IBM

IBM System/360 Operating System

System Operation Training Manual

Book of Illustrations

Student Text

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Preface

This publication contains the illustrations for *IBM System/360 Operating System: System Operation Training Manual (C20-1680).*

Contents

The punched card is used for recording up to 80 standard characters of data.

Whenever a "Read Card" command is given, all 80 columns pass the reading station. However, it is possible to control the number of bytes that are transferred to core storage so that as many as all 80 are transferred or as few as one.

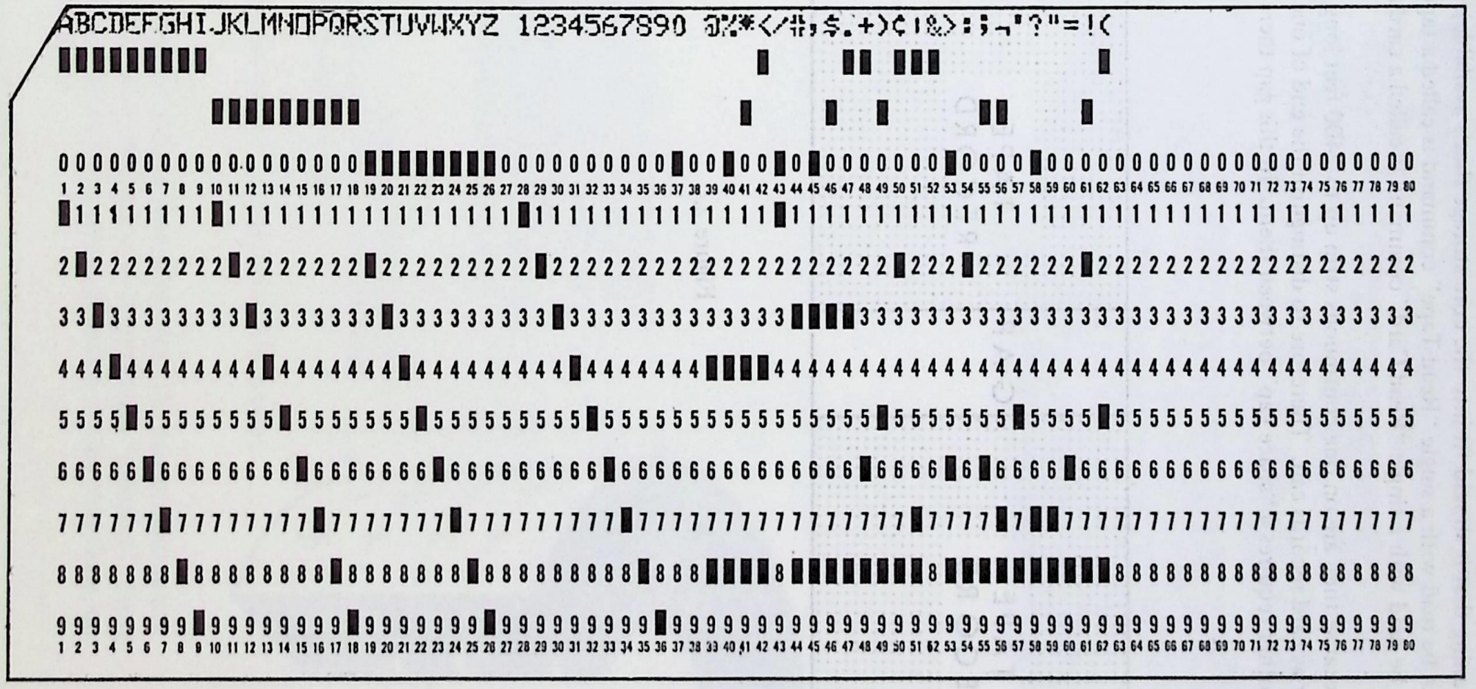


Figure 1.

Data on tape is not restricted to a fixed length as on cards. The data on tape may be of any practical length ("practical" meaning that it should fit into the core storage that's available). When recorded on tape, all the data that can be read with a single "Read Tape" command is called a tape record. (Similarly, all of the data that might be read with a single "Read Card" command is called a card record.)

Tape records, because they are on one continuous strip up to 2400 feet long, cannot be physically separated from each other as card records can. Therefore to distinguish the end of one tape record from the beginning of another requires a "space gap" between them. In this gap there is *absolutely nothing* . . . not even blanks.

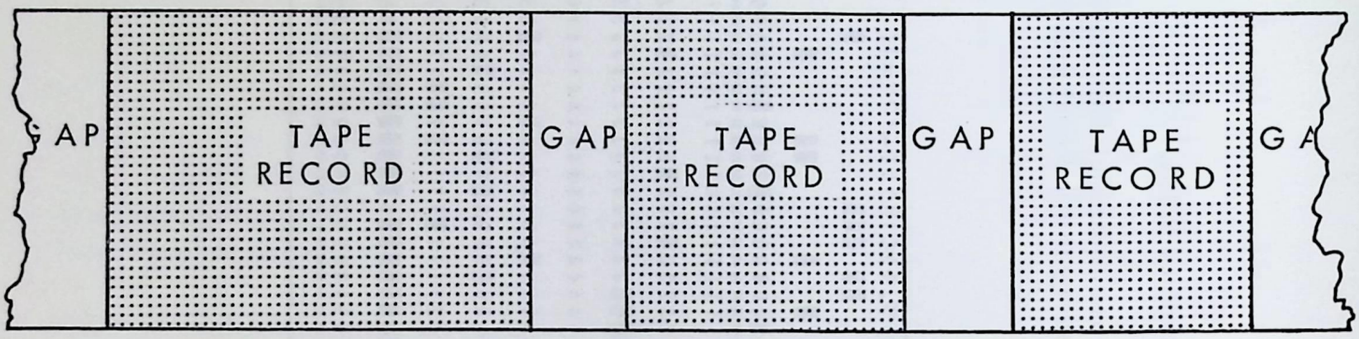
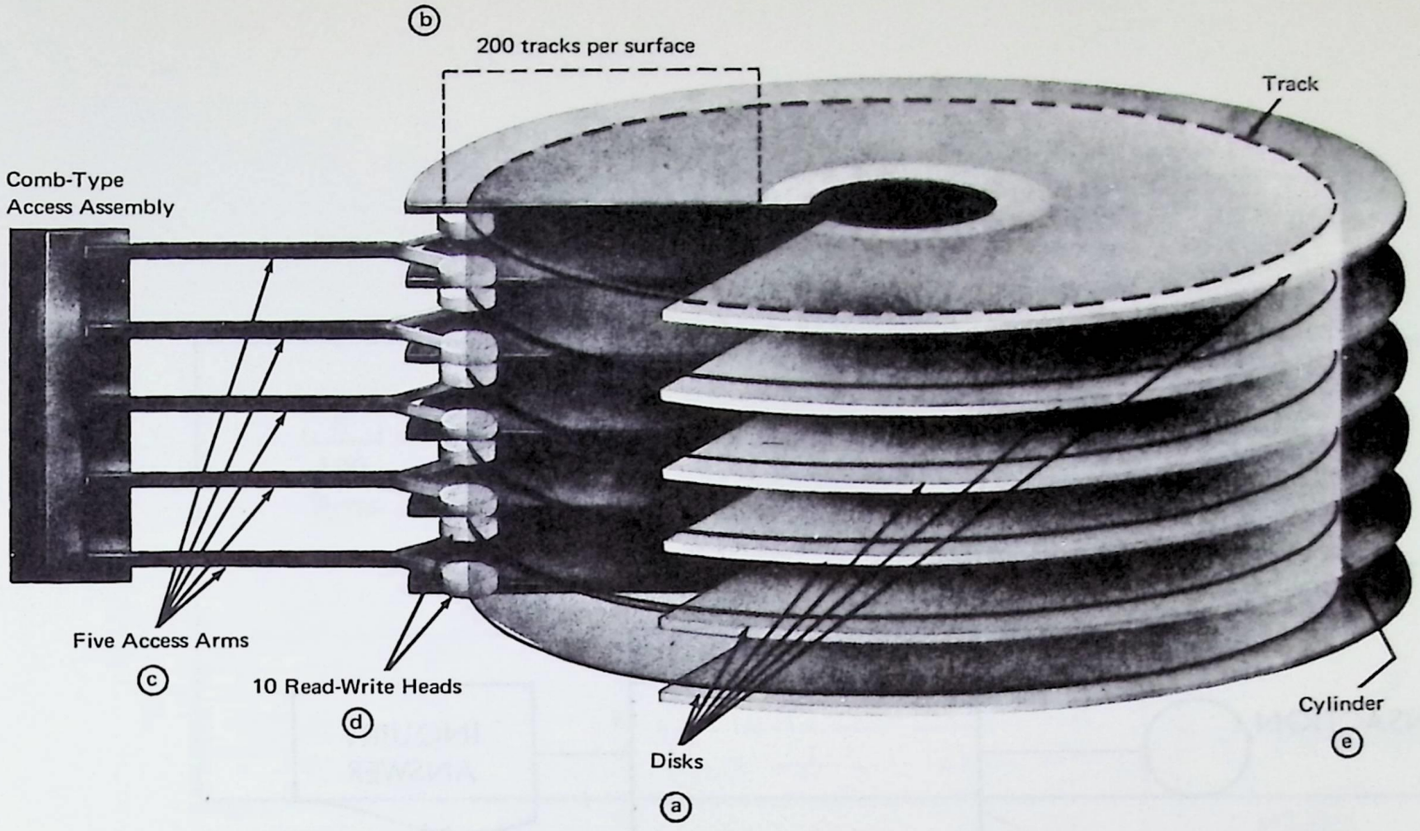
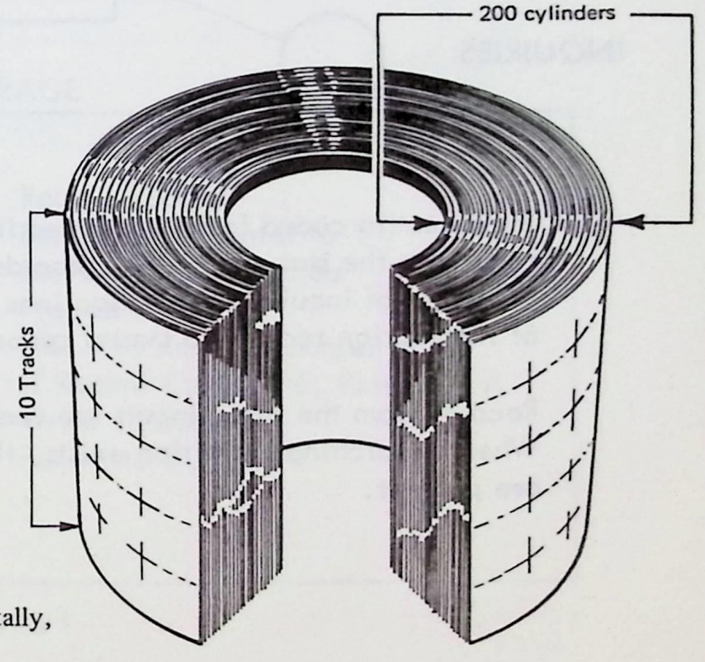


