp driver in the 1442-6 & 7. One driver is provided per card.

A typical circuit application diagram (Figure 5-8) illustrates the operation of this circuit.

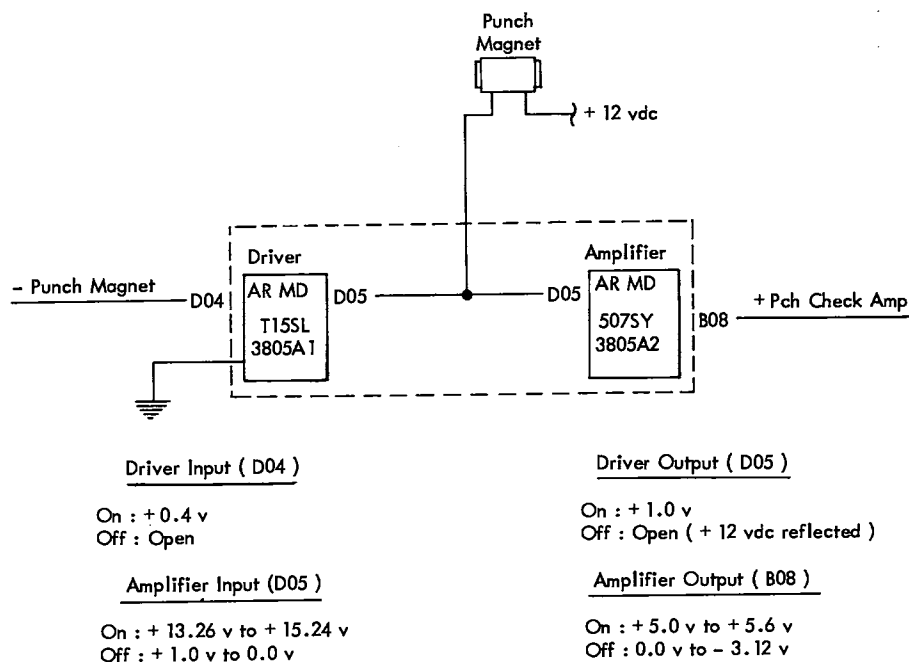


Figure 5-7. AR MD Punch Circuit

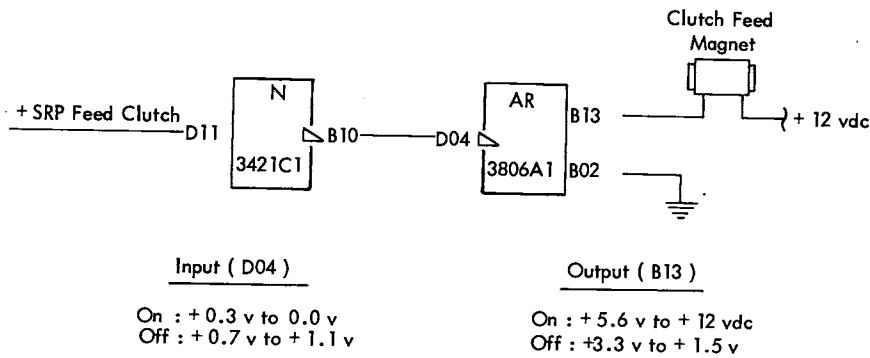


Figure 5-8. Typical 1.5 Amp AR Circuit Application

AR 5803819

This circuit functions as a 300 ma driver in the Models 6 and 7. Each card contains eight drivers.

A typical circuit diagram (Figure 5-9) illustrates the operation of this circuit.

