IBM Systems Reference Library

IBM 1402 Card Read-Punch

Presents the operating features of the IBM 1402 Card Read-Punch. Covers the keys, lights, and switches on Models 1, 2, and 3. Also contains information on the various special features that can be attached to the 1402.
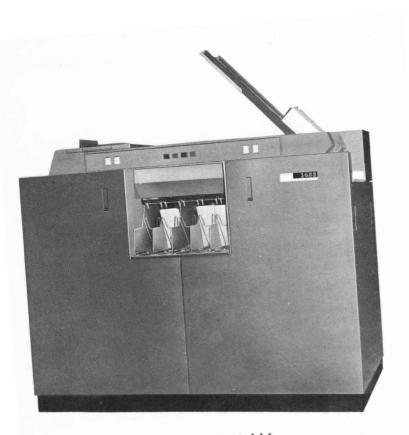
Contents

Figure 1. IBM 1402 Card Read-Punch, Model 1

The IBM 1402 Card Read-Punch (Figure 1) provides the system it is attached to with simultaneous punched-card input and output. There are three models of the 1402. Model 1 is used on an IBM 1401 Data Processing System. Model 2 is used on the IBM 1410, 7010, 7040, and 7044 Data Processing Systems. Model 3 is used on an IBM 1460 Data Processing System.

Each model of the 1402 has a read feed, a punch feed, and stackers that serve both feeds.

Features

Read Feed

The read feed has a rated reading speed of 800 cards per minute. Actual card speed is governed by the processing performed for each card. The read feed is equipped with a device for large-capacity loading, called a file feed. The file feed has a capacity of approximately 3,000 cards. Cards may be placed in either the file feed or the card hopper. The card weight should be placed on top of the cards. To place cards in the card hopper, the joggler gate must be opened (lowered). At all other times, this gate must be closed to permit card feeding or runout.

The cards pass through the read side of the machine 9-edge first, face down. The feed path is from right to left (Figure 2).

The card moves from the read hopper to the read check station during the first card-read cycle. During the second card-read cycle, the card passes through the read check station and moves up to the read station. (The read check station reads all 80 columns of the card to establish a hole count for checking purposes.) The card passes through the read station during the

third card-read cycle. (The read station also reads all 80 columns of the card, proves the hole count, and directs the data into core storage.) The card does not stop after it passes through the read station, but it is moved by a continuously-running mechanism into a select stacker area. From this point, the card is selected into one of the three available stackers.

Punch Feed

The punch feed has a rated speed of 250 cards per minute. The card hopper capacity is 1,200 cards. Cards feed 12-edge first, face down. The feed path is from left to right (Figure 2).

The card moves from the punch hopper to a blank station during the first card-punch cycle. (This blank station contains the punch-feed read brushes in a 1402 equipped with the punch feed read special feature.) During the second card-punch cycle, the card passes through the blank station and moves up to the punching mechanism. The card is punched during the third card-punch cycle, and moves up to the punch check station. (A hole count is also established during this cycle for checking purposes.) During the fourth card-punch cycle, the card passes through the punch check station and the hole count is proved. During this cycle, the card also moves into the select stacker area and is selected into one of the two available stackers.

Stackers

The IBM 1402 Card Read-Punch is equipped with five radial type stackers (Figure 3), with a capacity of 1,000 cards each. Cards may be removed from the stackers without stopping card feeding. If a stacker becomes full, operation stops and the stacker light turns ON.
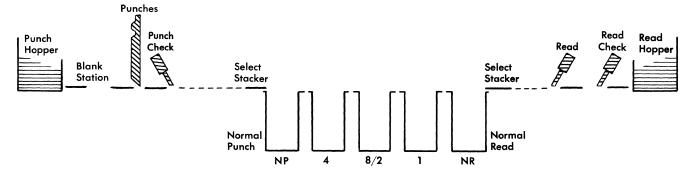

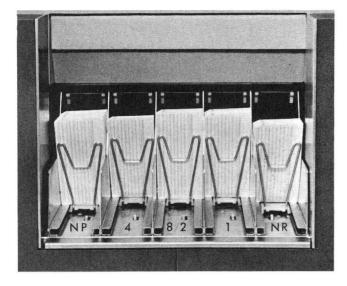Figure 2. IBM 1402 Card Feed Schematic

Figure 3. Radial Stackers

Cards from each feed can be program-directed to three of the five pockets. The cards from the read side go to the NR (normal read) pocket unless program-directed to pocket 1 or pocket 8/2. The cards from the punch side go to the NP (normal punch) pocket unless program-directed to pocket 4 or pocket 8/2. Thus, the center pocket (8/2) can receive cards from either feed.