Figure 2.





The 2311 Disk Storage Drive accommodates removable disk packs. Each pack consists of six disks mounted on a vertical shaft (a) . The top surface of the top disk and the bottom surface of the bottom disk are not used. Hence, each disk pack contains ten recording surfaces. Each surface is subdivided into 200 usable tracks (b) .

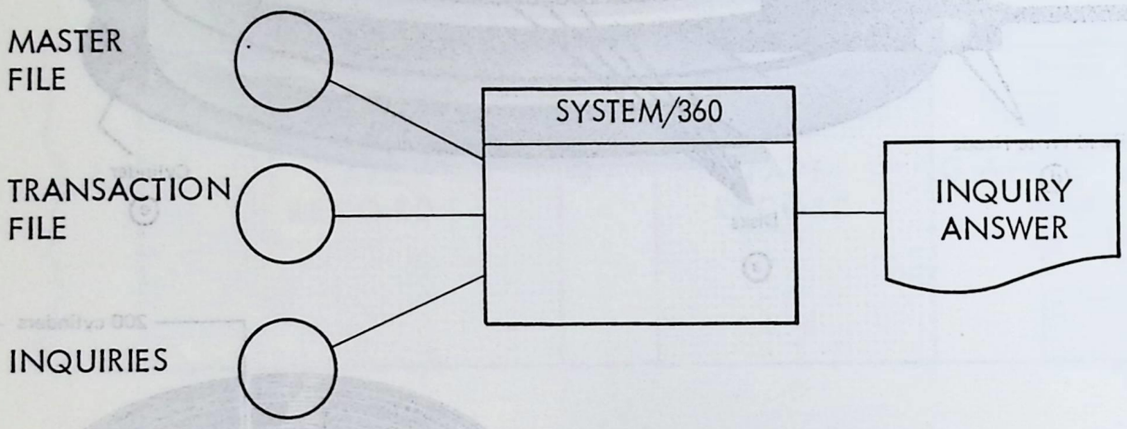
The access mechanism consists of a group of five arms (c) . – each arm has two read/write heads, hence one read/write head for each of the recording surfaces (d) .

The ten read/write heads *always* move in unison and horizontally, across the ten disk surfaces.

Ten tracks are readable or writable with each positioning of the access mechanism. These ten vertically-related tracks are referred to as comprising a "cylinder." Since there are 200 different positionings of the access mechanism, we say that there are 200 cylinders per disk pack (e) .

Each track may contain up to 3,625 bytes – this is also the maximum length a disk record may be. More than one disk record may be on a track. However, because gaps are required to distinguish successive disk records, a track will contain less than 3,625 bytes when a track has two or more records. For example, if punched card images were to be recorded on disk, each track could contain at most, 25 individual records of 80 characters each or a total of 2,000 characters.

Figure 3.



Inquiries (in coded form and transcribed onto tape) are often made regarding the status of master records and transactions against them. The ratio of inquiries to transactions may be 1 in 5 while the ratio of transaction records to master records may be 1 in 20.

Records from the three inputs are read until matching records are found. When a matching condition exists, the inquiry is processed and the results are put out.

Figure 4.

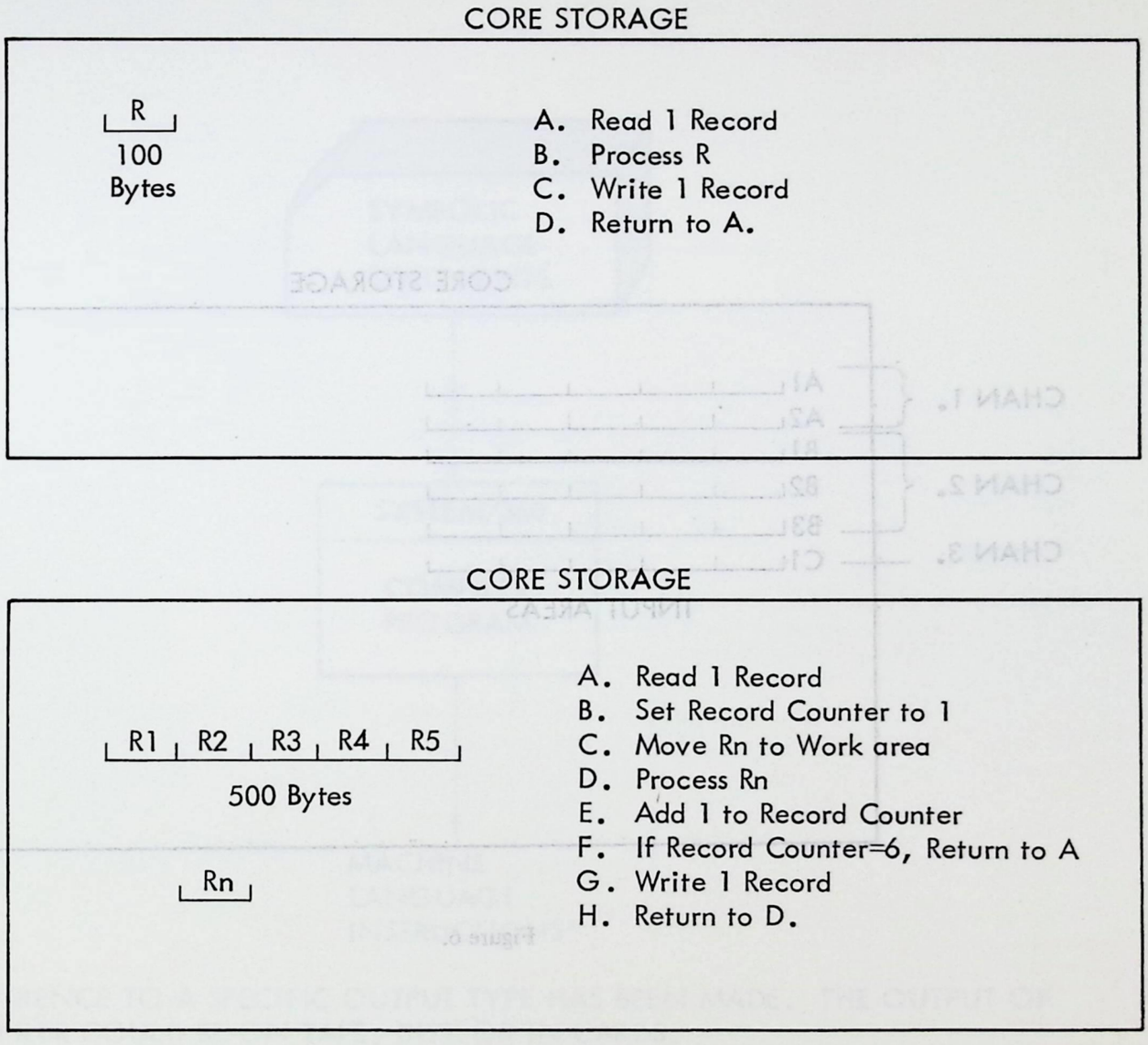

CORE STORAGE
R
100
Bytes
A. Read 1 Record
B. Process R
C. Write 1 Record
D. Return to A.
CORE STORAGE
R1 R2 R3 R4 R5
500 Bytes
Rn
A. Read 1 Record
B. Set Record Counter to 1
C. Move Rn to Work area
D. Process Rn
E. Add 1 to Record Counter
F. If Record Counter=6, Return to A
G. Write 1 Record
H. Return to D.

Figure 5.

