IBM

IBM Address-Writing Feature

for the 407 Accounting Machine

Manual of Operation

821

MAJOR REVISION (December 1958)

This edition, Form 224-6391-1, obsoletes Form 22-6391-0 and all earlier editions. Major changes are:

PAGE	SUBJECT
16	Figure 10, Wires 49, 50, 51
18	Figure 11, Wire 70
24	Figure 15, Wire 79
30	Figure 19, Wires 48, 49

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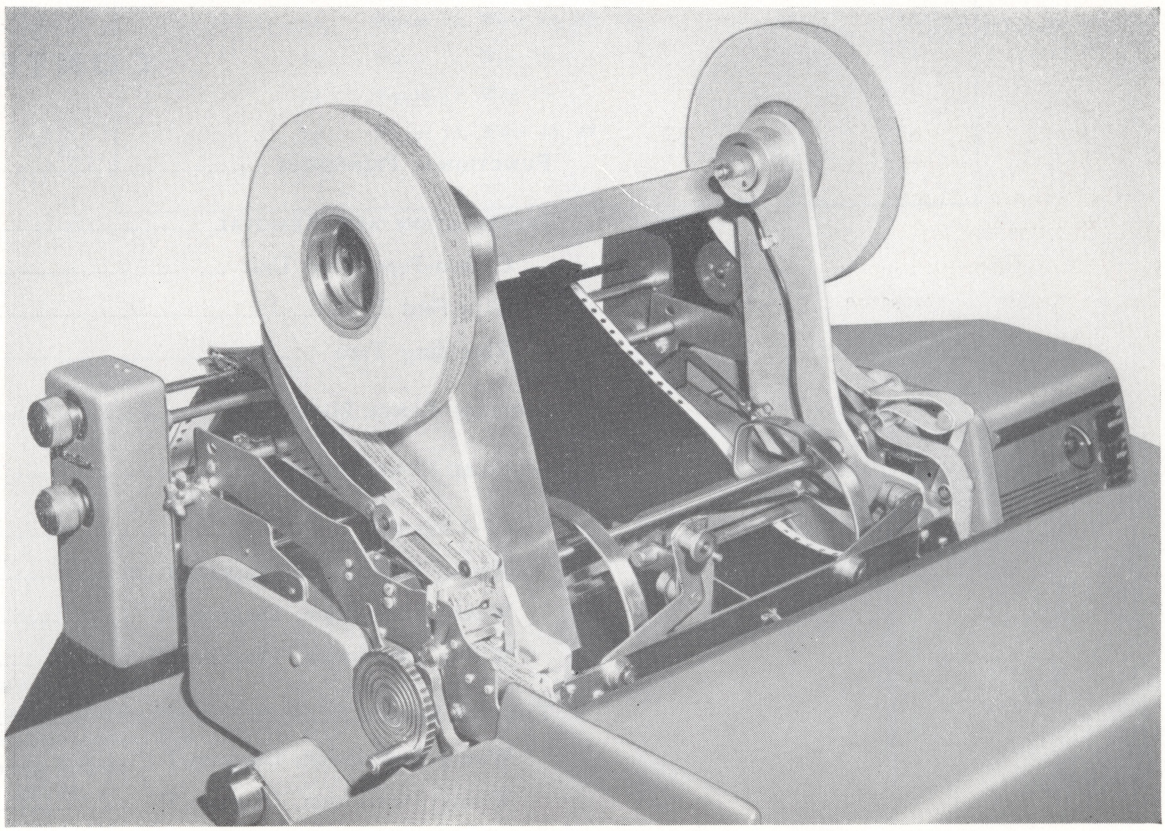


Address-Writing Feature on IBM 407 Accounting Machine

IBM Address-Writing Feature for the 407 Accounting Machine

ADDRESS LABELS are normally printed by the IBM 407 Accounting Machine on continuous forms. Interspersed three- and four-line addresses are produced at rates that vary between 1800 and 3000 labels per hour. Specially designed forms, permitting multiple-label printing side by side, increase production proportionately. The labels are then separated and attached to the material to be mailed. This method is adequate for a relatively low-volume application.

The IBM Address-Writing Feature prints three-line addresses at the rate of 9000 per hour (150 per minute). Interspersed three- and four-line addresses are produced at rates between 4500 and 9000 per hour.

Addresses are printed on a 7/8-inch tape (Figure 1) from IBM 403 MLP cards or IBM 407 MLR cards. Over 7000 carbon masters or 8000 labels can be produced from a roll of tape. The carbon masters, which are used in commercial heat-transfer addressing machines, have a reverse carbon image printed on the back of the tape. The labels are processed by automatic mailing machines that cut and affix them to material for mailing.

Functional Principles

THE TAPE is fed from a supply reel on the right—down to the platen—between the platen and print wheels and is rewound tightly on a reel on the left (Figure 2). Because the tape travels across the platen at an angle, four different lines of four separate addresses can be printed at the same time. The continuous-form carbon paper passes face-forward between the platen and the tape.

Printing is done from four fixed groups of print wheels. The right group prints the first line; the second group prints the second line; the third group prints the third line. The fourth group at the extreme left prints only when a fourth line is required.

Three-line addresses are punched in one card; four-line addresses require two cards that must be punched according to any one of the following patterns:

Three lines on the first card — one line on the second (3-1 system)

Two lines on the first card — two lines on the second (2-2 system)

One line on the first card — three lines on the second (1-3 system)

A standard carriage tape, punched in channel 1 at two-inch (12-line) intervals, is used to control the movement of the tape (2.805 inches) from right to left between proper print cycles.

Because the information must be printed from four different sources at the same time, the first line (24 characters) is printed from the first reading station, the second line (24 characters) from the second reading station, and the third and fourth lines (22 characters each) from counters and storage units.

A perforation is automatically cut in the tape between each address as the tape passes from the platen to the rewind reel. These 1/8-inch chadless holes serve to keep the tape in proper registration when it is processed by an automatic mailing machine.

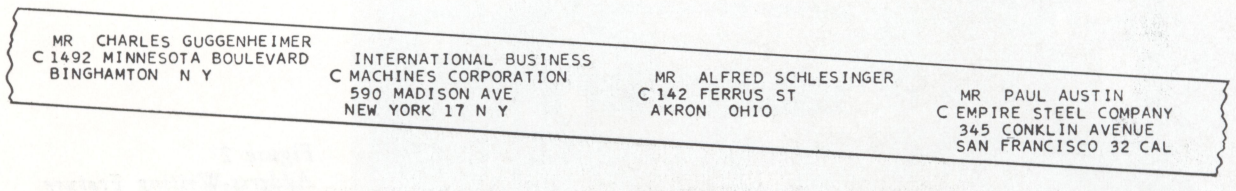


Figure 1. Printed Tape Section

Installation and Removal

THE ADDRESS-WRITING FEATURE (Figure 2) is installed on the standard carriage in place of the IBM Forms Tractor. The operator can install or remove this device without assistance. Before the device is mounted on the 407:

1. Remove the forms tractor.
2. Replace the standard platen with the special platen to provide room for the tape guides. Position the carriage laterally to center on the print wheels.
3. Move the side paper guides to the outer limits.
4. Set the form thickness adjustment at *1*.
5. Turn the form stop switch *off*.

CARBON-PAPER FEED UNIT

Installing

1. Loosen the four knurled nuts on the mounting studs.
2. Place the carbon-paper feed unit in the slots provided on the rear of the 407 carriage (Figure 3).
3. Tighten the four nuts, and plug the cable into the receptacle on the rear of the carriage.
4. Mount the metal apron (carbon-paper guide assembly) over the form-stop lever bar.

Removing

1. Disconnect plug.
2. Loosen mounting nuts.
3. Lift off.

Inserting Carbon Paper

1. With pin wheel pressure fingers closed to prevent tearing, feed the carbon paper, carbon side down, over the lower pin wheels (Figure 4), across the metal apron covering the form-stop lever arms and—if the tape unit is already in place—under the tie bar (Figure 3).

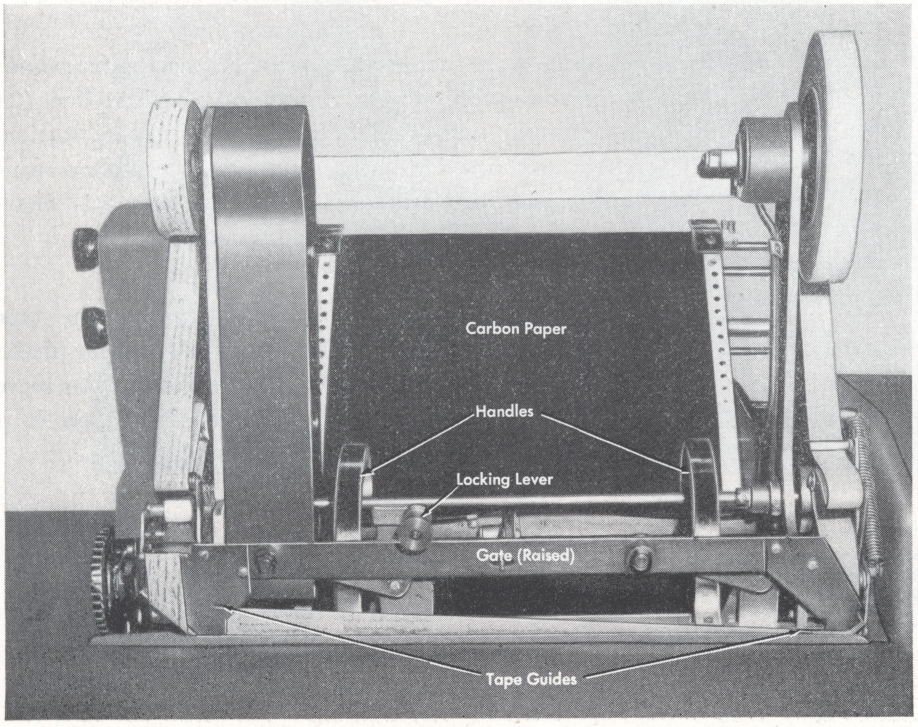


Figure 2
Address-Writing Feature
(Front View)

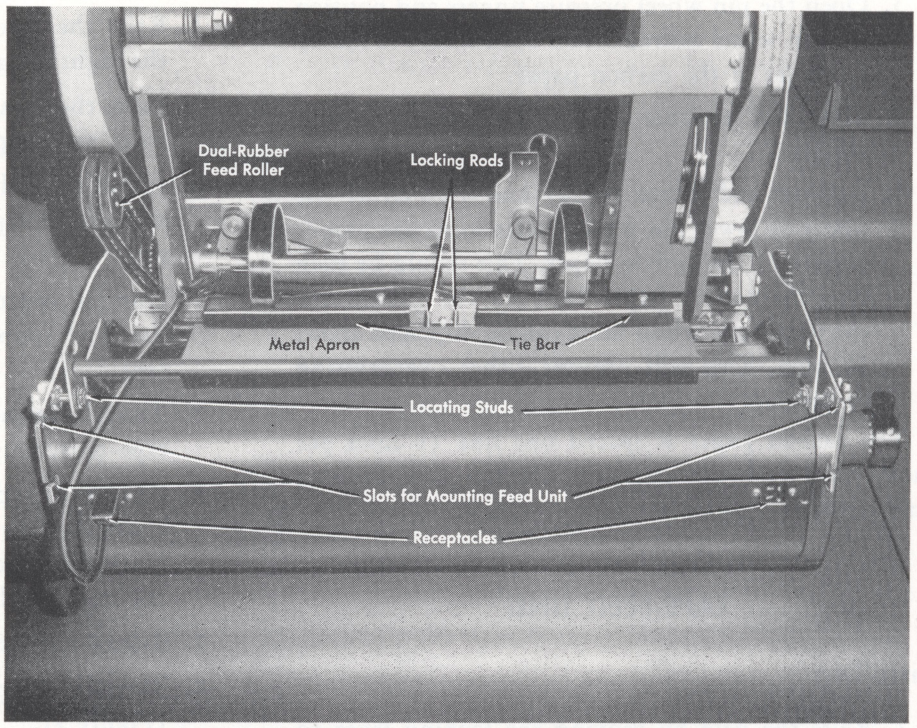


Figure 3
Tape-Feed Unit
(Rear View)