Models 1 and 3 Operating Keys, Lights, and Switches

The operating keys, lights, and switches on the Model 1 are identical to the keys, lights, and switches on the Model 3.

Card Read-Punch Keys and Lights

Some of the keys and lights on the 1402, Models 1 and 3, refer to the entire 1402 rather than only the reader or punch portion of the unit. These keys and lights (Figure 4) are:

START

This key is used to initiate machine operation after a manual, programmed, or automatic stop. This start key can be used interchangeably with the start keys on the processing unit and the IBM 1403 Printer.

STOP

This key is used to stop the system. If a program step is in process, it is completed before operation stops. This stop key can be used interchangeably with the stop keys on the processing unit and the IBM 1403 Printer.

CHECK RESET

This key must be pressed to reset any punch or read error indication (PUNCH/READ CHECK, PUNCH/READ STOP, TRANSPORT, VALIDITY), so that the start key can become effective to resume operation.

This key is effective only when the feed unit in error is cleared of cards.

POWER

When power is supplied to the card read-punch, the power light is ON.

FUSE

When a fuse in the card read-punch burns out, this light turns ON. The IBM customer engineer should replace the fuse.

TRANSPORT

This light turns ON to indicate a card jam in the transport area. After the card jam is cleared, this light can be turned OFF by pressing the 1402 check reset key. Any cards beyond the read brushes in the read feed or the punch check brushes in the punch feed have been processed, or punched and checked.

STACKER

If any of the five stackers becomes full, operation stops and this light signals the operator. When enough cards are removed to allow the stacker guide to return beyond the stacker trip device, this light turns OFF and operation can be resumed by pressing the start key.
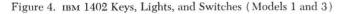
Reader Keys, Lights, and Switch

The card reader keys, lights, and switch (Figure 4) are:

LOAD

This key is used to start loading program instruction cards. Pressing the load key operates the read feed until a card has passed the read station. The I-address register is set to 001, and a word mark is set in address 001.

Figure 4. IBM 1402 Keys, Lights, and Switches (Models 1 and 3)

All other word marks in addresses 002 through 080 are removed.

When the card is read at the read station, the program starts and executes the instruction that is punched in the first columns of the card. Continued operation is completely under control of the program cards, and then the stored program, and does not require intervention by the operator.

When the punch switch is ON, pressing the load key also starts the punch.

NON-PROCESS RUN-OUT

This key is used to clear cards from the read feed. The key is operative only when the read hopper and file feed are empty and the joggler gate is closed. The last two cards that enter the normal read stacker have not been processed.

This key should also be pressed whenever power is turned on.

READER STOP

This light turns ON if any one of these conditions occurs:
● card-feed failure
● card jam
● clutch failure
● the reader non-process runout key is pressed during systems operation.

It can be turned OFF by pressing the 1402 check reset key.

When operation stops due to either a card feed failure or a card jam and *only* this light is ON, cards in the stacker and in the read feed beyond the read brushes have been processed. If the reader stop light is on and a card feed failure or card jam has *not* occurred, a stacker failure has probably occurred and the last card in the stacker has not been processed. If other lights are ON with this light, the cards probably have not been processed and should be re-fed.

READER CHECK

This light turns ON if:
● a hole-count error is detected during card reading.
● read release time is over-extended. This is a programming problem. After a program using the read-punch release special feature has been completely checked out, this condition should not occur.

This light can be turned OFF by pressing the 1402 check reset key after a non-process run-out operation is performed.

When operation stops and this light is ON, the last card in the stacker has not been processed, and must be re-fed after the error is corrected.

VALIDITY

If an invalid character is detected during a read operation, this light turns ON, and operation stops at the end of the read operation. The light can be turned OFF by pressing the 1402 check reset key. If the invalid punching in the card also causes a parity error, the process and storage lights on the console turn ON.

When operation stops and *only* this light is ON, the last card in the stacker has not been processed, and must be re-fed after the error is corrected.