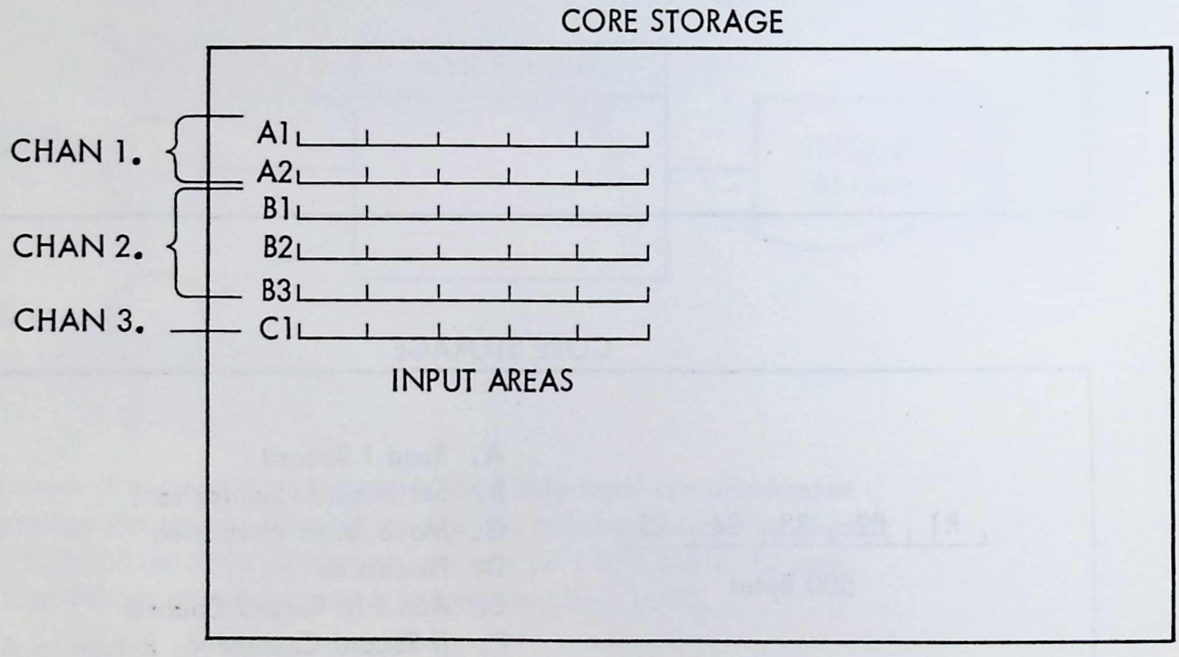
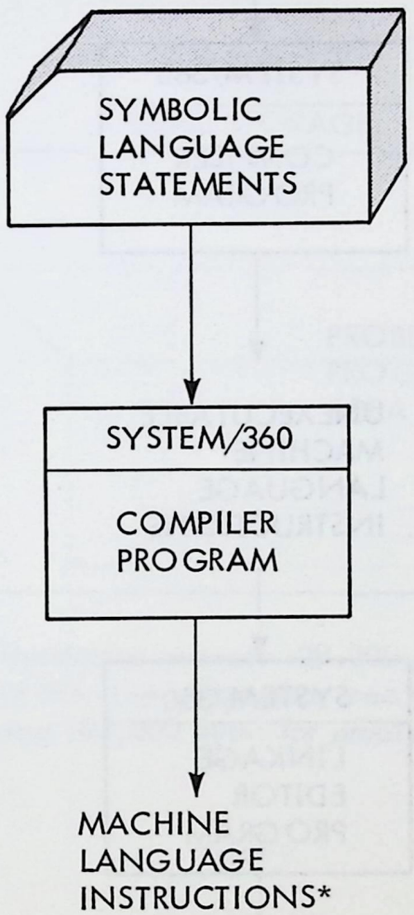


Figure 6.



*NO REFERENCE TO A SPECIFIC OUTPUT TYPE HAS BEEN MADE. THE OUTPUT OF A COMPILER COULD BE ON TAPE, DISK OR IN CARDS.

Figure 7.

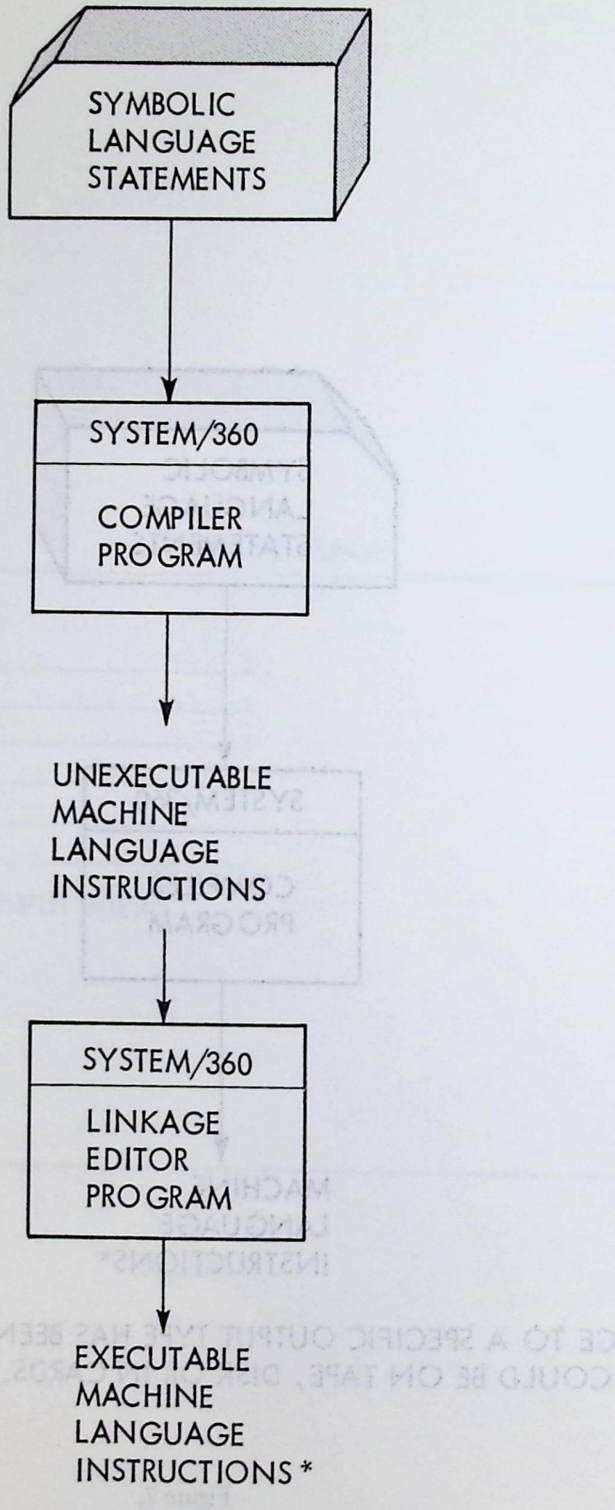
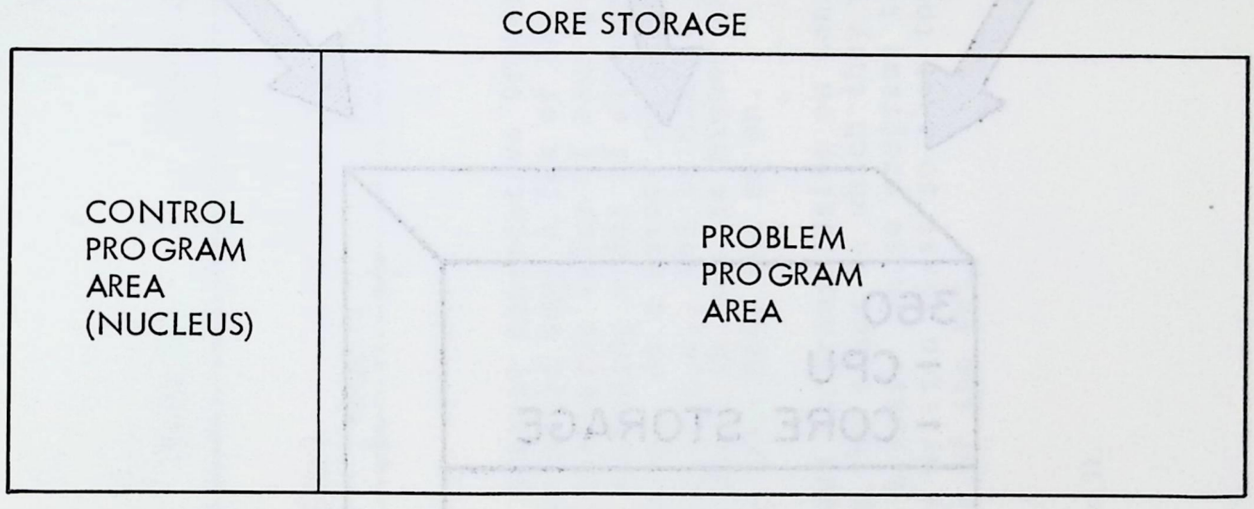
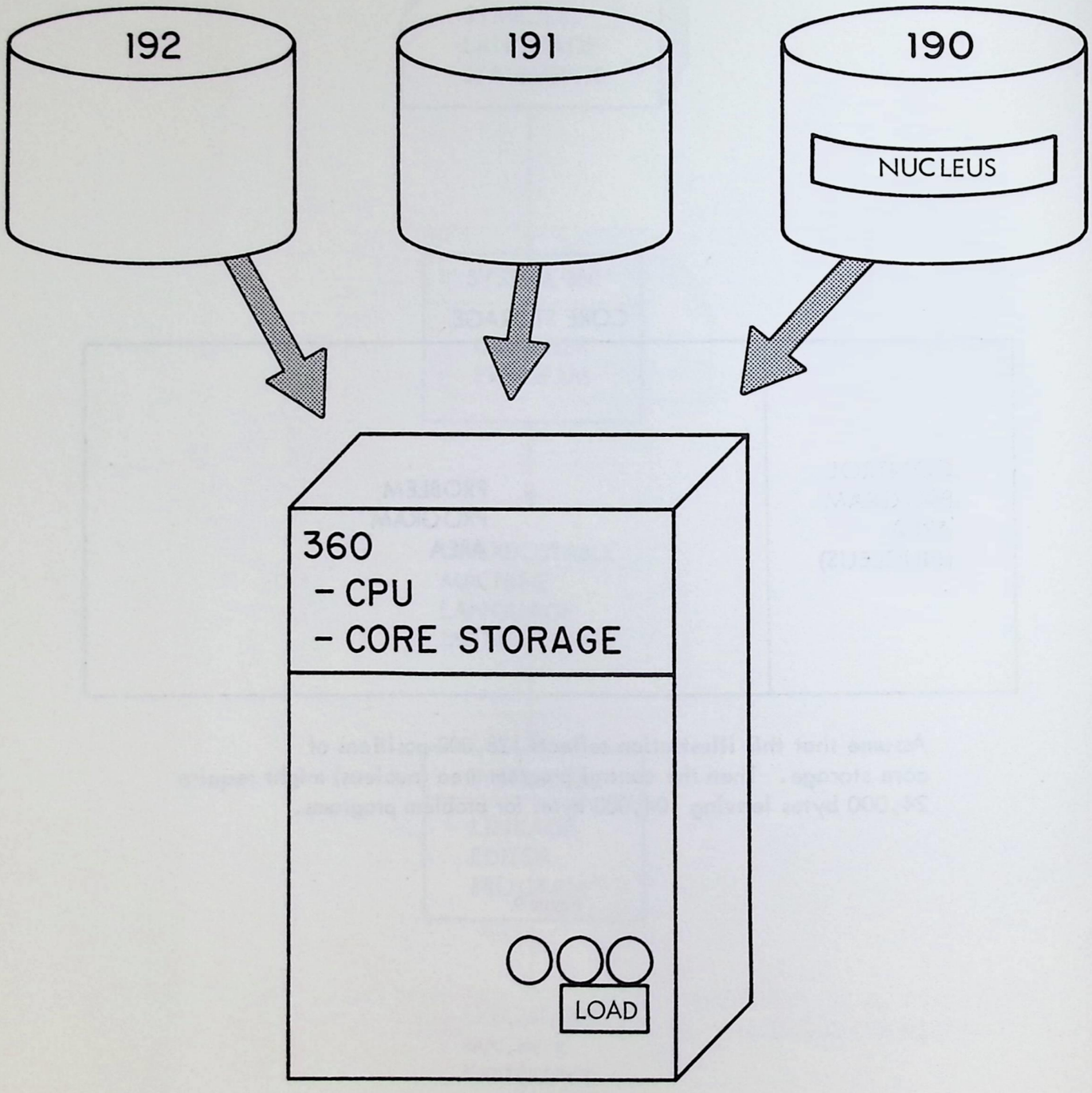