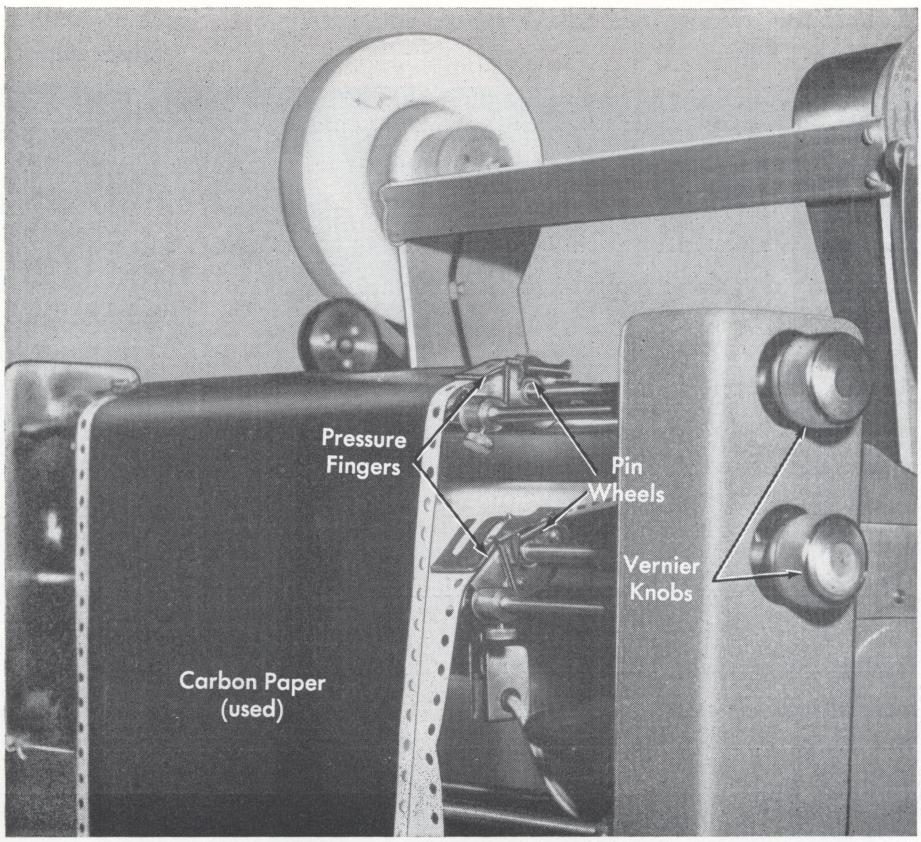


Figure 4
Carbon-Paper Feed Unit

2. Manipulate the carbon around the platen, back under the tie rod (if tape unit is in place), and over the upper pin wheels.
3. Open the pin wheel pressure fingers and position the pin wheel assemblies on both shafts to match the holes in the carbon paper.
4. Close the pressure fingers over the four pin wheels.
5. Pull out and rotate vernier knobs on either the upper or lower pin wheel shafts to secure proper tension of the carbon paper. This should be such that the carbon paper between the platen and the upper pin wheel shaft can be displaced about ½ inch. This will prevent either overprinting or tearing.

The carbon paper is spaced one line (6 lines per inch) with each carriage skip. Carbon is to be used only once.

TAPE-FEED UNIT

Installing

1. Raise the gate by moving the locking lever to the right (Figure 2).
2. Pull the locking rods to the center and latch down (Figure 3).
3. Lower the unit by the handles onto the 407 so that the rear locating studs (Figure 3) slide into the slots at the rear of the carriage frame.
4. Pivot the front of the device downward and rotate the platen until the gears mesh.
5. Move the locking lever to the left to lock the unit in place. This lowers the gate and releases the locking rods.
6. Tighten the locking nuts on the rear locating studs and plug the cable into the receptacle on the rear of the carriage (Figure 3).

Removing

1. Disconnect the plug and loosen the locking nuts on the rear locating studs.
2. Move the locking lever to the right to raise the gate (Figure 2).
3. Pull the locking rods to the center and latch down (Figure 3).
4. Lift the unit off by the handles.

THREADING TAPE

WITH the device mounted on the 407:

1. Raise the gate by pushing the locking lever to the right (Figure 2).
2. Push the dual-rubber feed roller down, away from the supply reel.
3. Install the roll of tape on the reel so that the free end of the tape hangs down at the rear of the roll.
4. Unwind approximately three feet of tape. Place the dual-rubber feed roller against the roll of tape.
5. Thread the tape under the pin and around the tape-tension arm and guide rollers (Figure 5).
6. Pass the tape down behind the gate at the right, across the face and through the right tape guides. Draw the tape across to the left tape guides on the back of the gate and up the face.
7. Release the locking lever to lower gate.
8. Thread the tape over the first roller to the punch (Figure 5).
9. With the platen clutch disengaged, turn the platen knob to feed sufficient tape through the punch roller (Figure 5) so that the end can be attached to the rewind reel.
10. Pass the tape under the etched plastic guide and around the guide and tension rollers to the cardboard core of the rewind reel (Figure 5).
11. Engage the platen clutch and rotate the vernier platen knob so that the punched hole is directly under the etched marking in the plastic guide. This assures proper alignment with the printing.
12. Disengage the platen clutch again and restore the carriage by depressing the carriage *restore* key. Re-engage the platen clutch.

After the unit is mounted on the 407 and the tape is threaded, place the cards in the hopper and depress the *start* key for three cycles. As the tape tension decreases near the end of each tape-feed cycle, the right tape-tension arm energizes the magnetic brake of the supply reel to prevent over-feeding the tape. If the tape breaks, the tape-break switches automatically stop the machine. To stop the machine during the operation, use the machine *stop* key, or incorrect spacing will result.

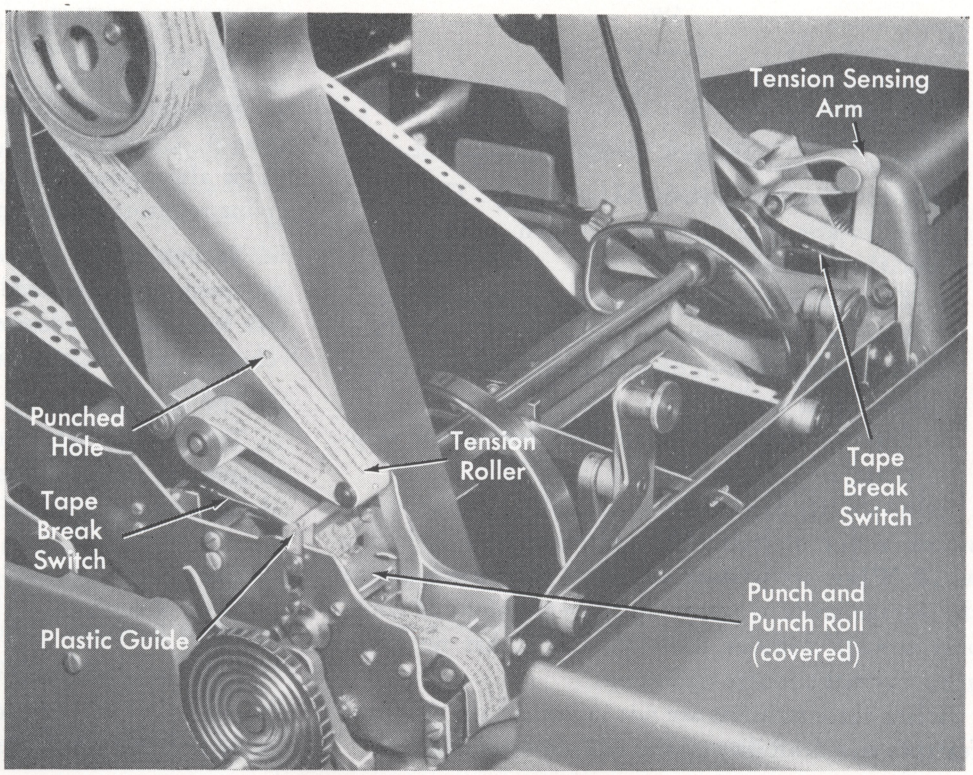
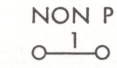


Figure 5
Tape Threading

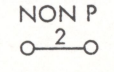
Control-Panel Hubs

THE ADAPTATION of the 407 to the Address-Writing Feature requires the mounting of eight additional control-panel hubs. These, with accompanying internal circuitry, alter the normal operation of storage and printing.



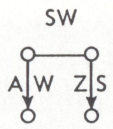
(AU, 77-78)

Non-Print 1 (AU, 77-78). These hubs will accept any impulse 9 through half-after-1 to cause a non-print operation in print wheels 97-120, the printing area of line 1 of each address. This feature may be used independently of an address-writing operation.



(AV, 77-78)

Non-Print 2 (AV, 77-78). These hubs will accept any impulse 9 through half-after-1 to cause a non-print operation in print wheels 67-96. However, the printing area of line 2 of each address should be kept to print wheels 69-92 to maintain proper alignment. This feature may be used independently of an address-writing operation.



(AU-AV, 79-80)

Address-Writing Switch (AU-AV, 79). This switch is wired to alter the normal operation of the 407 to permit the following:

1. Zone-only storage in the four storage units.
2. Zone storage in counters 6A, 6B, 6C and 6D.
3. Automatic read-in of each zone counter with its associated storage unit.
4. Carriage operation to provide for proper skipping.

Zone-Storage Switch (AU-AV, 80). This switch is automatically on when the address-writing switch is wired. When not writing addresses, this switch adapts the storage units to accept up to 64 positions of zone-only storage without selection, but it has no effect upon normal counter operation.

When these switches are not in use, all the standard features and flexibility of the 407 are available.

General Operation

LINES 1 AND 2 of each address are printed directly from the card as it passes first and second reading. Line 3 and line 4 (when required) are read into storage and counters, and are read out for printing during the appropriate cycle. If four-line addresses are involved, storage capacity is required for four different lines of 22 characters each. There will be two 3rd-lines and two 4th-lines in storage at one time. These 88 positions of alphabetic storage are provided in four groups:

Group I Zones—Storage unit A, counter group 6A
Digits—Counter groups 4A, 4B, 4C, 3C, 4D, and 3D

Group II Zones—Storage unit B, counter group 6B
Digits—Counter groups 8C, 8D, and 6E

Group III Zones—Storage unit C, counter group 6C
Digits—Counter groups 3A, 8A, 3B, and 8B

Group IV Zones—Storage unit D, counter group 6D
Digits—Counter groups 8E, 6F, and 8F

(This represents all storage and counters available on the 407 Model A-1.)

Storage groups I and III are used alternately for line 3. Groups II and IV alternate to store line 4. This alternating system (Figure 7) is controlled by pilot selectors as shown on the wiring diagrams.

To insure that cards are grouped properly, checks on card sequence, card coding, and the control field are made as the addresses are being prepared. If this check is not met for any reason, the machine automatically stops.