If the I/O CHECK STOP switch on the console is OFF and a validity error is detected during a read operation, this validity light turns ON but operation does not stop. Validity errors are ignored.

READER ON/OFF

This switch controls the read unit of the machine. When it is OFF, the read feed is inoperative.

Punch Key, Lights, and Switch

The punch unit key, light, and switch (Figure 4) are:

NON-PROCESS RUN-OUT

This key is used to clear the punch feed. The last two cards in the normal punch stacker have not been punched, and the third-from-last card has not been checked.

This key should also be pressed whenever power is turned on.

PUNCH STOP

This light turns ON if any one of these conditions occurs:
● card-feed failure
● card jam
● clutch failure (see note)
● the punch non-process run-out key is pressed during systems operation.

It can be turned OFF by pressing the 1402 check reset key.

When operation stops and *only* this light is ON, cards in the stacker or in the punch feed beyond the punch check brushes have been punched and checked. A card between the punch and punch check stations has not been punched, or it may be incorrectly punched. When the operation is restarted after the error condition has been corrected, this card is automatically punched and checked. If other lights are on with this light, the condition of the cards varies.

Note: If a card feed failure or card jam does not occur and *only* this light js on, the last card in the stacker should be checked to see if it has been processed.

PUNCH CHECK

This light turns ON if:
- a hole-count error is detected in the punch feed.
- the B-register detects a parity error during a punching operation.
- the A-register detects a parity error during a punching operation.
- punch release time is overextended. This is a programming problem. After a program using the read-punch release special feature has been completely checked out, this condition should not occur.

This light can be turned OFF by pressing the 1402 check reset key after a non-process run-out operation is performed.

CHIPS

When the chip box is full or not properly positioned, this light turns ON and the machine interlocks. The light turns OFF when the empty chip box is replaced (or properly positioned) in the machine. Operation can be resumed by pressing the start key.

PUNCH ON/OFF

This switch controls the *punch* unit of the machine. When it is OFF, the punch is inoperative. When it is ON, the machine operates if all the interlock circuits in the punch are satisfied.

Model 2 Operating Keys and Lights

Card Read-Punch Lights

Several lights on the IBM 1402 Card Read-Punch, Model 2, refer to the entire 1402 rather than only to the reader or punch. These lights (Figure 5) are:

STACKER

Shows that one or more pockets are full. Both the reader and the punch units stop.

FUSE

Shows that a fuse has blown in the reader or punch unit.

POWER

Shows that power is being supplied to the 1402.

TRANSPORT

Shows that a card jam has occurred in the stacker area. Card feeding is stopped in the rest of the 1402 until the jam is removed.

Reader Keys and Lights

Card reader keys and lights (Figure 5) are:

READER START

Operating this key feeds three cards into the read feed, fills the reader buffer with the contents of the first card, and turns on the reader-ready light. When the reader has been stopped, pressing the start key turns on the reader-ready light, and allows the cards to continue feeding under program control. When the cards are removed from the read feed hopper and the end-of-file key is not operated, pressing the start key moves the remaining two or three cards, unprocessed, to the stacker area.

READER STOP

Operating this key stops the reader and turns off the reader-ready light.

END-OF-FILE

Operating this key activates circuits that signal a last-card condition in the processing unit. The last-card condition can be used by the program to initiate an end-of-file routine. The end-of-file latch is turned on following the data transfer of the last card. The next card-read instruction is interpreted as a NO-OP.

The end-of-file key, which can be pressed at any time, causes the card reader to operate in one of these ways:
1. With four or more cards in the read hopper, all cards are processed and run into a stacker. Operating the stop key or processing the last card causes the end-of-file condition to be reset.
2. With three cards remaining in the feed, a card-read or card-feed instruction before operation of the end-of-file key causes the program to set the not-ready I/O channel status indicator. Pressing the end-of-file key, and then the start key, allows the last three cards to be processed and run into a stacker. Operating the stop key or processing the last card causes the end-of-file condition to be reset.

		PUNCH READY	CHIPS		STACKER	POWER		VALIDITY	READER READY				
PUNCH START	PUNCH STOP	PUNCH CHECK							READER CHECK	END OF FILE	READER STOP	READER START	
		PUNCH STOP			FUSE	TRANSPORT			READER STOP				

Figure 5. IBM 1402 Keys and Lights (Model 2)

3. With one, two, or three cards to be processed in the read hopper, pressing the end-of-file key and then the start key feeds the card or cards and turns on the reader-ready light after the first card passes the second read station. The card or cards are processed and run into a stacker. Operating the stop key or processing the last card causes the end-of-file condition to be reset.