SYMBOLIC
LANGUAGE
STATEMENTS
SYSTEM/360
COMPILER
PROGRAM
UNEXECUTABLE
MACHINE
LANGUAGE
INSTRUCTIONS
SYSTEM/360
LINKAGE
EDITOR
PROGRAM
EXECUTABLE
MACHINE
LANGUAGE
INSTRUCTIONS *
*THE OUTPUT FROM THE LINKAGE EDITOR
PROGRAM IS ALWAYS PLACED ON DISK STORAGE.

Figure 8.



Assume that this illustration reflects 128,000 positions of core storage. Then the control program area (nucleus) might require 24,000 bytes leaving 104,000 bytes for problem programs.

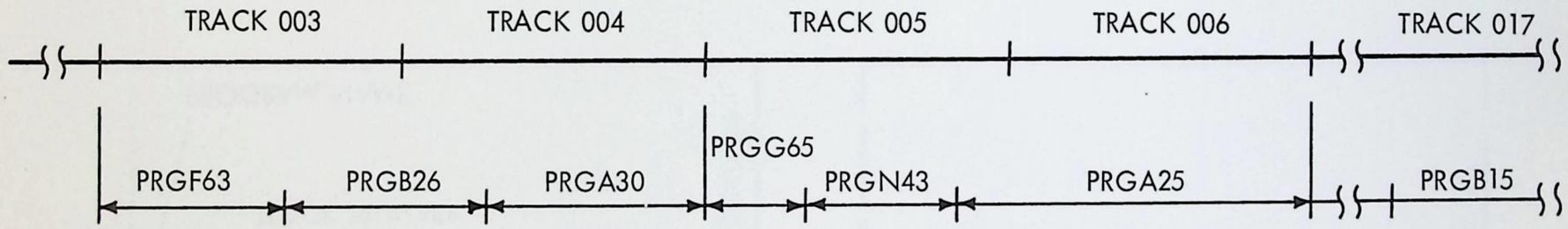
Figure 9.



IN THE BEGINNING

CORE STORAGE IS EMPTY

Figure 10.



This is a schematic of how several consecutive tracks projected in a straight line would keep a few of the 1,000 programs. Note the alphameric value of each program name: they are not in ascending order of alphameric values---they don't have to be. As a matter of fact, these values are all mixed up---i.e., F63 is higher in alphameric value than B26, which in turn is higher than A30, which in turn is lower than G65, and so on.

The order in which these 1000 programs reside on consecutive tracks is the same as the order in which they were initially written onto the tracks. Those programs that are used most are intentionally written first so that they will be closest to the beginning of the set.

Figure 11.

—— THE DIRECTORY STARTS ON TRACK 000

—— THE ENTRIES IN THE DIRECTORY REFERENCE THE ITEMS STARTING IN TRACK 003 (AS SHOWN IN FIGURE 11)

TRACK 000

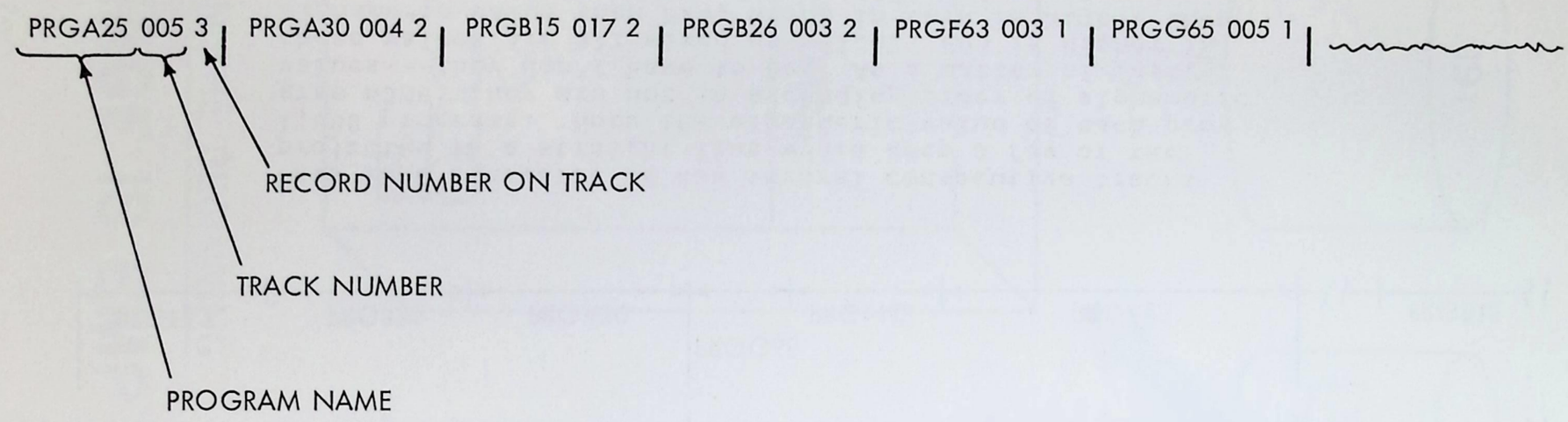


Figure 12.