To align the left ends of all lines in an address as shown in Figure 1, the following print wheels are designated:

Line	4	3	2	1
Print Wheels	13-34	41-62	69-92	97-120

Two cards punched with a three-line code must be placed at the end of the file to permit the last card to print and the tape to space correctly on run-out.

The 3-1 System

IN THIS SYSTEM a three-line address is punched in one card. The only code required is a 3-punch, which is normal in an MLP/MLR card containing three lines of information.

A four-line address in the 3-1 system requires two cards. The first card contains three lines of information and two identifying punches: a 3-punch to identify it as a three-line card, and another code to identify it as the first card of a two-card group. Either MLP or MLR codes may be used to distinguish a first-card from a second in a two-card application. Or, as in the cards illustrated (Figure 6), a 5 is used in the MLP/MLR column, because it will have no effect on an MLP/MLR operation if these cards are used for that purpose in another application.

The second card contains the fourth line of the address in the second field. This is normal for an MLR-4 card. (If an MLR-1 card is used, the fourth line is in the first field.) The first two lines of the address are listed as the card is read. Lines 3 and 4 are stored and later read out for printing.

The planning chart in Figure 7 has been prepared from the card sequence shown in Figure 6. The tape sections in Figure 8 illustrate the preparation of the tape in conjunction with the planning chart.

The complete control-panel diagram for the 3-1 system is divided into three diagrams to facilitate reading. The wires on the diagrams are numbered so that a description can be made by referring to a specific wire or group of wires.

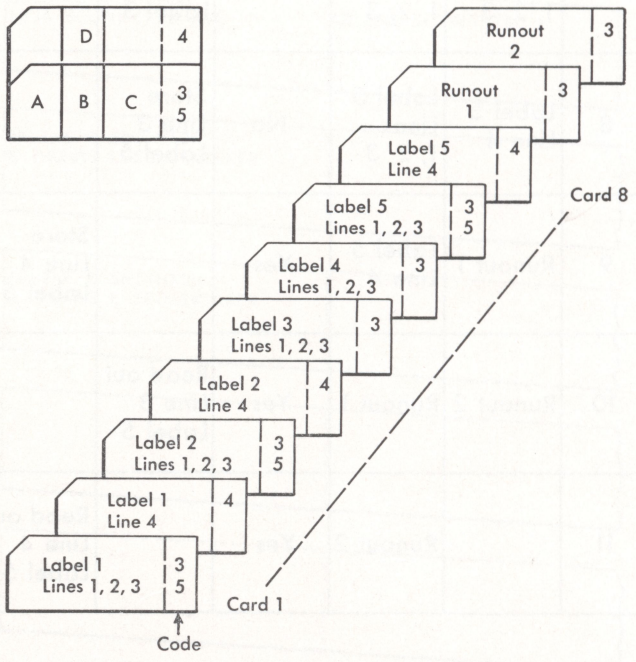


Figure 6. Sample Card Sequence for 3-1 System

CYCLE	FIRST READING	SECOND READING	CARRIAGE SKIP End of Cycle	STORAGE I	STORAGE II	STORAGE III	STORAGE IV	LINE 1 PRINT	LINE 2 PRINT	LINE 3 PRINT	LINE 4 PRINT
1	Label 1 Lines 1, 2, 3		Yes					List Line 1 Label 1			
2	Label 1 Line 4	Label 1 Lines 1, 2, 3	No	Store Line 3 Label 1				Non-Print	List Line 2 Label 1		
3	Label 2 Lines 1, 2, 3	Label 1 Line 4	Yes		Store Line 4 Label 1			List Line 1 Label 2	Non-Print		
4	Label 2 Line 4	Label 2 Lines 1, 2, 3	No	Read out Line 3 Label 1		Store Line 3 Label 2		Non-Print	List Line 2 Label 2	Print Line 3 Label 1	
5	Label 3 Lines 1, 2, 3	Label 2 Line 4	Yes				Store Line 4 Label 2	List Line 1 Label 3	Non-Print		
6	Label 4 Lines 1, 2, 3	Label 3 Lines 1, 2, 3	Yes	Store Line 3 Label 3	Read out Line 4 Label 1	Read out Line 3 Label 2		List Line 1 Label 4	List Line 2 Label 3	Print Line 3 Label 2	Print Line 4 Label 1
7	Label 5 Lines 1, 2, 3	Label 4 Lines 1, 2, 3	Yes	Read out Line 3 Label 3		Store Line 3 Label 4	Read out Line 4 Label 2	List Line 1 Label 5	List Line 2 Label 4	Print Line 3 Label 3	Print Line 4 Label 2
8	Label 5 Line 4	Label 5 Lines 1, 2, 3	No	Store Line 3 Label 5		Read out Line 3 Label 4		Non-Print	List Line 2 Label 5	Print Line 3 Label 4	
9	Runout 1	Label 5 Line 4	Yes		Store Line 4 Label 5				Non-Print		
10	Runout 2	Runout 1	Yes	Read out Line 3 Label 5						Print Line 3 Label 5	
11		Runout 2	Yes		Read out Line 4 Label 5						Print Line 4 Label 5

Figure 7. Planning Chart for Cards Shown in Figure 6

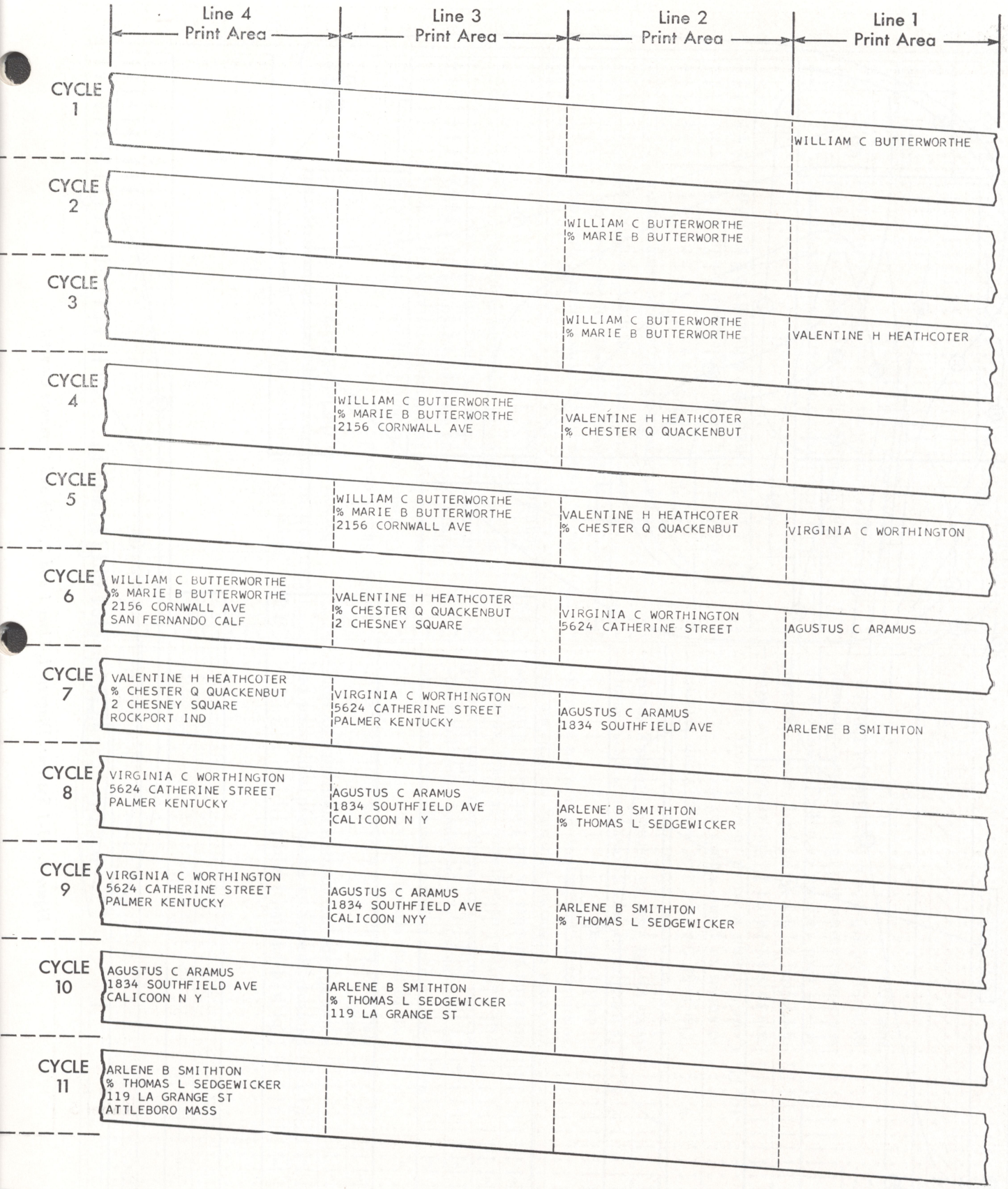


Figure 8. Tape Address Printed from Cards Shown in Figure 6

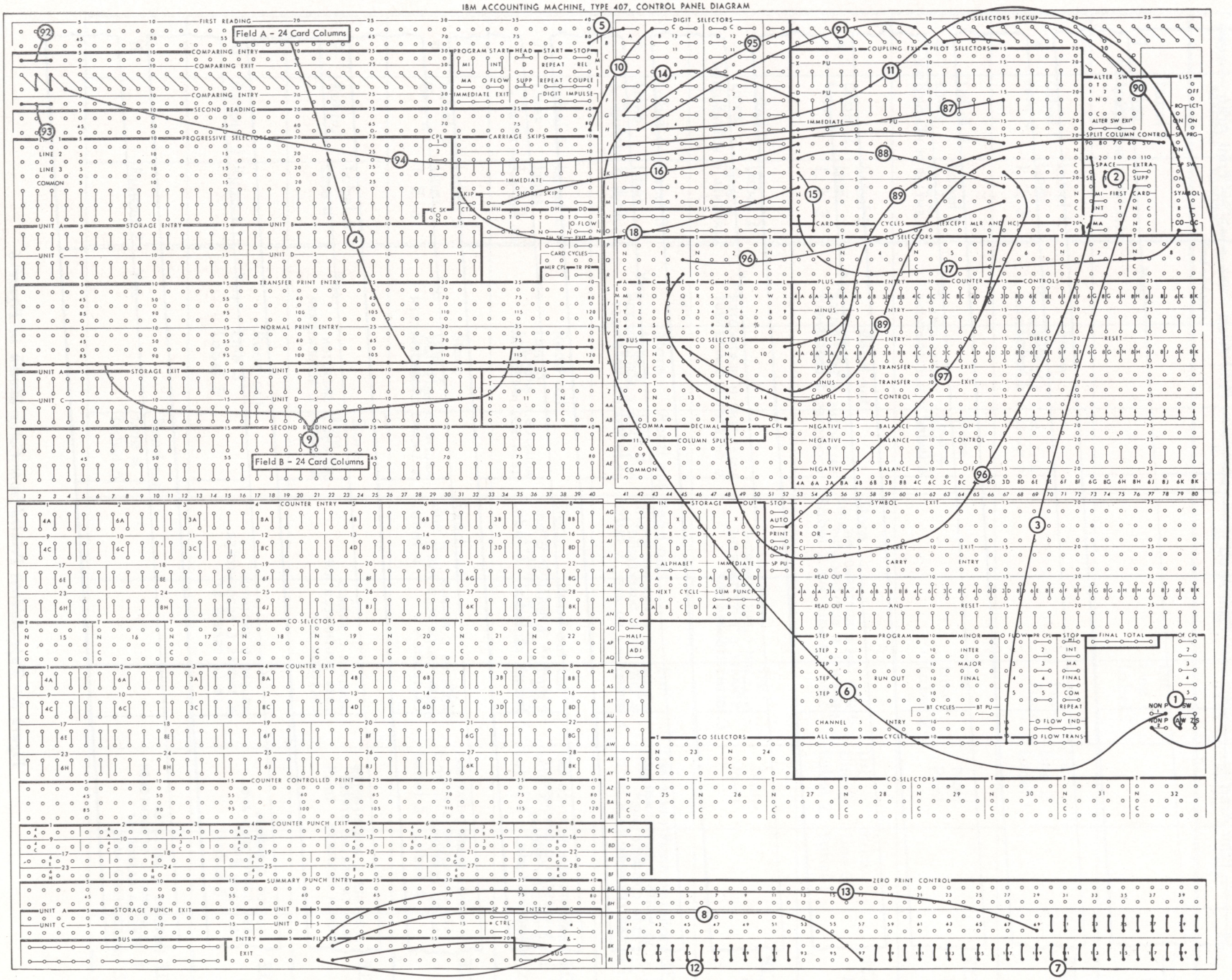


Figure 9. 3-1 System: Diagram I, Lines 1 and 2, Skip and Sequence Control

WIRING DESCRIPTION: Diagram I (Figure 9)

1. The A-W switch is wired.

2, 3. Normal spacing is wired and suppressed because all tape movement is controlled by skipping.