READER READY LIGHT

Shows that the reader is under program control.

VALIDITY LIGHT

Shows that an invalid character has been detected during a feed operation. The light remains on until the next feed instruction is started. During the read instruction, the invalid character is transferred from buffer to storage.

READER STOP LIGHT

Shows a feed failure or card jam during a feed operation. This error stops the reader and turns off the reader-ready light.

READER CHECK LIGHT

Shows the detection of a hole-count error, parity error, or buffer-timing error during a feed operation. The light remains on until the next feed instruction is started. During the read instruction the data are transferred from buffer to storage, and the processing unit sets the data check I/O channel status indicator on and the program can test it.

Punch Keys and Lights

Card punch keys and lights (Figure 5) are:

PUNCH START

Operating this key feeds two cards into the punch feed and turns on the punch-ready light. When the punch has been stopped, pressing the start key turns on the punch-ready light, and allows card punching to resume under program control. When the cards have been removed from the punch feed hopper, pressing the start key moves the three cards remaining in the punch feed to the normal-punch pocket. The first card that enters the normal-punch pocket is unchecked.

PUNCH STOP

Operating this key stops the punch and turns off the punch-ready light.

PUNCH READY LIGHT

Shows that the punch is under program control.

PUNCH STOP LIGHT

Indicates a feed failure or card jam during a punch operation. This error stops the punch and turns off the punch-ready light.

PUNCH CHECK LIGHT

Shows the detection of a hole-count error, parity error, or buffer timing error during a punch operation.

CHIPS

This light shows that the chip receptacle is full or not in place.

Special Features

51-Column Interchangeable Read Feed

The 51-column interchangeable read feed (including file feed) permits the feeding of either 51-column cards or standard 80-column cards in the read feed of the IBM 1402 Card Read-Punch.

The 51-column card is commonly used for charge sales slips, postal money-order forms, installment payments, inventory cards, and many other applications.

Using an interchangeable feed allows direct entry to the data processing system from the stub card. This eliminates the need for reproducing 51-column cards into standard 80-column cards.

To adapt the read feed for 51-column-card operation, the operator installs a tray and hopper side plates on the read file feed, and adjusts the stackers on the read side.

Normal operations of the IBM 1402 Card Read-Punch can be performed with 51-column cards in the read feed. For example, a file of 51-column cards can be processed in the read feed while the results are punched in 80-column cards in the punch feed. However, when the stackers are adjusted to accept 51-column cards, no cards from the read feed can be *selected* into stacker 8/2.

Machine Features

Modifying the read file feed and stackers readily adapts the IBM 1402 Card Read-Punch for processing 51-column cards.
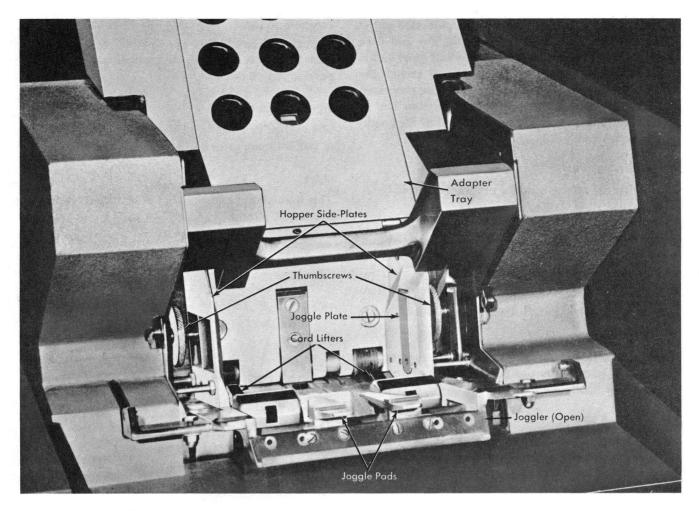
Figure 6. 51-Column Interchangeable Read Feed

MODIFYING THE FILE FEED

An *adapter tray* (Figure 6), placed on the file-feed magazine, accommodates the 51-column cards. A modified card weight enables feeding the last cards from the hopper. Inserting two *hopper side plates* (Figure 6) positions the 51-column cards at the center of the feed. Thumbscrews fasten the side plates to the hopper. Jogglers align the cards in the hoppers, as in standard operation.