NUCLEUS	INITIATOR DETERMINES I/O AVAILABILITY AND IF SATISFIED, TELLS NUCLEUS TO LOAD THE PROBLEM PROGRAM

NUCLEUS	FORTCOMP COMPILES A MACHINE LANGUAGE PROGRAM FROM FORTRAN SOURCE STATEMENTS AND PLACES THE MACHINE LANGUAGE INSTRUCTIONS ONTO DISK (OR ALTERNATIVELY ONTO TAPE OR INTO CARDS)

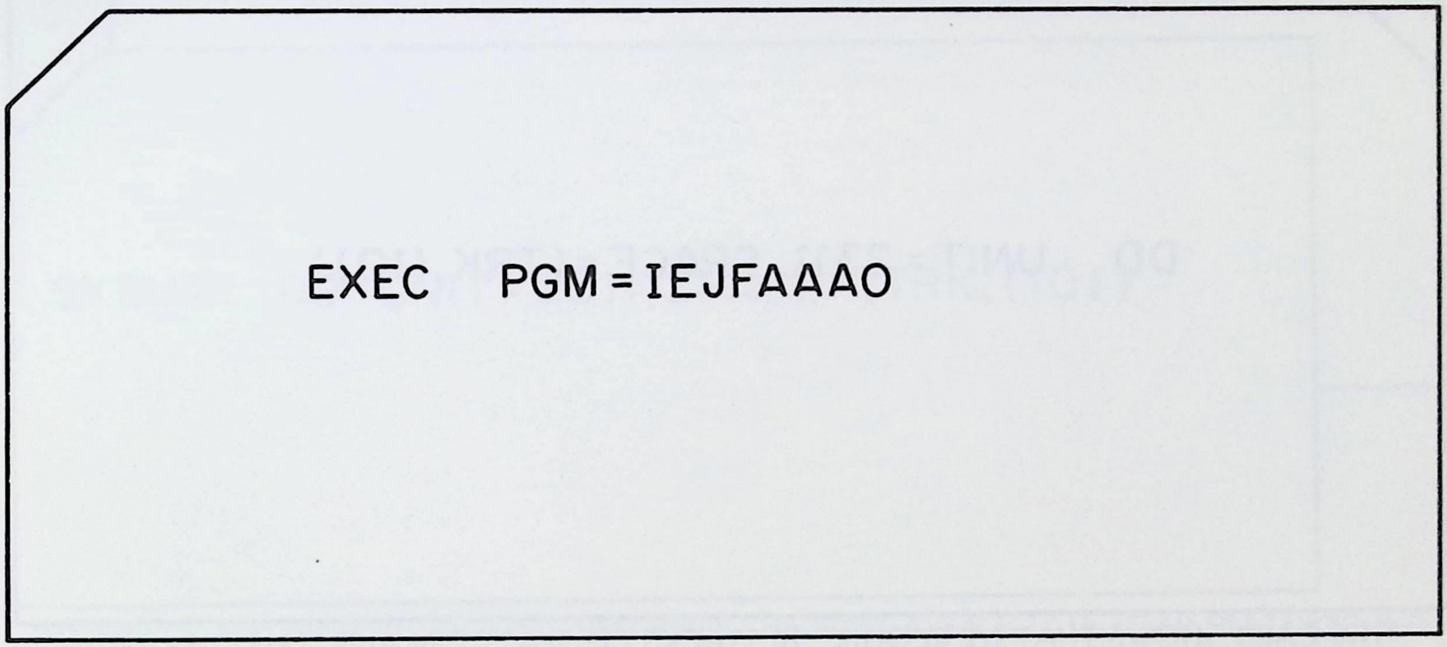
Figure 13.

NUCLEUS	RDRINTRP 1. READS CODED DESCRIPTION OF I/O REQUIREMENTS AND NAME OF REQUESTED PGM 2. INTERPRETS AND ASSEMBLES CODED DESCRIPTIONS FOR USE BY INITIATOR 3. TELLS NUCLEUS TO LOAD INITIATOR

NUCLEUS	INITIATOR DETERMINES I/O AVAILABILITY AND IF SATISFIED, TELLS NUCLEUS TO LOAD PROBLEM PROGRAM

NUCLEUS	FORTCOMP COMPILES A MACHINE LANGUAGE PROGRAM FROM FORTRAN SOURCE STATEMENTS AND PLACES THE MACHINE LANGUAGE INSTRUCTIONS ONTO DISK (OR ALTERNATIVELY ONTO TAPE OR INTO CARDS)

Figure 14.



THIS ILLUSTRATION SHOWS SOME OF THE DATA REQUIRED BY THE READER/INTERPRETER SO IT CAN TELL THE INITIATOR THAT THE REQUESTED PROGRAM IS CALLED IEJFAAA0. (IEJFAAA0 IS THE NAME OF A FORTRAN COMPILER PROGRAM)

Figure 15.

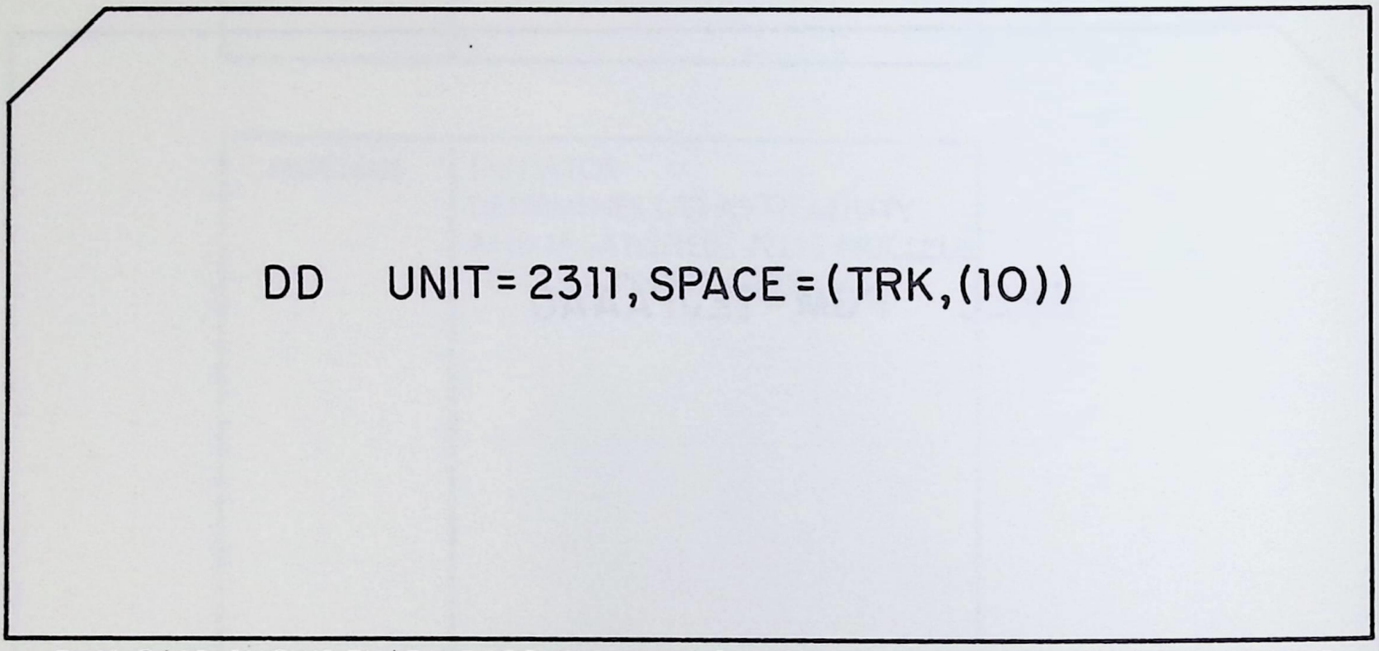
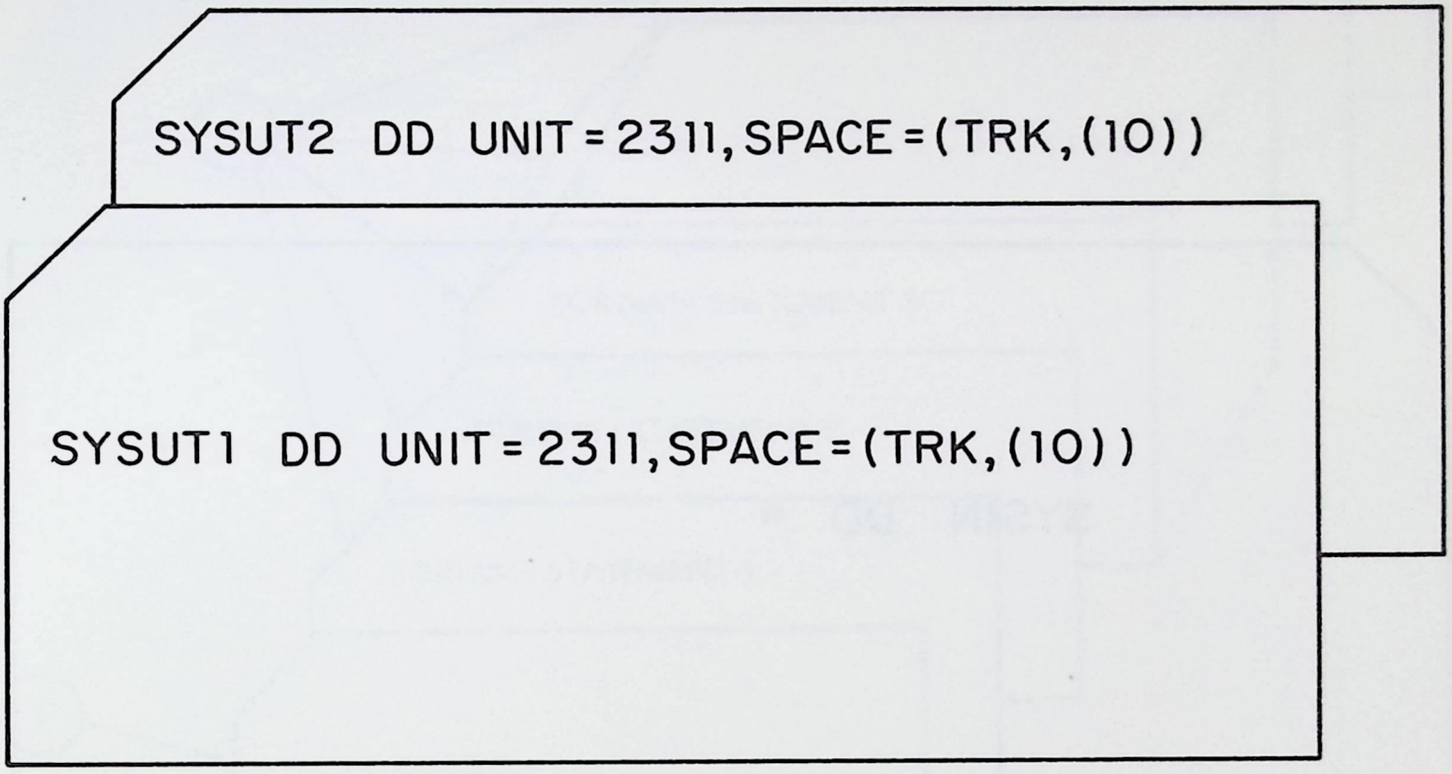
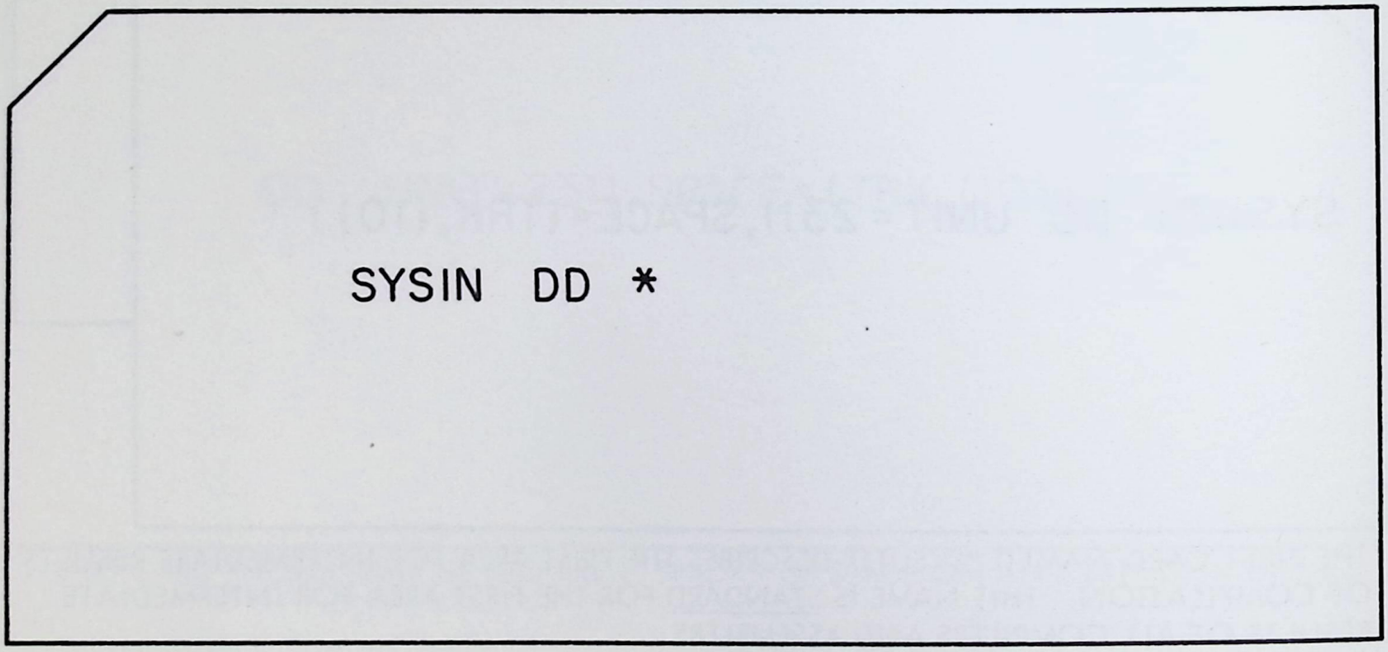