4. The field for line 1 is wired from FIRST READING to print wheels 97-120.

5, 6. Code column is wired through DIGIT SELECTOR to NON-PRINT 1. This causes a non-print operation in line-1 printing area when a 4-card (second card of a group) at FIRST READING contains punches in the first field. This also prevents erroneous printing of 4th-line information in the 1st-line area when an MLR-1 card is used.

7, 8. Normal ZERO-PRINT CONTROL is wired with a path to the fuse to permit printing special characters to the left in line 1.

9. The field for line 2 is wired from SECOND READING to print wheels 69-92.

10, 11. Code Column is wired through DIGIT SELECTOR to NON-PRINT 2. This causes a non-print operation in line-2 printing area when an MLR-4 card (second card of a group) is at SECOND READING and thus prevents erroneous printing of 4th-line information in the 2nd-line area.

12, 13. Normal ZERO-PRINT CONTROL is wired with a path to the fuse to permit printing special characters to the left in line 2.

14-18. Skip Control

Carriage operation (skip-to-1 before each second line) is initiated by PILOT SELECTOR 1. These selectors are transferred for all 3-cards at second reading. A short impulse (CO-CC) is used to prevent erroneous skipping.

87-97. Sequence Control

A. A 5-card (87), which is the first card of a two-card group, must also be a 3-card (14, 88) and must be followed by a 4-card (89-91) of the same control group (92-94).

B. A 4-card, or a single-card group (a 3-card), must be followed by a 3-card (95, 96).

[To prevent overloading, SPLIT-COLUMN impulses through respective co-selectors are used to give equivalent 3- and 4- impulses at first reading on a card cycle.]

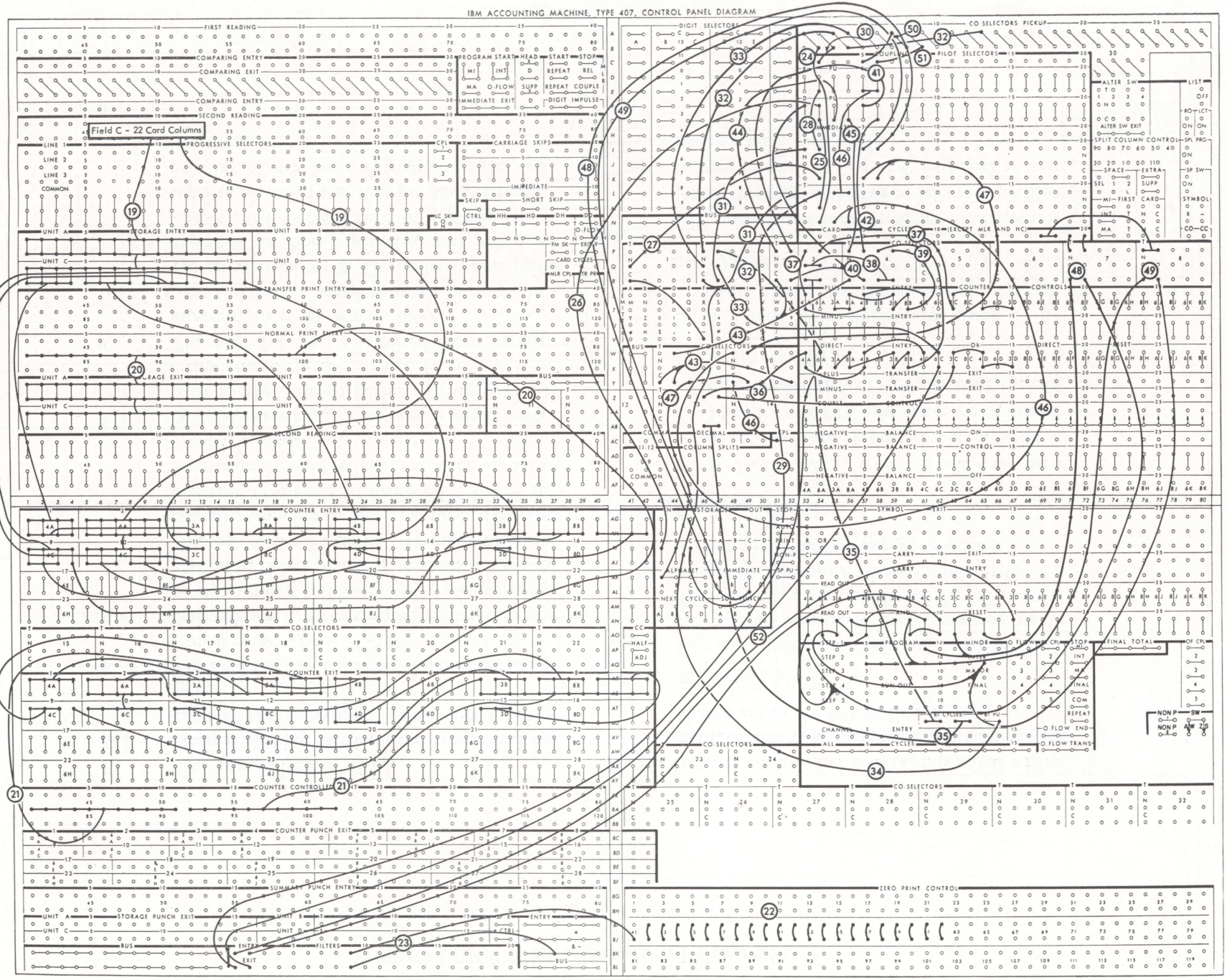


Figure 10. 3-1 System: Diagram II, Line 3

19. The field for line 3 is wired to the entries of storage groups I and III.

20, 21. The exits of storage groups I and III are wired to print wheels 41-62.

22, 23. Normal ZERO-PRINT CONTROL is wired with a path to the fuse to permit printing special characters to the left in line 3.

24-39. This wiring alternates the read-in of storage groups I and III with each 3-card. The cycle begins with the first 3-card picking PILOT SELECTORS 1 and 2 (14, 95, 24-26) to cause storage group I to read in. PILOT SELECTOR 2 is then re-picked by an emitted *X* through CO-SELECTOR 1 (27) and its own point (28) until the next 3-card is read. This second 3-card causes storage group III to read in (29), PILOT SELECTOR 2 to drop, and PILOT SELECTOR 1 to re-pick. CO-SELECTOR 2 is coupled with PILOT SELECTOR 2 (30). The remainder of storage groups I and III is controlled to read in during the proper cycle through PILOT SELECTOR 1 and CO-SELECTOR 2 (31-33). [BALANCE-TEST-CYCLES impulses (34-39) are used through co-selectors 3 and 4 to prevent overloading.]

40-50. This wiring alternates the read-out of storage groups I and III. With each 3-card, storage groups I and III are controlled through PILOT SELECTORS 5 and 6 to read out. The cycle is started by a 3-card following a 3-card, resulting in a direct control on PILOT SELECTOR 5 or 6 (40-42); or, by a 4-card following a 3-card, resulting in an indirect control of PILOT SELECTOR 5 or 6 (46, 47) through CO-SELECTOR 3 or 4 and PILOT SELECTOR 3 or 4 (44, 45). [The COLUMN-SPLIT-COUPLE impulse is used as equivalent to an emitted *X*. CARD-CYCLES impulses, through coupled (50, 51) CO-SELECTORS 7 and 8, are used to prevent overloading.] Zone-storage counters must be DIRECT RESET (52).

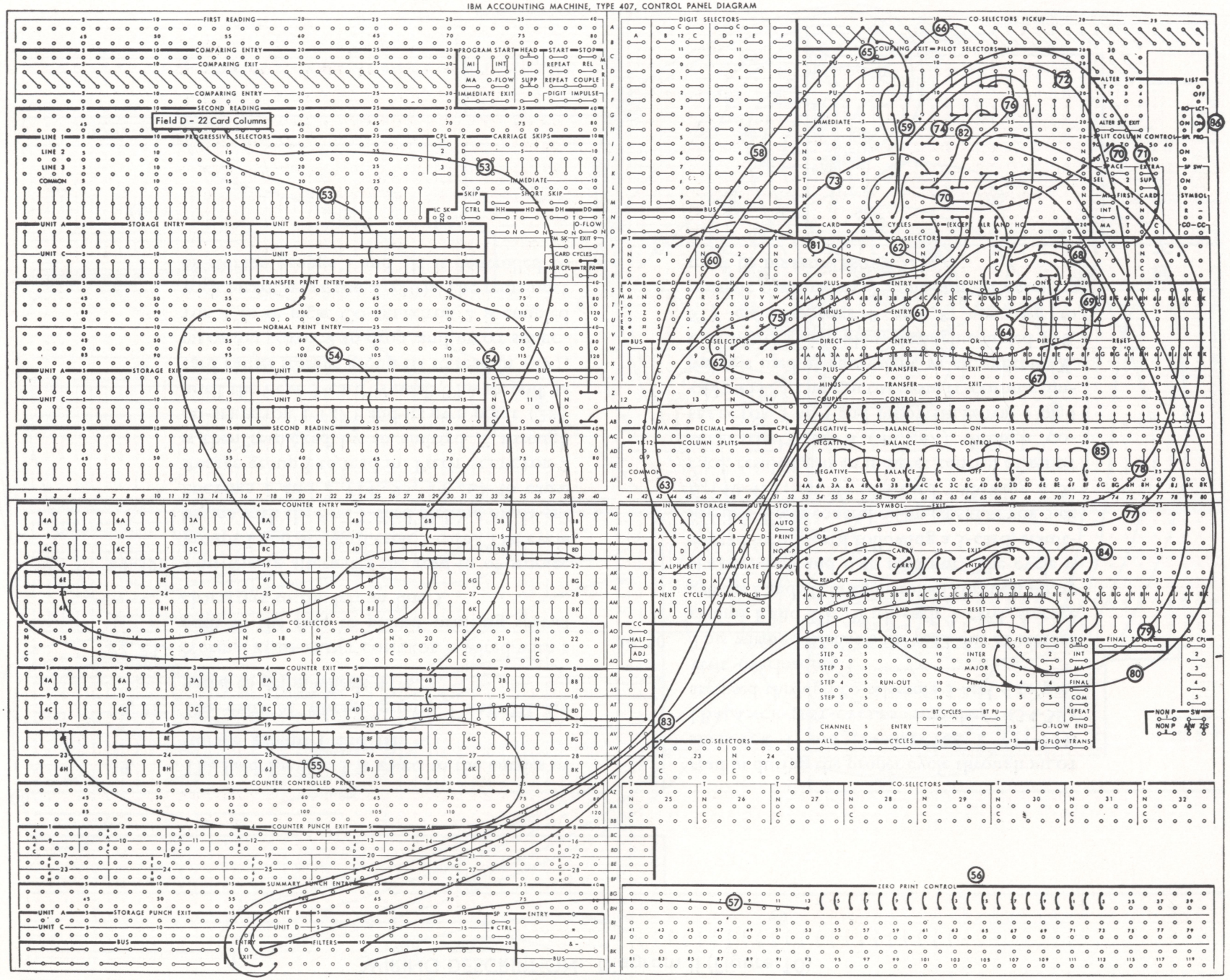


Figure 11. 3-1 System: Diagram III, Line 4

WIRING DESCRIPTION: Diagram III (Figure 11)

53. The field for line 4 is wired from SECOND READING to the entries of storage groups II and IV.

54, 55. The exits of storage groups II and IV are wired to print wheels 13-34.