In 51-column-card operation, the first column of the card corresponds to column 15 of an 80-column card, and is therefore read by brush 15; the last column corresponds to column 65 and is read by brush 65. A factor of 14 relates the card column to the reading brush. A switch for regulating the storing of information from a 51-column card is physically located in the 1402. It is automatically turned on when the stacker guide is pulled forward for stacking of 51-column cards.

When the switch is ON, the information from a 51-column card is read into the read-in area of storage beginning in positon 015 and extending to position 065. Positions 001-013 and 066-080 are not altered during a 51-column operation. Position 014 is used for cycle timing.

This switch provides for the proper loading of instructions from 51-column cards when the load key is used. With the switch ON, pressing the load key causes a word mark to be set in storage positions 015 and automatically clears position 016 to 065 of word marks and places 015 in the I-address register. It should be noted that a factor of 14 must be added to the read-in area addresses.

Notes:
1. Left-scored, 51-column cards must not contain punches in the columns that are equivalent to columns 28 and 29 of an 80-column card. Columns 28 and 29 make up the edge of a left-scored, 51-column card, and card misfeeding may occur if these columns are punched. The first punch in a 51-column card should be in the column equivalent to column 30 of an 80-column card.
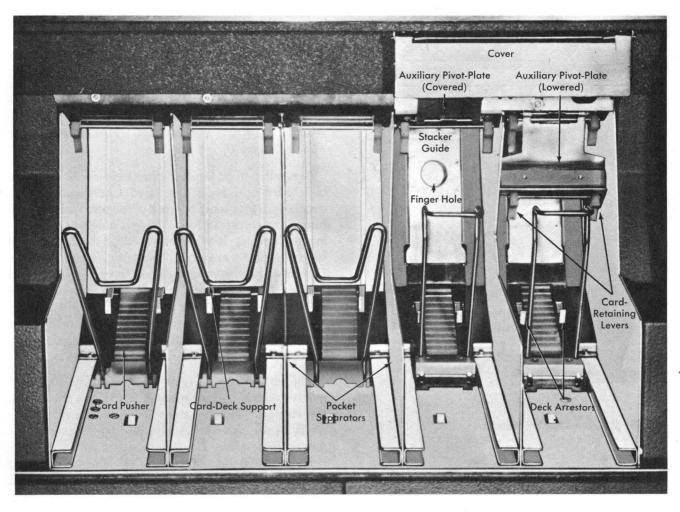2. When changing from 51-column to 80-column operation, a few blank 80-column cards should be run

Figure 7. 51-Column Adjustable Stackers

through the read feed to ensure that the card transport is clear.

ADJUSTING THE SECONDARY STACKERS

The operator adjusts the stacker guide (Figures 7 and 8) at the rear of stackers NR and 1 to accommodate 51-column cards. A finger hole permits pulling the guide forward to reduce the depth of the stacker. A spring latch holds the guide securely in either the 51- or 80-column card position.

A *pivot-plate* assembly (Figures 7 and 8) adapts the front of stackers NR and 1 for stacking either 51- or 80-column cards. The 51-column pivot plate with card-retaining levers swings down and fastens to the stacker separators. This assembly provides a lower pivot for properly stacking the 51-column cards.

For standard 80-column operation, the operator pulls each auxiliary pivot-plate assembly forward and then places it under the cover.

Modified *card-deck supports* (Figures 7 and 8) for stackers NR and 1 permit stacking 51-column cards, standard cards, and the scored cards processed by the

machine. The capacity of each of these stackers is 800 cards.

SETUP OPERATION

To set up the IBM 1402 Card Read-Punch to feed 51-column cards in the read feed:

1. Position the side plates in the hopper, and fasten firmly by turning the knurled thumbscrews. Be careful not to interfere with the card lifters.
2. Place the 51-column-card tray over the file-feed magazine.
3. Reach into stackers NR and 1 and, using the finger hole, pull the guide forward until it latches.
4. Raise the cover over the auxiliary pivot-plate assemblies, lower one assembly partially, and then slide the main pivot-plate to the rear until it latches.
5. Swing the auxiliary pivot-plate assembly down until it latches to the stacker separators. (Repeat steps 4 and 5 for the other pivot-plate assembly.)