DD UNIT=2311,SPACE=(TRK,(10))
THIS CARD SHOWS THAT WE REQUIRE 10 TRACKS OF SPACE ON ANY 2311 DISK DRIVE

Figure 16.



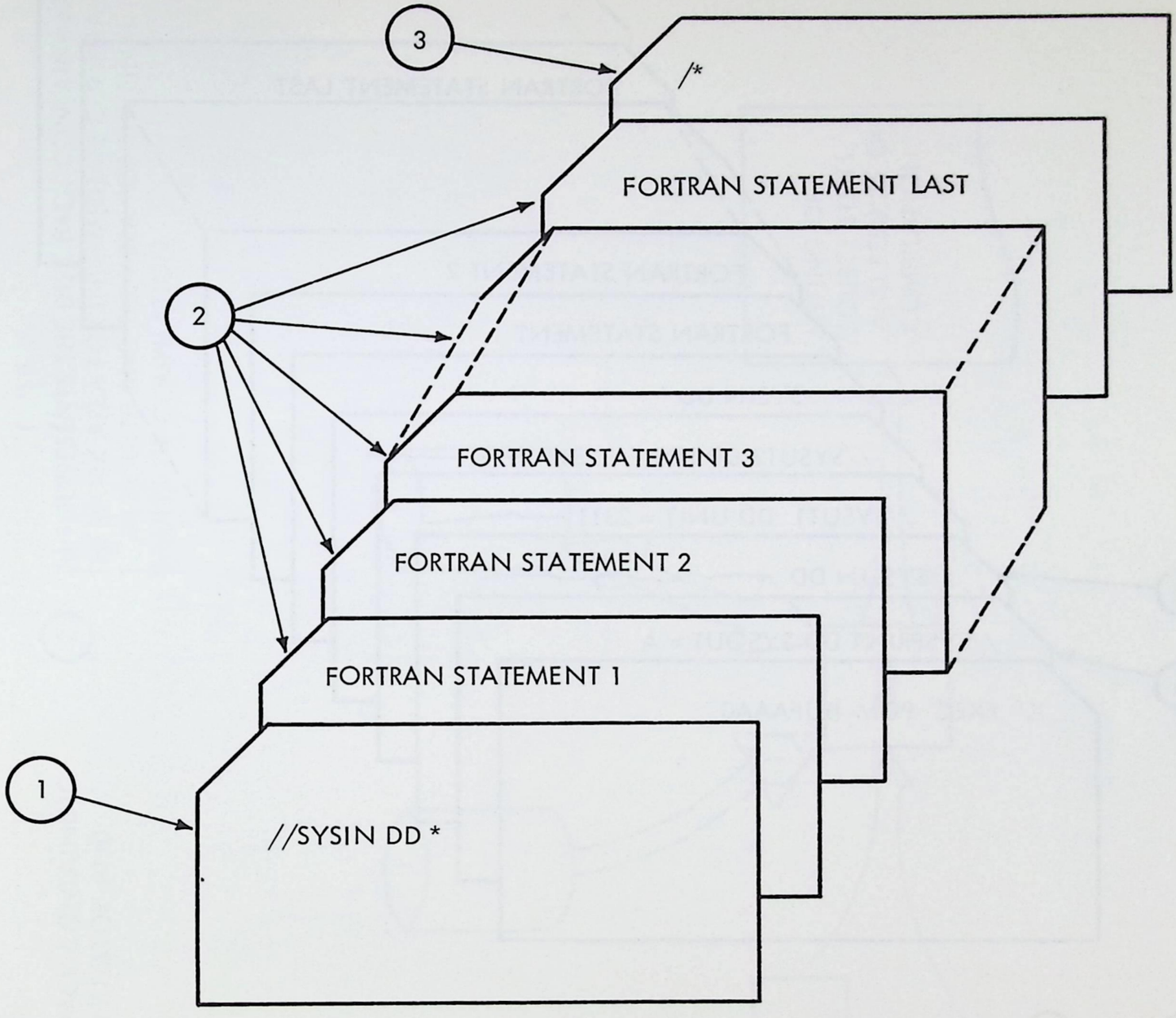
THE FIRST CARD NAMED "SYSUT1" DESCRIBES THE FIRST AREA FOR INTERMEDIATE RESULTS OF COMPILATION. THIS NAME IS STANDARD FOR THE FIRST AREA FOR INTERMEDIATE RESULTS OF ALL COMPILERS AND ASSEMBLERS
SYSUT2 IS LIKEWISE STANDARD, AND IT DESCRIBES THE SECOND AREA REQUIRED FOR INTERMEDIATE RESULTS

Figure 17.



THE ASTERISK INFORMS THE READER/INTERPRETER THAT THE CARDS WHICH FOLLOW THIS ONE CONTAIN DATA TO BE PROCESSED BY THE PROBLEM PROGRAM

Figure 18.