56, 57. Normal ZERO-PRINT CONTROL is wired to permit printing special characters to the left in line 4.

58-73. This wiring alternates the read-in of storage groups II and IV. The cycle is started with the first 4-card (91) picking CO-SELECTOR 9 to give an equivalent 4 (58) at first reading to prevent overloading. This impulse causes storage group II to read in and picks PILOT SELECTORS 7 and 8 (59-61). PILOT SELECTOR 7 is then re-picked by an emitted & (62) through CO-SELECTOR 5 and its own point until the next 4-card is read. The second 4-card causes storage group IV to read in (63, 64), PILOT SELECTOR 7 to drop, and PILOT SELECTOR 8 to re-pick. CO-SELECTOR 6, which is coupled (65) with PILOT SELECTOR 7, provides the control for the remainder of storage groups II and IV. CARD-CYCLES impulses, through coupled CO-SELECTOR 12, are used to prevent overloading (66-69). In addition, PILOT SELECTORS 9 and 10 are picked when groups II and IV, respectively, are impulsed to read in (70-72).

73-83. This wiring causes the read-out of storage groups II and IV at the proper time. The cycle is initiated by picking PILOT-SELECTOR 9 or 10 (71, 72). This results in picking PILOT SELECTOR 11 or 12 when a 4-card is present (73, 74). PILOT SELECTOR 11 or 12 then controls PILOT SELECTOR 13 or 14 (75, 76), respectively, to cause storage group II or IV to read out (77-80). However, if a 3-card is present, the delay of PILOT SELECTOR 11 or 12 is bypassed by an equivalent 3-impulse (81). This picks PILOT SELECTOR 13 or 14 directly (82) to cause storage group II or IV to read out at the proper time. Zone-storage counters must be DIRECT RESET (83).

84, 85. The zone-storage counters are set up individually for carry and for NEGATIVE BALANCE OFF. The remaining counters are coupled into groups as pre-arranged to form the four storage groups. This provides for proper printing when a single-counter group contains all 9's, as when storing the numeric portion of the letters *riz* in Arizona. This would result in 0's if treated as a single counter rather than a portion of a group.

86. LAST CARD TOTAL switch is wired to clear the counters during run-in and run-out. [If this hub is not available, wire 47, through the normal point of CO-SELECTOR 10 to MAJOR PROGRAM START, will perform the same function.]

The 2-2 System

THIS SYSTEM requires that the two cards used for a 4-line address be punched with 2 lines in the first card and 2 lines in the second card.

The first card has a 1-punch and a 6-punch to identify it as the first card of a two-card group. The second card has a 2-punch to identify it as the second card of a two-card group.

If a 3-line address is needed, two cards are required and are punched the same as a 4-line card with the exception that one of the fields would be blank. If a 2-line address is required, only one card is needed and it is punched with a 1 only.

The planning chart in Figure 13 has been prepared from the card sequence shown in Figure 12. The complete control-panel wiring is shown on two diagrams to make it more readable.

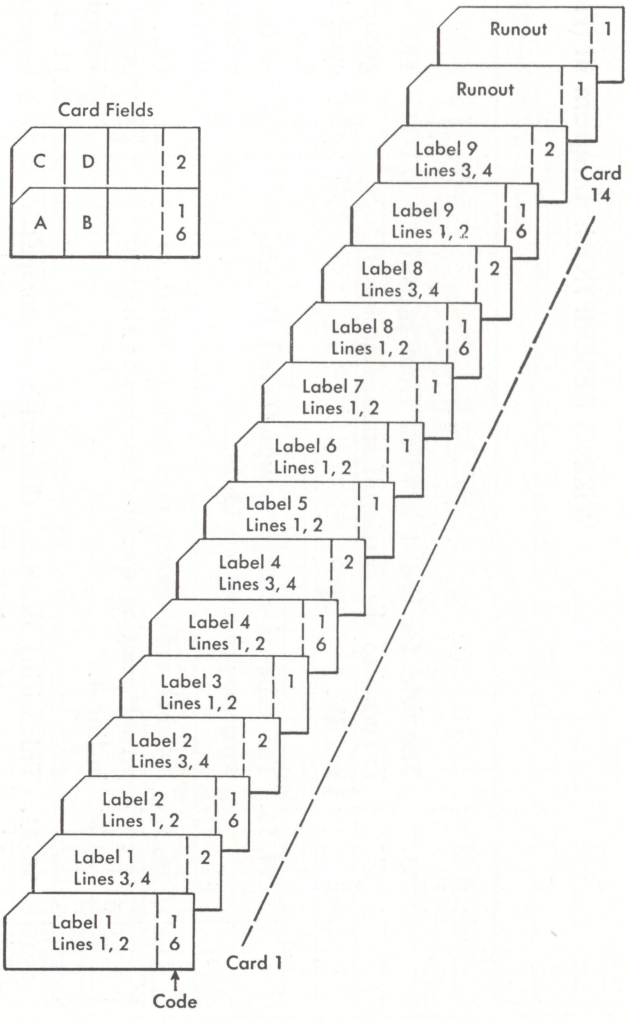


Figure 12. Sample Card Sequence for 2-2 System

CYCLE	FIRST READING	SECOND READING	CARRIAGE SKIP END OF CYCLE	STORAGE I	STORAGE II	STORAGE III	STORAGE IV	LINE 1 PRINT	LINE 2 PRINT	LINE 3 PRINT	LINE 4 PRINT
1	Label 1 Lines 1 & 2		Yes					List Line 1 Label 1			
2	Label 1 Lines 3 & 4	Label 1 Lines 1 & 2	No					Non- Print	List Line 2 Label 1		
3	Label 2 Lines 1 & 2	Label 1 Lines 3 & 4	Yes	Store Line 3 Label 1	Store Line 4 Label 1			List Line 1 Label 2	Non- Print		
4	Label 2 Lines 3 & 4	Label 2 Lines 1 & 2	No	Read out Line 3 Label 1				Non- Print	List Line 2 Label 2	Print Line 3 Label 1	
5	Label 3 Lines 1 & 2	Label 2 Lines 3 & 4	Yes	Store Line 3 Label 2			Store Line 4 Label 2	List Line 1 Label 3	Non- Print		
6	Label 4 Lines 1 & 2	Label 3 Lines 1 & 2	Yes	Read out Line 3 Label 2	Read out Line 4 Label 1			List Line 1 Label 4	List Line 2 Label 3	Print Line 3 Label 2	Print Line 4 Label 1
7	Label 4 Lines 3 & 4	Label 4 Lines 1 & 2	No				Read out Line 4 Label 2	Non- Print	List Line 2 Label 4		Print Line 4 Label 2
8	Label 5 Lines 1 & 2	Label 4 Lines 3 & 4	Yes	Store Line 3 Label 4	Store Line 4 Label 4			List Line 1 Label 5	Non- Print		
9	Label 6 Lines 1 & 2	Label 5 Lines 1 & 2	Yes	Read out Line 3 Label 4				List Line 1 Label 6	List Line 2 Label 5	Print Line 3 Label 4	
10	Label 7 Lines 1 & 2	Label 6 Lines 1 & 2	Yes		Read out Line 4 Label 4			List Line 1 Label 7	List Line 2 Label 6		Print Line 4 Label 4
11	Label 8 Lines 1 & 2	Label 7 Lines 1 & 2	Yes					List Line 1 Label 8	List Line 2 Label 7		
12	Label 8 Lines 3 & 4	Label 8 Lines 1 & 2	No					Non- Print	List Line 2 Label 8		
13	Label 9 Lines 1 & 2	Label 8 Lines 3 & 4	Yes	Store Line 3 Label 8			Store Line 4 Label 8	List Line 1 Label 9	Non- Print		
14	Label 9 Lines 3 & 4	Label 9 Lines 1, & 2	No	Read out Line 3 Label 8				Non- Print	List Line 2 Label 9	Print Line 3 Label 8	
15	Runout 1	Label 9 Lines 3 & 4	Yes	Store Line 3 Label 9	Store Line 4 Label 9						
16	Runout 1	Runout 2	Yes	Read out Line 3 Label 9			Read out Line 4 Label 8			Print Line 3 Label 9	Print Line 4 Label 8
17		Runout 2	Yes		Read out Line 4 Label 9						Print Line 4 Label 9