Reverse this procedure to return to standard card-feeding. *Note:* Handle and store the adapter tray and hopper side plates carefully to avoid damaging them.
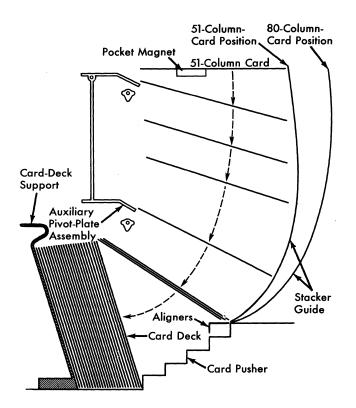
Figure 8. 51-Column Stacker Schematic

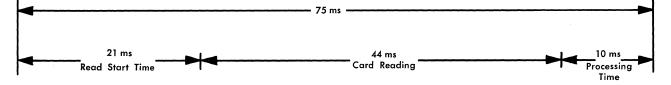## Early Card Read (Model 1 only; Standard on Model 3)

The early card read feature for the IBM 1402 Card Read-Punch minimizes the decrease in card-reading speed caused by lengthy processsing routines. In such routines, the card-reading mechanism can engage sooner, thus reducing the time between the reading of cards.

The card reader operates at a rated speed of 800 cycles per minute (one cycle every 75 milliseconds). The card reading speed depends on the timing of the READ CARD instructions in the program. To effect continuous card-reading at the rate of 800 cards per minute, a READ CARD instruction must be given within 10 milliseconds after the preceding card has been actually read into core storage (labeled *Processing Time* in Figure 9).

Normally, if processing time exceeds 10 ms in a basic card-read cycle, the rated card-reading speed decreases. This occurs because of the mechanical structure of the card-read feed. There is only one time during the read cycle when the feeding mechanism can be engaged. If a READ CARD instruction is given too late (processing time exceeds 10 ms), a card-read cycle is skipped, thus reducing the input speed from 800 to 400 cards per minute (Figure 10). Similarly, if the time required for processing exceeds 85 ms, two read cycles are skipped, and the input speed is reduced to 266 cards per minute.

The early card read feature provides two additional points (clutch points) where the feeding mechanism can engage. When processing time between cards exceeds 10 ms, the feed mechanism can engage 50 ms sooner than before. The time between card feeding is reduced to 100 ms rather than 150 ms. Instead of a 50 percent reduction in the rated speed (to 400 cpm), there is only a reduction of 25 percent (to 600 cpm) as shown in Figure 11.

Similarly, when processing time between cards exceeds 35 ms, the feed mechanism can engage 25 ms sooner than before. The time between card feeding is reduced to 125 ms rather than 150 ms. Instead of a 50 percent reduction in the rated speed (to 400 cpm), there is only a reduction of 40 percent (to 480 cpm) as shown in Figure 12.

CARD READING
800 CARDS PER MINUTE (Assume that operation code "1" was given during previous cycle)

The Read Start Time not available as Process Time
unless the "Read Release" special feature is installed.
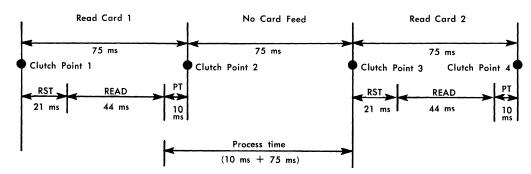
Figure 9. Card Read Cycle
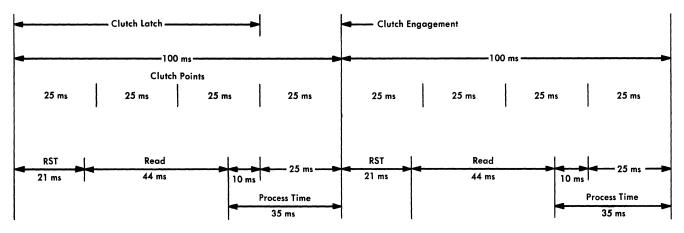
Figure 10. 400 CPM Operation
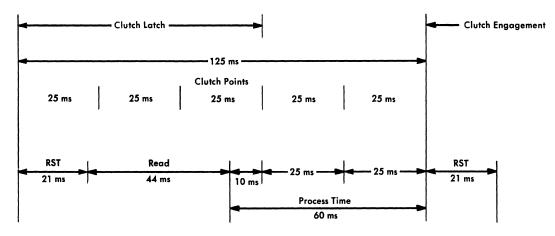