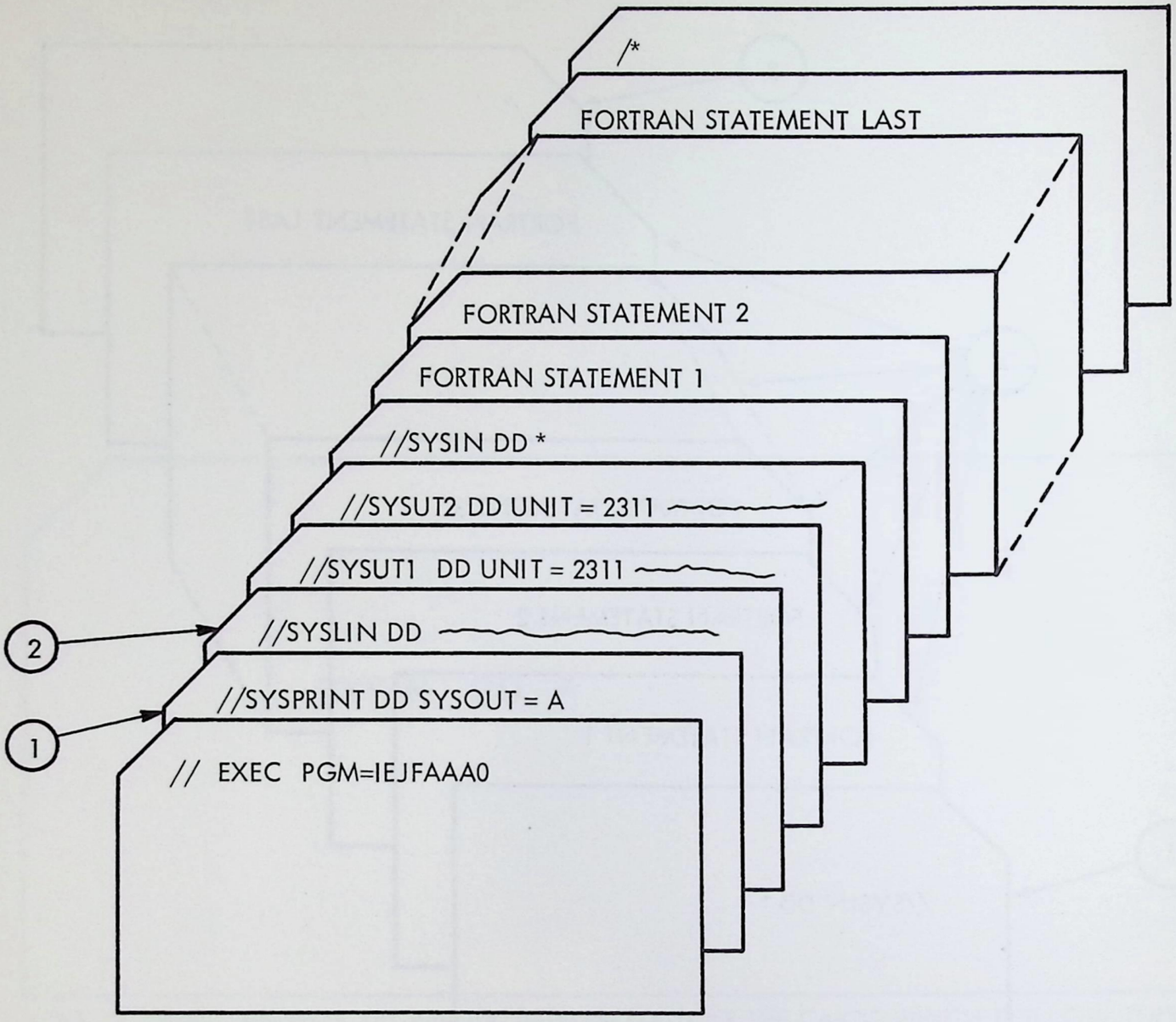


1 THE "//" IN COLUMNS 1 AND 2 DISTINGUISHES CARDS FOR THE READER/ INTERPRETER FROM DATA CARDS

2 EXCEPT UNDER CERTAIN SPECIAL CIRCUMSTANCES, DATA CARDS SHOULD NOT HAVE A "//" IN COLUMNS 1 AND 2

3 THE "/*" IN COLUMNS 1 AND 2 SIGNIFY THAT THERE ARE NO MORE DATA CARDS

Figure 19.



(1) AND (2) THESE CARDS DESCRIBE I/O REQUIREMENTS THAT WEREN'T PREVIOUSLY DISCUSSED. (1) DESCRIBES THE REQUIREMENT FOR A PRINTER AND (2) DESCRIBES THE REQUIREMENT FOR 5 TRACKS OF SPACE ON A DISK PACK

Figure 20.

(1) THIS REPRESENTS THE DISK PACK CONTAINING THE READER/INTERPRETER, INITIATOR AND FORTRAN COMPILER

(2) THIS REPRESENTS THE DISK PACK CONTAINING THE WORK AREA FOR INTERMEDIATE COMPILATION RESULTS AND THE AREA FOR THE FINAL RESULTS OF COMPILATION

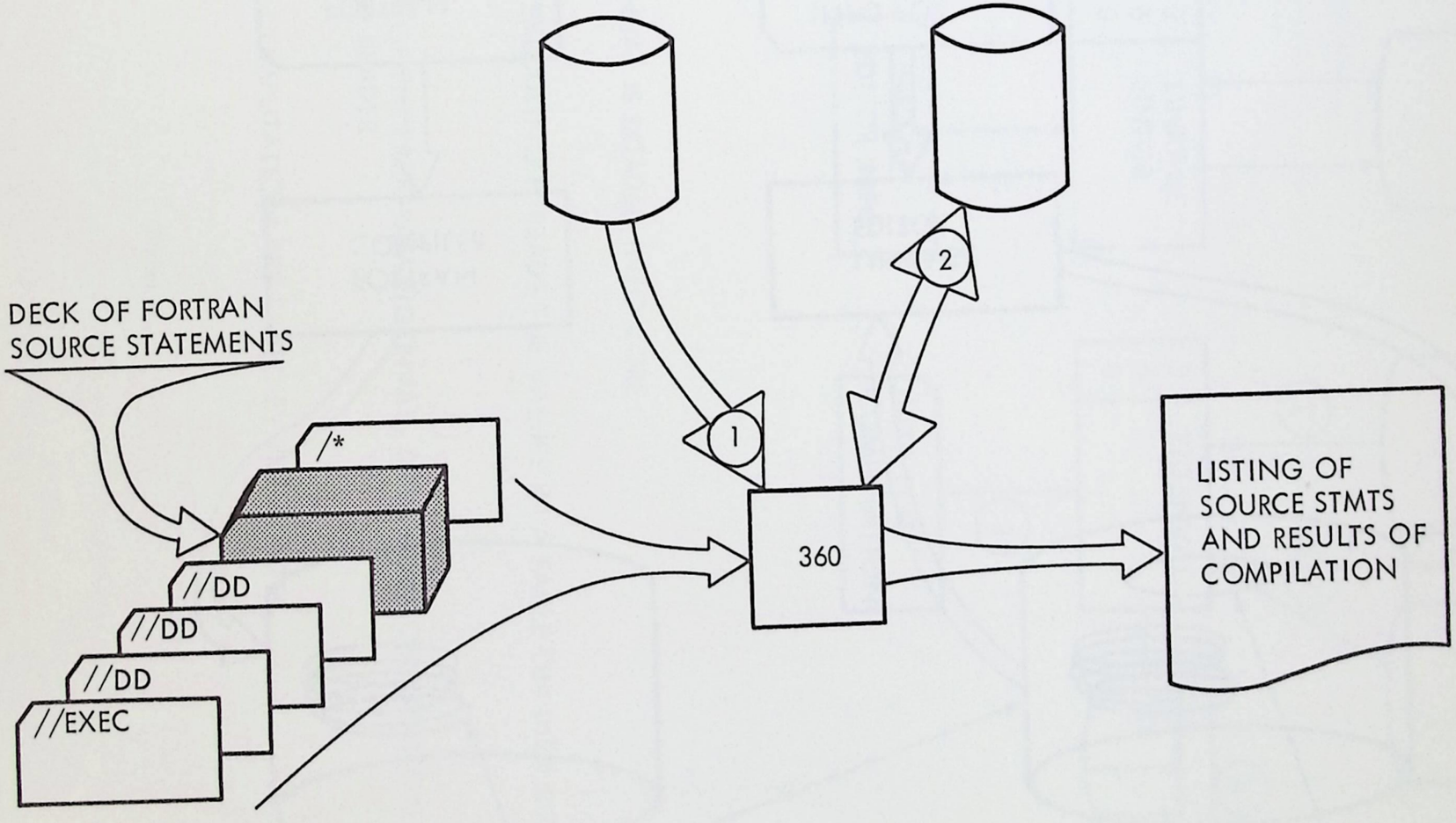


Figure 21.