Figure 13. Planning Chart for Cards Shown in Figure 12

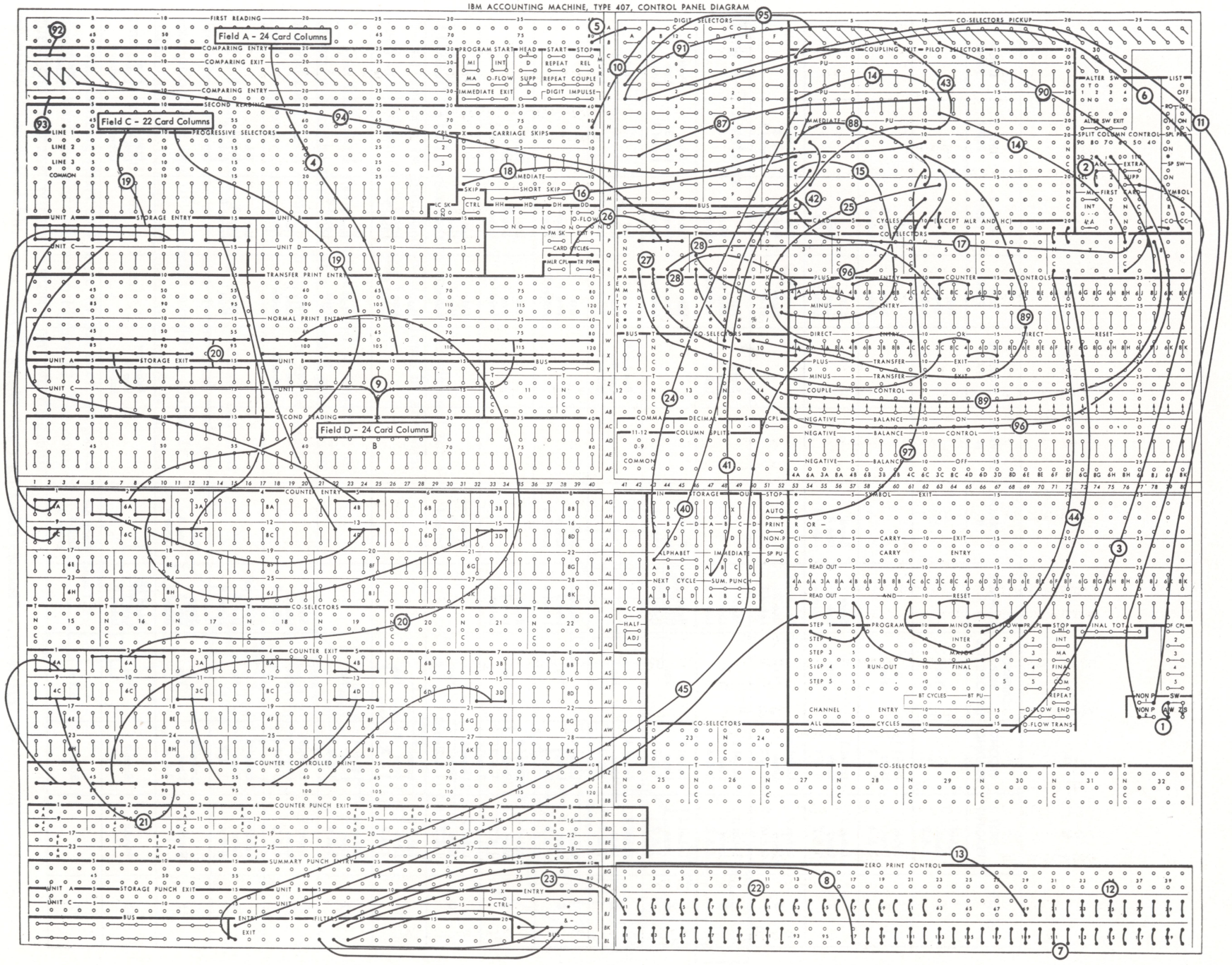


Figure 14. 2-2 System: Diagram I, Lines 1, 2, and 3, Skip and Sequence Control

WIRING DESCRIPTION: Diagram I (Figure 14)

Except where indicated, wiring on these diagrams corresponds in function to the same numbered groups in the 3-1 system.

1. The A-W switch is wired.

2, 3. Normal spacing is wired and suppressed because all tape movement is controlled by skipping.

4. The field for line 1 is wired from FIRST READING to print wheels 97-120.

5, 6. Code column is wired to DIGIT SELECTOR and to NON-PRINT 1. This causes a non-print operation in line-1 printing area when a 2-card (second card of a group) at first reading contains punches in the first field. This also prevents erroneous printing of 3rd-line information in the 1st-line printing area when an MLR-1 card is used.

7, 8. Normal ZERO-PRINT CONTROL is wired with a path to the fuse to permit printing special characters to the left in line 1.

9. The field for line 2 is wired from SECOND READING to print wheels 69-92.

10, 11. Code column is wired through DIGIT SELECTOR to NON-PRINT 2. This causes a non-print operation in line-2 printing area when a 2-card (second card of a group) is at second reading and thus prevents erroneous printing of 4th-line information in the 2nd-line area.

12, 13. Normal ZERO-PRINT CONTROL is wired with a path to the fuse to permit printing special characters to the left in line 2.

14-18. Skip Control
Carriage operation (skip-to-1) is initiated whenever there is a 1-card (i.e., no 2-card) at first reading. An emitted 9-impulse (15) and CO-CC (17) are used to give short impulses for picking other selectors and to prevent erroneous skipping.

19. The field for line 3 is wired to the entries of storage group I.

20, 21. The exits of storage group I are wired to print wheels 41-62.

22, 23. Normal ZERO-PRINT CONTROL is wired with a path to the fuse to permit printing special characters to the left in line 3.

24-28. This wiring causes storage group I to read in line 3 (14, 24, 25). CARD-CYCLES impulses through CO-SELECTOR 1 are used to prevent overloading (26-28).

40-45. This wiring causes storage group I to read out line 3. CARD-CYCLES impulses through CO-SELECTOR 7 are used to prevent overloading. Zone-storage counter must be DIRECT RESET (45).

87-97. Sequence Control

A. A 6-card (87), which is the first card of a two-card group, must also be a 1-card (14, 88) and must be followed by a 2-card (89-91) of the same control group (92-94).

B. A 2-card, or a single-card group (a 1-card), must be followed by a 1-card (95, 96).

[To prevent overloading, SPLIT-COLUMN impulses, through respective co-selectors, are used to give equivalent 2-impulses at first reading on a card cycle.]

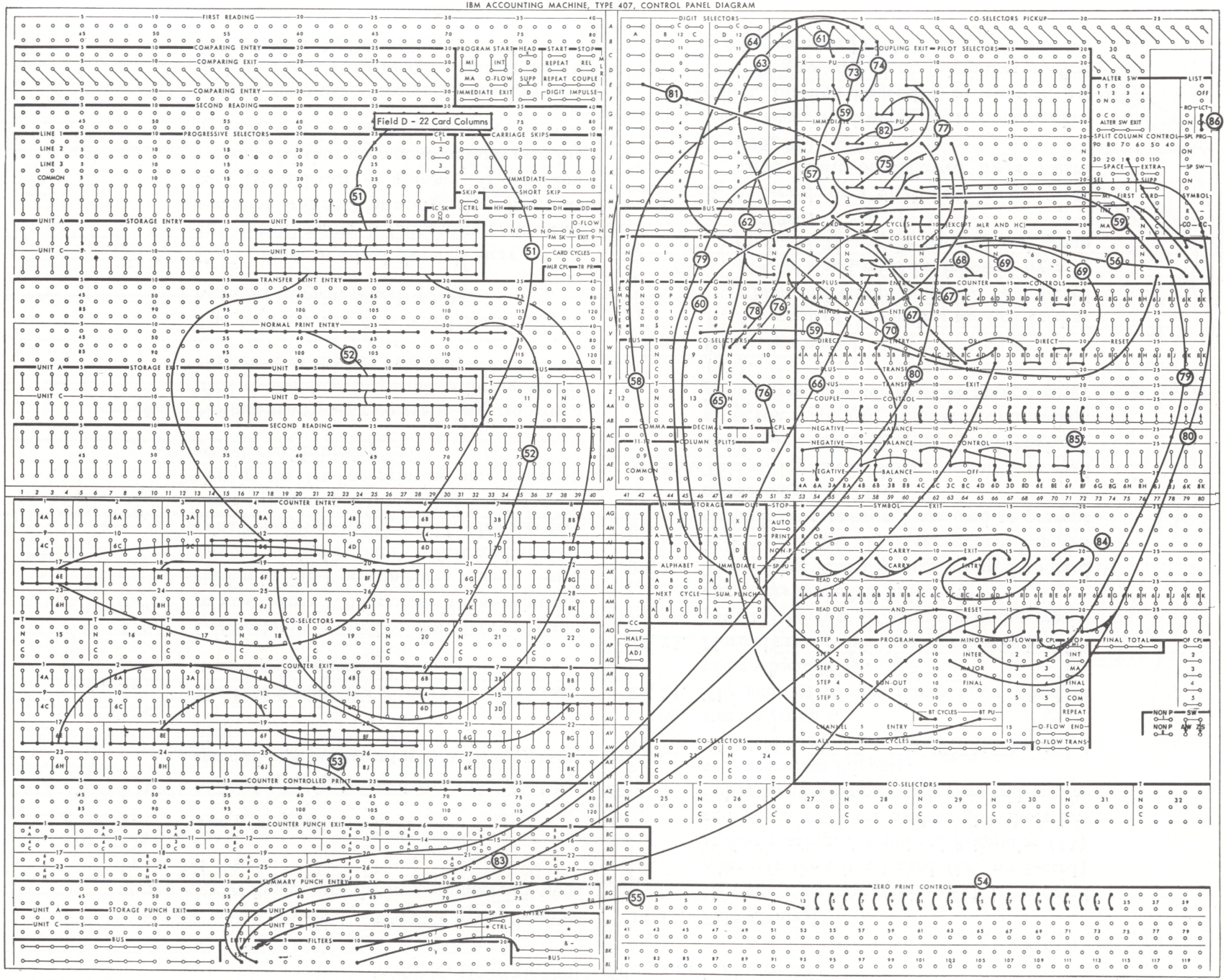


Figure 15. 2-2 System: Diagram II, Line 4

51. The field for line 4 is wired from SECOND READING to the entries of storage groups II and IV.

52, 53. The exits of storage groups II and IV are wired to print wheels 13-34.

54, 55. Normal ZERO-PRINT CONTROL is wired to permit printing special characters to the left in line 4.

56-70. This wiring alternates the read-in of storage groups II and IV. The cycle is started with the first 2-card (91) transferring CO-SELECTOR 8. This provides impulses which substitute for a 2 at first reading to prevent overloading. This impulse (56) picks PILOT SELECTOR 3 through its own point (57) and causes storage group II to read in (58). PILOT SELECTOR 3 then is re-picked by an emitted X (59) through its transferred point to cause the next 2-card to read in storage group IV (60). PILOT SELECTOR 1 and CO-SELECTOR 3, which is coupled (61) with PILOT SELECTOR 3, provide the control for the remainder of the storage groups II and IV (62-70). BALANCE-TEST-CYCLES impulses are used to prevent overloading (65-69).

73-83. This wiring alternates the read-out of storage groups II and IV. The cycle is initiated by the picking of PILOT SELECTOR 4 or 5 (73, 74). This results in picking PILOT SELECTOR 6 or 7 when a 2-card is present (56, 75). PILOT SELECTOR 6 or 7, by a COLUMN-SPLIT impulse (76), then controls PILOT SELECTOR 8 or 9 (77), respectively, to cause storage group II or IV to read out (78-80). However, if a 1-card (81) is present, the delay of PILOT SELECTOR 6 or 7 is bypassed and PILOT SELECTOR 9 or 10 is picked directly (82). This causes storage group II or IV to read out at the proper time. Zone-storage counters must be DIRECT RESET (83).

84, 85. The zone-storage counters are set up individually for carry and for NEGATIVE BALANCE OFF. The remaining counters are coupled into groups as pre-arranged to form the four storage groups. This provides for proper printing when a single-counter group contains all 9's, as when storing the numeric portion of the letters *riz* in Arizona. This would result in 0's if treated as a single counter rather than a portion of a group.

86. LAST CARD TOTAL switch is wired to clear the counters during run-in and run-out. [If this hub is not available, wire 40 through the normal point of CO-SELECTOR 10 to MAJOR PROGRAM START will perform the same function.]