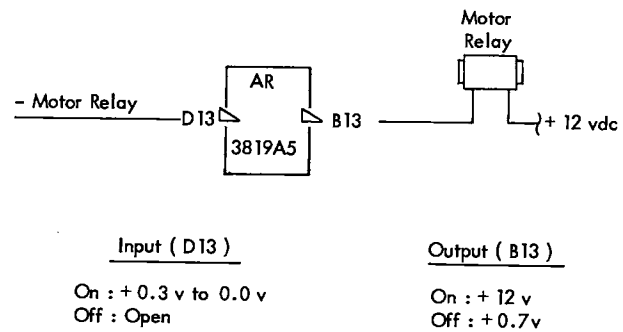


Figure 5-9. Typical 300 Ma AR Circuit Application

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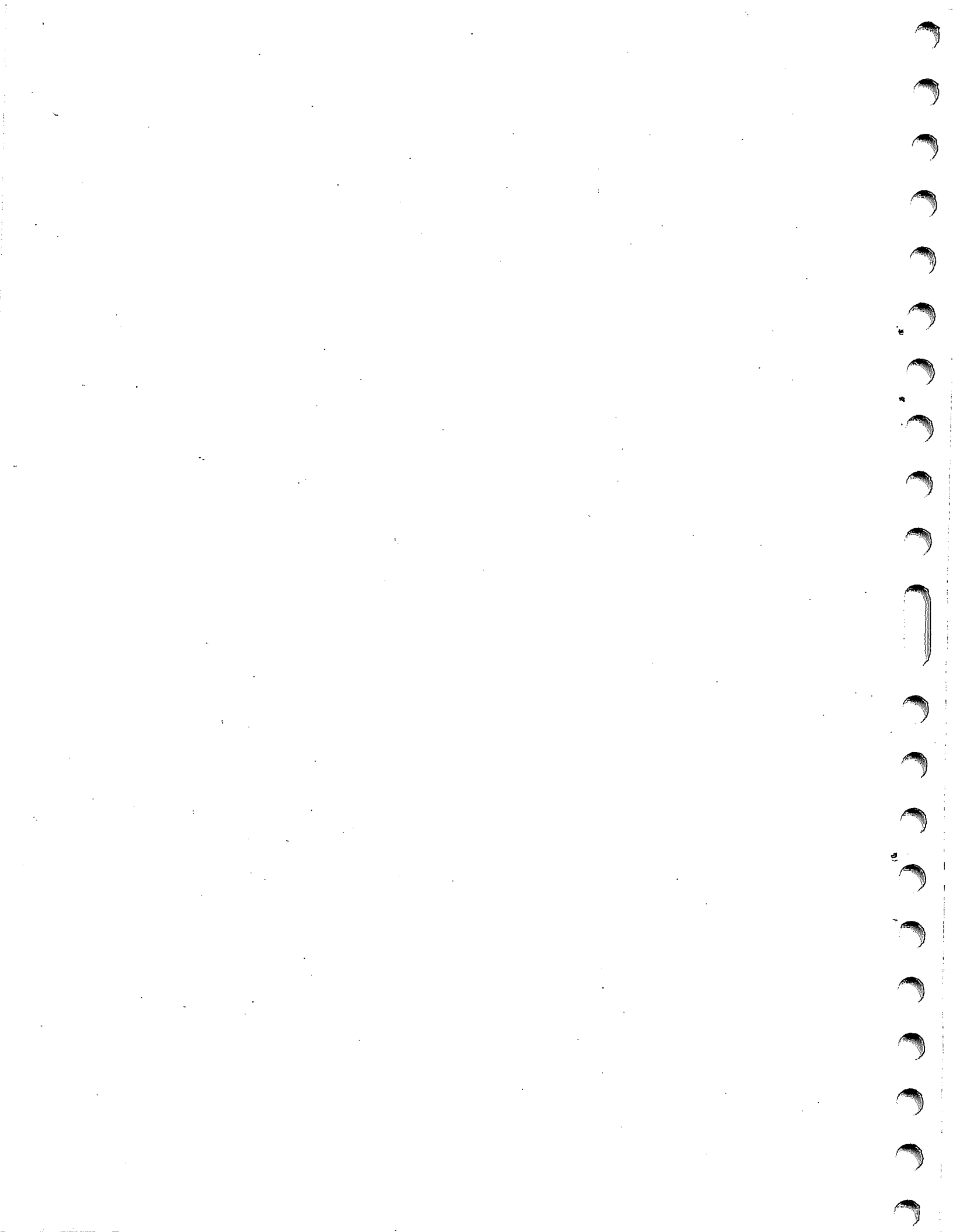
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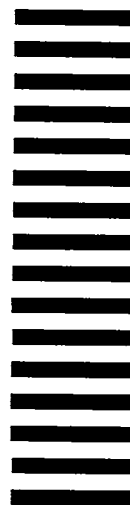
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