Figure 11. 600 CPM with Early Card Read

Figure 12. 480 CPM with Early Card Read

Card Feed Cycle Timing	Cards Per Minute
75 ms	800
100 ms	600
125 ms	480
150 ms	400
175 ms	342
200 ms	300
225 ms	266
250 ms	240

Figure 13. Card Feed Timings

Figure 13 is chart showing the card feed cycle times and the resultant cards per minute output.

Punch Feed Read (Models 1 and 3 only)

In some applications it is desirable to read information into the system, calculate, and punch the results in the same card from which the input data was read. By using the punch feed read feature, the card at the punch-feed-read station can be read while the card ahead of it is being punched. To permit this type of operation, a special set of 80 reading brushes, called *punch feed read,* is added to the IBM 1402 Card Read-Punch feed, one station ahead of the punch station (Figure 14). The R d-character specifies that the card is to be read from the punch side of the 1402. The normal read area (storage locations 001-080) receives the information from the punch feed read in the same manner as information is read from the read feed. A validity and a columnar hole-count check is made on each card column read from the punch-feed-read brushes. MLP card codes cannot be read by the punch-feed-read brushes.

The punching operation for machines equipped with punch feed read is the same as in the basic 1401. Stor-

age positions 101-180 are specified as the punch area, and a hole-count check is made at the punch brushes. The hole-count check of prepunched data is begun at the punch-read station and is completed at the punch-check station after punching has occurred.

Note: Punching in prepunched columns is acceptable, provided that the resultant character is valid and that the punches read at the punch-feed-read station are not repeated. For example, an X can be punched in a card column that already contains a 2, but punching a K (X and 2 punches) at the punch station if either an X or a 2 was already in the card, results in a hole-count check.

The d-character R activates the punch-feed-read brushes. It can be used with the operation codes PUNCH CARD (4), WRITE AND PUNCH (6), and START PUNCH FEED (9). If the combination instruction READ AND PUNCH (5), or WRITE READ AND PUNCH (7) is given, read and punch errors occur.

Read-Punch Feed

Instruction Format.

Mnemonic	Op Code	d-character
SPS P	4	R
A RF	—	

Function. When this instruction is used, the punch feed operates and reads the card entering the read station on the punch side. It also causes the card at the punch station to be punched. The R character modifier makes this instruction effective.

Word Marks. Word marks are not affected.

Timing. T = N $(L_I + 1)$ ms + punch start time (37 ms) and punching time of 184 ms (Figure 15). (Punch start time can be used for processing if the punch release special feature is installed.)

Note. An additional 3 ms is required in excess of the normal punch time of 181 ms when the punch feed read feature is used. Processing time available is 19 ms.
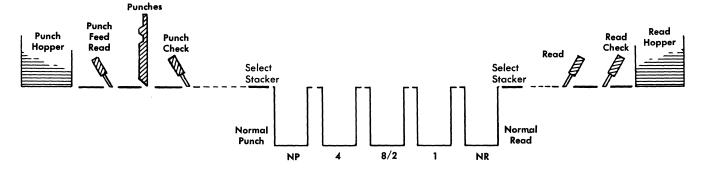

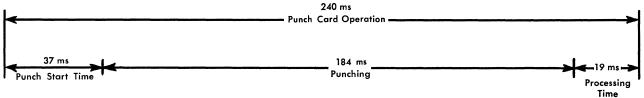
Figure 14. Punch Feed Read Schematic

Figure 15. Punch Timing (Read-Punch Feed)

Address Registers After Operation.

I-Add. Reg.	A-Add. Reg.	B-Add. Reg.
NSI	d*bb*	181

Example. Read the card at the punch feed read station and punch a card (Figure 16).

Assembled Instruction: <u>4</u>   R

Figure 16. Read-Punch Feed

Read-Punch Feed and Branch

Instruction Format.

Mnemonic	Op Code	I-address	d-character
SPS P	<u>4</u>	xxx	R
A RF			

Function. This instruction causes the same function as READ-PUNCH FEED, except that an automatic branch to the I-address is effected.