The 1-3 System

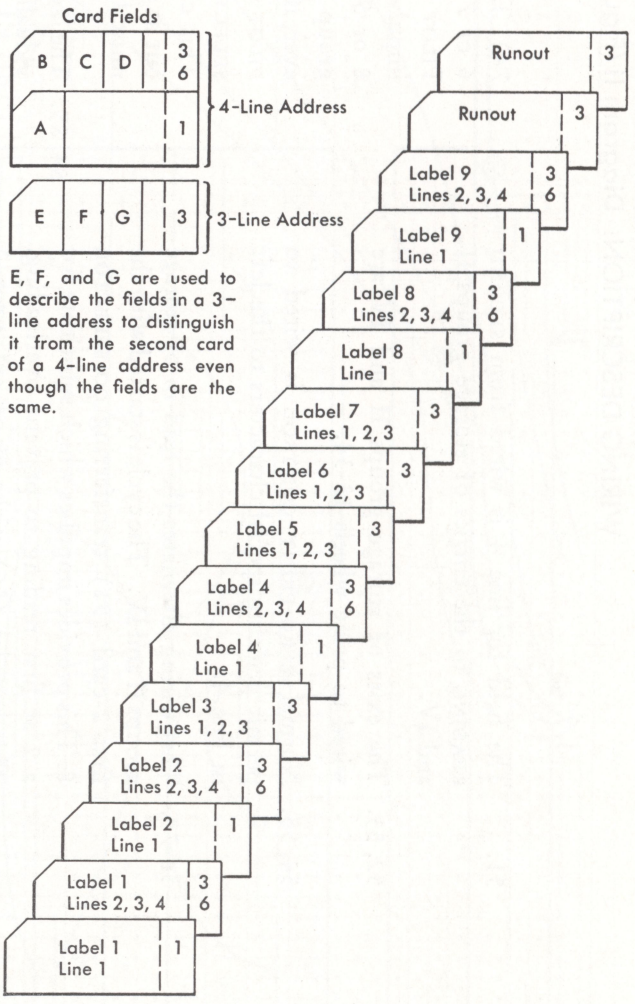


Figure 16. Sample Card Sequence for 1-3 System

THIS SYSTEM requires that the two cards used for a 4-line address be punched with the first line in the first card and with the second, third and fourth lines in the second card.

The first card, being a one-line card, has a normal 1-punch for MLP/MLR operation. The second card would, therefore, have a 3-punch. In addition to this coding, the second card of a 4-line address must be coded with a 6. If a 3-line address is used, only one card is required with the normal MLP/MLR-3 code.

The planning chart in Figure 17 has been prepared from the card sequence shown in Figure 16. The three control-panel diagrams following the planning chart are combined to form the complete wiring for the 1-3 system.

CYCLE	FIRST READING	SECOND READING	CARRIAGE SKIP END OF CYCLE	STORAGE I	STORAGE II	STORAGE III	STORAGE IV	LINE 1 PRINT	LINE 2 PRINT	LINE 3 PRINT	LINE 4 PRINT
1	Label 1 Line 1		Yes					List Line 1 Label 1			
2	Label 1 Lines 2, 3, & 4	Label 1 Line 1	No					Non- Print			
3	Label 2 Line 1	Label 1 Lines 2, 3, & 4	Yes	Store Line 3 Label 1	Store Line 4 Label 1			List Line 1 Label 2	List Line 2 Label 1		
4	Label 2 Lines 2, 3, & 4	Label 2 Line 1	No	Read out Line 3 Label 1				Non- Print		Print Line 3 Label 1	
5	Label 3 Lines 1, 2, & 3	Label 2 Lines 2, 3, & 4	Yes			Store Line 3 Label 2	Store Line 4 Label 2	List Line 1 Label 3	List Line 2 Label 2		
6	Label 4 Line 1	Label 3 Lines 1, 2, & 3	Yes	Store Line 3 Label 3	Read out Line 4 Label 1	Read out Line 3 Label 2		List Line 1 Label 4	List Line 2 Label 3	Print Line 3 Label 2	Print Line 4 Label 1
7	Label 4 Lines 2, 3, & 4	Label 4 Line 1	No	Read out Line 3 Label 3			Read out Line 4 Label 2	Non- Print		Print Line 3 Label 3	Print Line 4 Label 2
8	Label 5 Lines 1, 2, & 3	Label 4 Lines 2, 3, & 4	Yes		Store Line 4 Label 4	Store Line 3 Label 4		List Line 1 Label 5	List Line 2 Label 4		
9	Label 6 Lines 1, 2, & 3	Label 5 Lines 1, 2, & 3	Yes	Store Line 3 Label 5		Read out Line 3 Label 4		List Line 1 Label 6	List Line 2 Label 5	Print Line 3 Label 4	
10	Label 7 Lines 1, 2, & 3	Label 6 Lines 1, 2, & 3	Yes	Read out Line 3 Label 5	Read out Line 4 Label 4	Store Line 3 Label 6		List Line 1 Label 7	List Line 2 Label 6	Print Line 3 Label 5	Print Line 4 Label 4
11	Label 8 Line 1	Label 7 Lines 1, 2, & 3	Yes	Store Line 3 Label 7		Read out Line 3 Label 6		List Line 1 Label 8	List Line 2 Label 7	Print Line 3 Label 6	
12	Label 8 Lines 2, 3, & 4	Label 8 Line 1	No	Read out Line 3 Label 7				Non- Print		Print Line 3 Label 7	
13	Label 9 Line 1	Label 8 Lines 2, 3, & 4	Yes			Store Line 3 Label 8	Store Line 4 Label 8	List Line 1 Label 9	List Line 2 Label 8		
14	Label 9 Lines 2, 3, & 4	Label 9 Line 1	No			Read out Line 3 Label 8		Non- Print		Print Line 3 Label 8	
15	Runout 1	Label 9 Lines 2, 3, & 4	Yes	Store Line 3 Label 9	Store Line 4 Label 9				List Line 2 Label 9		
16	Runout 2	Runout 1	Yes	Read out Line 3 Label 9			Read out Line 4 Label 8			Print Line 3 Label 9	Print Line 4 Label 8
17		Runout 2			Read out Line 4 Label 9						Print Line 4 Label 9

Figure 17. Planning Chart for Cards Shown in Figure 16

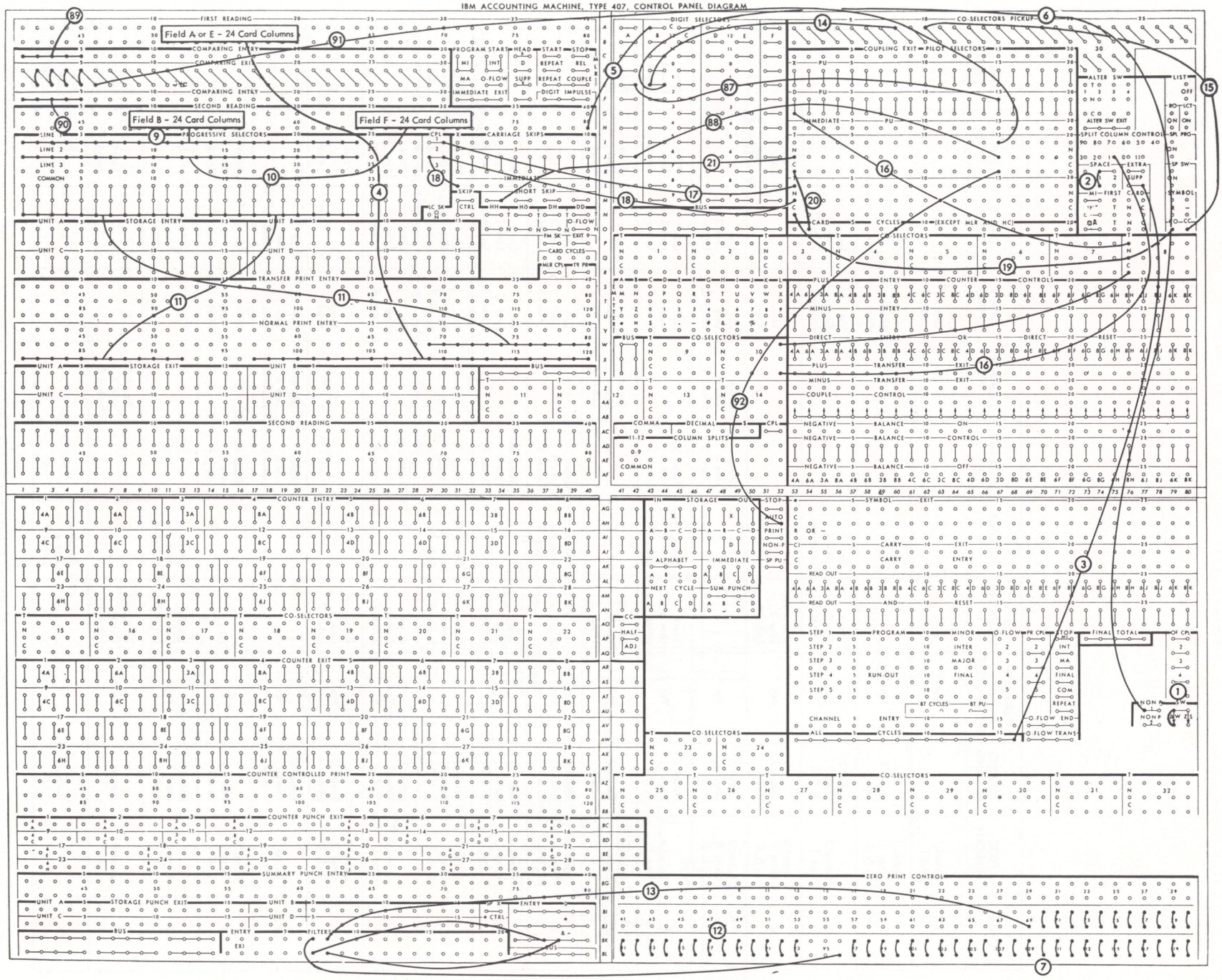


Figure 18. 1-3 System: Diagram 1, Lines 1 and 2, Skip and Sequence Control

WIRING DESCRIPTION: Diagram I (Figure 18)

1. The A-W switch is wired.

2, 3. Normal spacing is wired and suppressed because all tape movement is controlled by skipping.

4. The card field *(A, E)* for line 1 is wired from FIRST READING to print wheels 97-120.

5, 6. Code column is wired through DIGIT SELECTOR to NON-PRINT 1. This causes a non-print operation of card field *B* in line 1 printing area when a 6-card (second card of a group) is at first reading.

7, 8. Normal ZERO-PRINT CONTROL is wired with a path to the fuse to permit printing special characters to the left in line 1.

9-11. Card fields *B* and *F* for line 2 are wired to LINE 1 and LINE 2, respectively, of the PROGRESSIVE SELECTOR, and from the COMMON to print wheels 69-92.

12, 13. Normal ZERO-PRINT CONTROL is wired with a path to the fuse to permit printing special characters to the left in line 2.

14-18. An equivalent 1-impulse at second reading (14-16) controls the printing of either field *B* or field *F*.

18-21. Skip Control
Carriage Operation (skip-to-1 before each second line) is initiated by CO-SELECTOR 8 and PILOT SELECTOR 1 which is normal for 3-cards at second reading. A short impulse (CO-CC) is used to prevent erroneous skipping.

87-92. Sequence Control
A 1-card (first card of a two-card group) must be followed by a 6-card (87, 88) of the same control group (89-91).

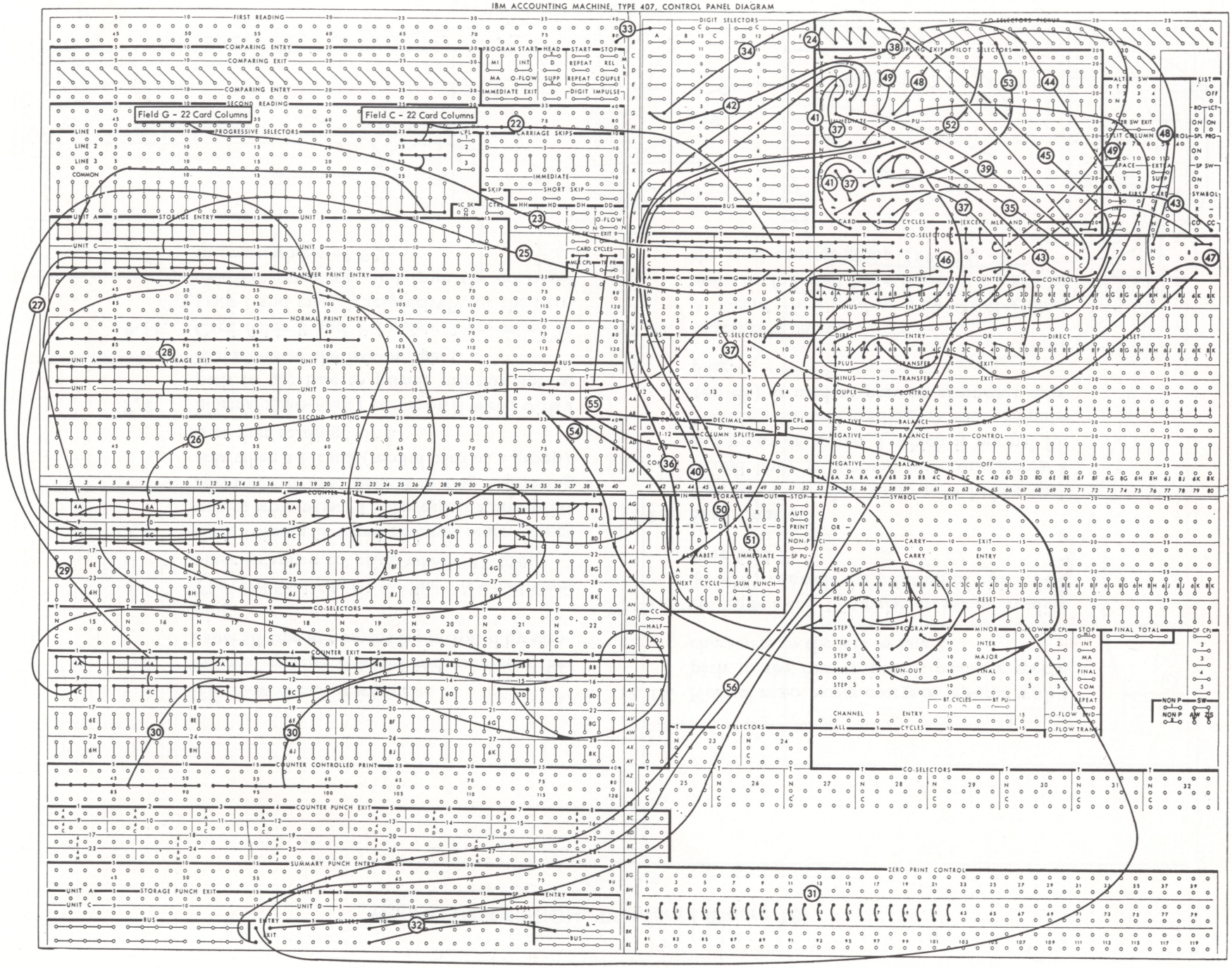


Figure 19. 1-3 System: Diagram II, Line 3

WIRING DESCRIPTION: Diagram II (Figure 19)

22-27. Card fields *C* and *G* for line 3 are wired to the entries of storage groups I and III. PILOT SELECTOR 1 (17, 18) controls the selection of the two fields through the unused portion of the PROGRESSIVE SELECTOR of LINE 1 and LINE 2 and CO-SELECTORS 1-4.

28-30. The exits of storage groups I and III are wired to print wheels 41-62.

31, 32. Normal ZERO-PRINT CONTROL is wired with a path to the fuse to permit printing special characters to the left in line 3.

33-47. This wiring alternates the read-in of storage groups I and III with each 3-card. The cycle begins with the first 3-card picking PILOT SELECTOR 2 and causing storage group I to read in (33-36). PILOT SELECTOR 2 is then re-picked by an emitted *X* (37) through CO-SELECTOR 6 and its own point. The next 3-card through CO-SELECTOR 7, which is coupled to PILOT SELECTOR 2 (38), picks PILOT SELECTOR 3 to cause storage group II to read in (39, 40). PILOT SELECTOR 3 is then re-picked through its own point until the next 3-card (41). To prevent overloading, CARD-CYCLES impulses, through CO-SELECTORS 5 and 8, are used to read in the remainder of storage groups I and III (42-47).

48-56. This wiring alternates the read-out of storage groups I and III through PILOT SELECTORS 5 and 6 (48, 49) which are transferred one cycle after the storage groups read in. CARD-CYCLES impulses through CO-SELECTORS 11 and 12, are used to prevent overloading (54, 55). Zone-storage counters must be DIRECT RESET (56).

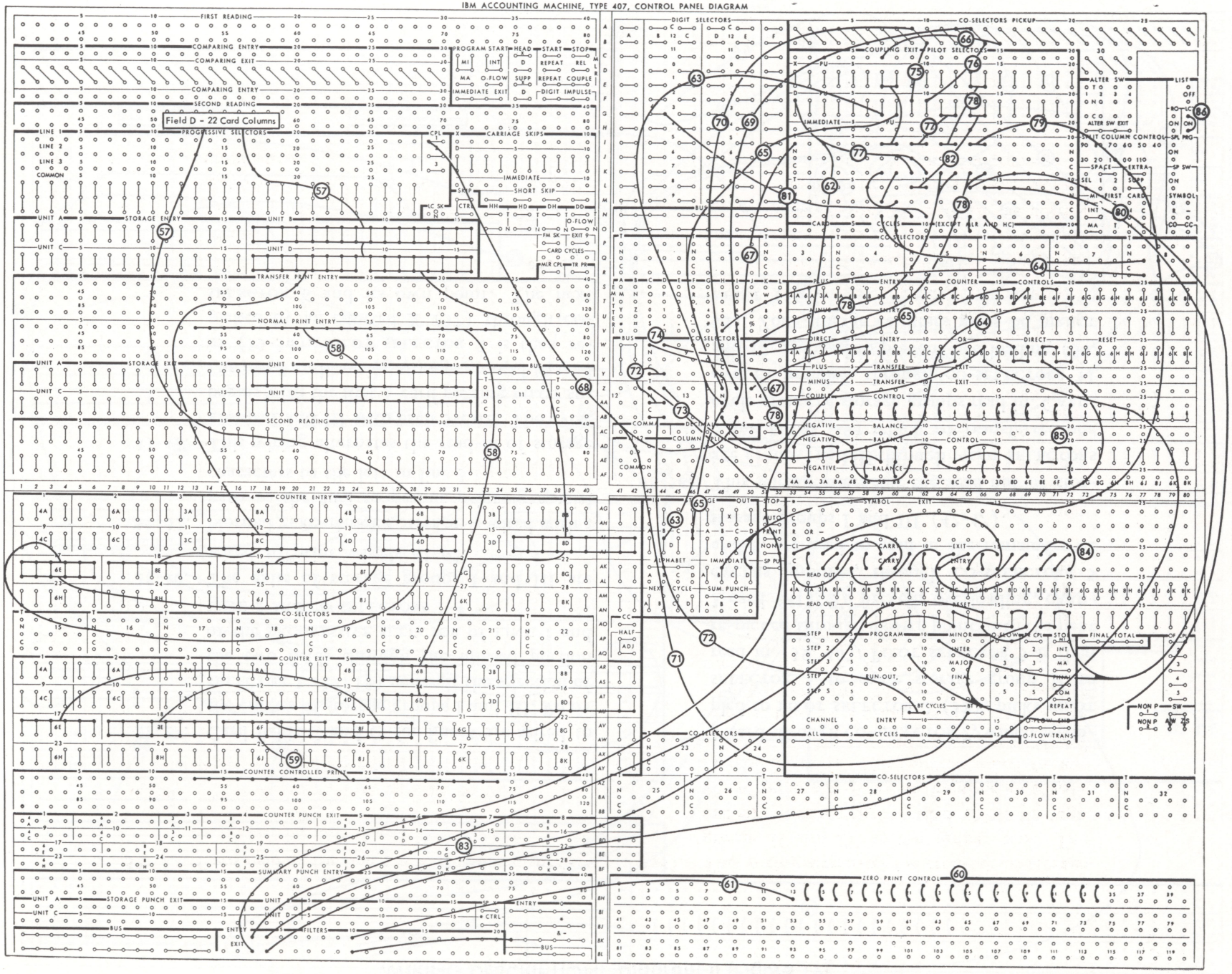


Figure 20. 1-3 System: Diagram III, Line 4

WIRING DESCRIPTION: Diagram III (Figure 20)

57. Card field *D* for line 4 is wired to the entries of storage groups II and IV.

58, 59. The exits of storage groups II and IV are wired to print wheels 13-34.

60, 61. Normal ZERO-PRINT CONTROL is wired to permit printing special characters to the left in line 4.

62-74. This wiring alternates the read-in of storage groups II and IV. The cycle is initiated by the first 1-card (62), through the normal points of CO-SELECTOR 14, picking PILOT SELECTOR 7 and causing storage group II to read in (63). PILOT SELECTOR 7 is re-picked through its own point by an emitted & (64) until the next 1-card is read. This second 1-card, through the transferred points of CO-SELECTOR 14, causes storage group IV to read in and PILOT SELECTOR 8 to pick (65). PILOT SELECTOR 7 then drops and PILOT SELECTOR 8 re-picks through its own point (64). CO-SELECTOR 14, which is coupled to PILOT SELECTOR 7 (66), also controls the remainder of storage groups II and IV (66-70). BALANCE-TEST-CYCLES impulses, through CO-SELECTORS 9 and 13, are used to prevent overloading (71-74).

75-83. This wiring alternates the read-out of storage groups II and IV at the proper time. The cycle is initiated by a 1-card (77), through PILOT SELECTOR 9 or 10, picking PILOT SELECTOR 11 or 12. This controls PILOT SELECTOR 13 or 14 by a COLUMN-SPLIT-COUPLE impulse to cause storage groups II and IV to read out (78-80). However, if a 3-card is present, the delay of PILOT SELECTOR 11 or 12 is bypassed (81, 82). This picks PILOT SELECTOR 13 or 14 directly to cause storage groups II and IV to read out at the proper time. Zone-storage counters must be DIRECT RESET (83).

84, 85. The zone-storage counters are set up individually for carry and for NEGATIVE BALANCE OFF. The remaining counters are coupled into groups as pre-arranged to form the four storage groups. This provides for proper printing when a single-counter group contains all 9's as when storing the numeric portion of the letters *riz* in Arizona. This would result in 0's if treated as a single counter rather than a portion of a group.

86. LAST CARD TOTAL switch is wired to clear the counters on run-in and run-out. [If this hub is not available, wire 47 through the normal point of CO-SELECTOR 10 to MAJOR PROGRAM START will perform the same function.]

Appendix

1. The use of the Address-Writing Feature, or the instructions given in this manual of operation, in no way alters the *Operating Rules and Suggestions* given in the 407 Accounting Machine Manual of Operation, Form 22-5765.

2. The tape recommended is IBM part 252407, or equivalent, according to Engineering Specification 894753:

   Weight: 16-pound no. 1 sulphite bond
   Tensile Strength: 20 pounds per 1-inch width
   Thickness: .0032 ± .0002 inch
   Width: .875 ± .005 inch
   Reel: inside diameter 3 inches; outside diameter not over 11 inches.

   Paper must be white, clean cut and free of fuzz.

3. Because of the unique nature of the heat-transfer process, IBM carbon paper, or equivalent, must be used for satisfactory results. This may be purchased under parts 242920 (250 sheets) and 243118 (1000 sheets). A 9½-inch carbon paper (part 244638) is available for applications where only 3-line carbon masters are printed.

IBM®

IBM 407 ADDRESS-WRITING FEATURE

Form 224-6391-1

Form 224-6391-1 (12-58:2M-JC)