Word Marks. Word marks are not affected.

Timing. T = N (L_I + 1) ms + punch start time (37 ms) and punching time of 184 ms. (Punch start time can be used for processing if the punch release special feature is installed.)

Address Registers After Operation.

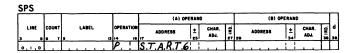| I-Add. Reg.	A-Add. Reg.	B-Add. Reg.
NSI	BI	181

Example. Read the card at the punch-feed-read station, punch a card, and branch to START6 (0598) for the next instruction (Figure 17).

Read-Punch Feed and Write

Instruction Format.

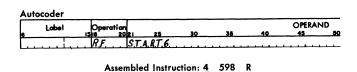| Mnemonic	Op Code	d-character
SPS WP	<u>6</u>	R
A WRF		

Assembled Instruction: <u>4</u>   598   R

Figure 17. Read-Punch Feed and Branch

Function. This instruction causes the printer to operate and print a line, and the punch unit to read a card, and also causes the card at the punch station to be punched. The d-character R specifies that the card at the punch feed station is to be read. The printer takes priority and operates first, but the signal to start the punch feed read is automatically given before the end of the print operation, so that actual card reading starts soon after the print cycle is complete.
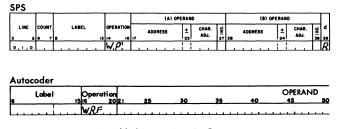
Words Marks. Word marks are not affected.

Timing. T = N (L_I + 1) ms + the timing conditions for print and punch overlap (see *Write and Punch Operation Timing Chart* — Figure 91, *System Operation Reference Manual,* Form A24-3067). The print operation normally takes 84 ms. Punch start time is 37 ms and the punch reading time is 184 ms. An additional 3 ms are added to the normal punching time of 181 ms. Normal processing time available is 19 ms.

Note. If the print storage special feature is installed in the system, the automatic signal to start the punch feed read operation is given shortly after the transfer of data to the print storage area. Thus, additional processing time can be gained by using print storage.

Address Registers After Operation.

I-Add. Reg.	A-Add. Reg.	B-Add. Reg.
NSI	d*bb*	181

Example. Write a line, read a card at the punch-feed-read station, and punch a card (Figure 18).

15

SPS

LINE	COUNT	LABEL	OPERATION	(A) OPERAND				(B) OPERAND				d
				ADDRESS	±	CHAR. ADJ.	IND.	ADDRESS	±	CHAR. ADJ.	IND.	
0 1 0			W P									R

Autocoder

Label	Operation					OPERAND	
	WRF	25	30	35	40	45	50

Assembled Instruction: **6** R

Figure 18. Read-Punch Feed and Write

Read-Punch Feed, Write and Branch

Instruction Format.

Mnemonic		Op Code	I-address	d-character
SPS	WP	6	xxx	R
A	WRF			

Function. Same as the READ-PUNCH FEED AND WRITE except that the program branches to the I-address for the next instruction.

Word Marks. Word marks are not affected.

Timing. T = N (L$_I$ + 1) ms + the timing conditions for print and punch overlap (see *Write and Punch Operation Timing Chart* — Figure 91, *System Operation Reference Manual,* Form A24-3067). The print oper-

ation normally takes 84 ms. Punch start time is 37 ms and the punch reading time is 184 ms. An additional 3 ms are added to the normal punching time of 181 ms. Normal processing time available is 19 ms.

Note. If the print storage special feature is installed in the system, the automatic signal to start the punch feed read operation is given shortly after the transfer of data to the print storage area. Thus, additional processing time can be gained by using print storage.

Address Registers After Operation.

I-Add. Reg.	A-Add. Reg.	B-Add. Reg.
NSI	BI	181

Example. Print a line, read and punch a card from the punch side of the IBM 1402, and branch to START6 (0895) for the next instruction (Figure 19).

SPS

LINE	COUNT	LABEL	OPERATION	(A) OPERAND				(B) OPERAND				d
				ADDRESS	±	CHAR. ADJ.	IND.	ADDRESS	±	CHAR. ADJ.	IND.	
0 1 0			W P	S T A R T 6								

Autocoder

Label	Operation					OPERAND	
	WRF	START6	25	30	35	40	45	50

Assembled Instruction: **6** 895 R

Figure 19. Read-Punch Feed, Write and Branch