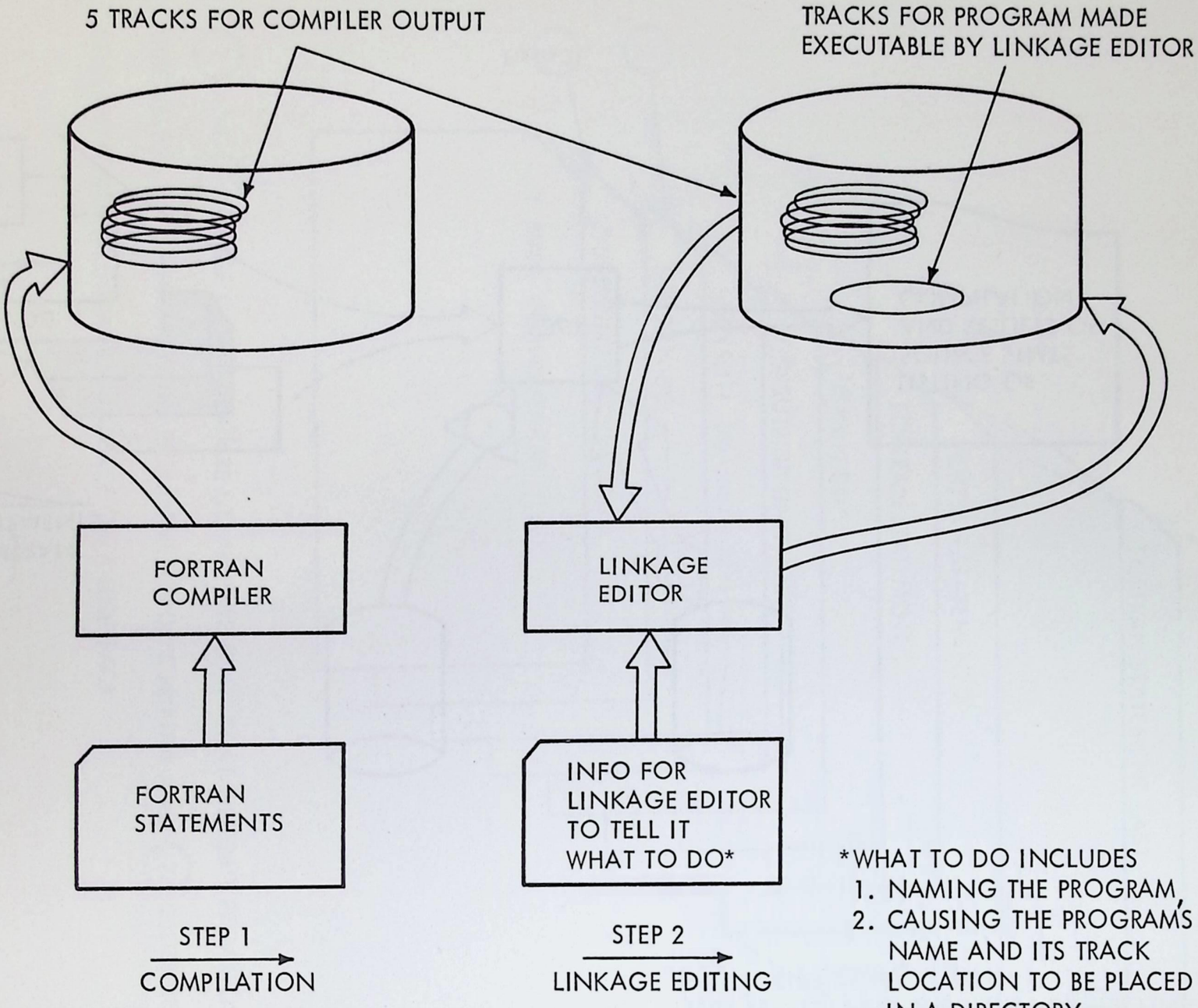
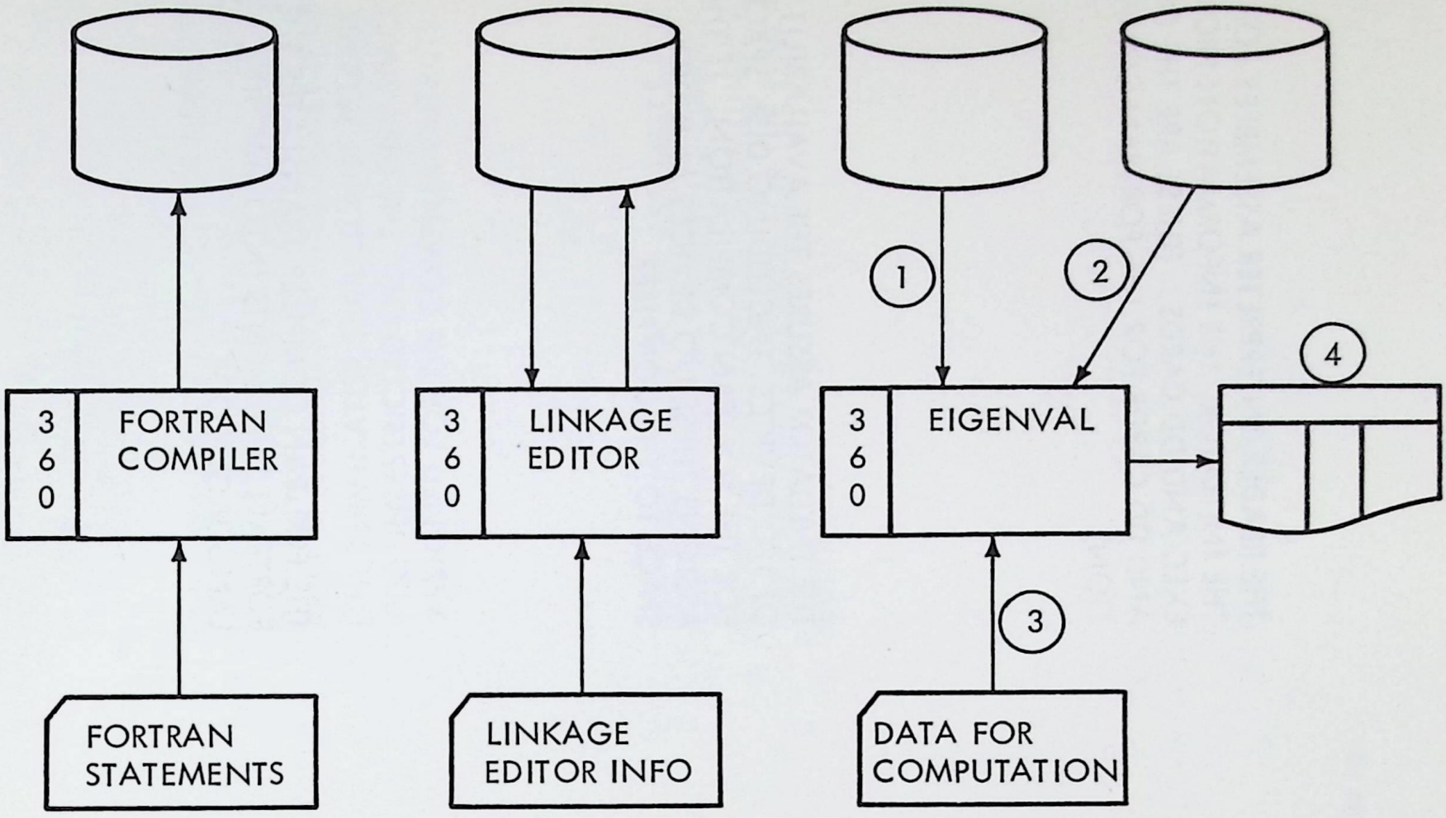

5 TRACKS FOR COMPILER OUTPUT
TRACKS FOR PROGRAM MADE EXECUTABLE BY LINKAGE EDITOR
FORTRAN COMPILER
LINKAGE EDITOR
FORTRAN STATEMENTS
INFO FOR LINKAGE EDITOR TO TELL IT WHAT TO DO*
STEP 1
COMPILATION
STEP 2
LINKAGE EDITING
*WHAT TO DO INCLUDES
1. NAMING THE PROGRAM,
2. CAUSING THE PROGRAM'S NAME AND ITS TRACK LOCATION TO BE PLACED IN A DIRECTORY

Figure 22.



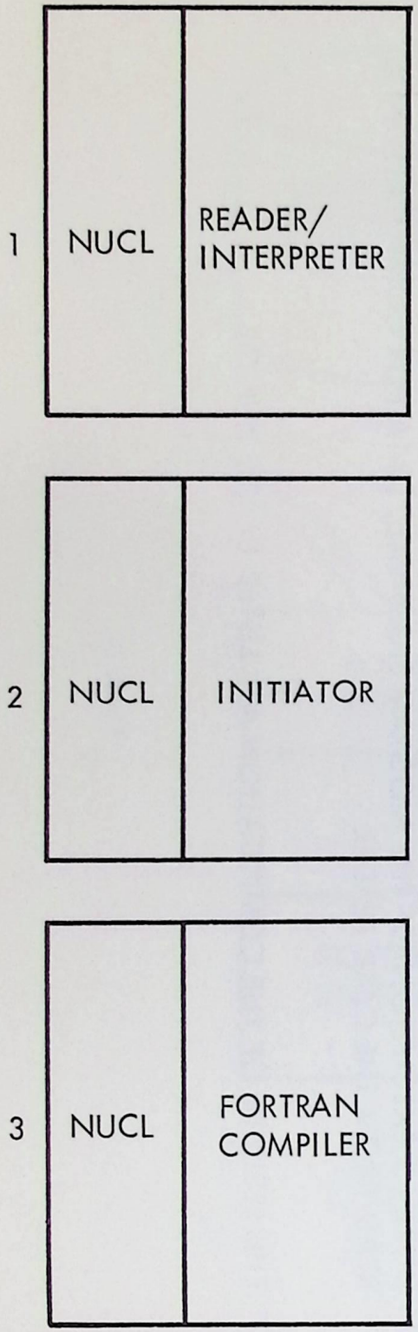
(1) THE PROGRAM EIGENVAL IS LOADED INTO CORE

(2) ONCE EIGENVAL IS EXECUTING IT READS THE VALUES IN A TABLE ON DISK INTO CORE

(3) DURING EXECUTION OF THE PROGRAM EIGENVAL, DATA FOR COMPUTATION IS READ FROM THE CARD READER

(4) THE RESULTS OF THE COMPUTATION ARE LISTED BY THE PRINTER

Figure 23.



THE READER/INTERPRETER ASSEMBLES FOR THE INITIATOR, THE INFORMATION FROM EXEC AND DD CARDS. (THESE ARE THE EXEC AND DD CARDS FOR THE FORTRAN COMPILATION)

THE INITIATOR ASSURES THE AVAILABILITY OF I/O DEVICES, INCLUDING DISK SPACE, FOR THE FORTRAN COMPILATION. IT THEN ASSIGNS THESE I/O DEVICES AND DISK SPACE TO THE COMPILER

THE FORTRAN COMPILER TRANSLATES THE FORTRAN STATEMENTS INTO MACHINE LANGUAGE CODE

Figure 24a.

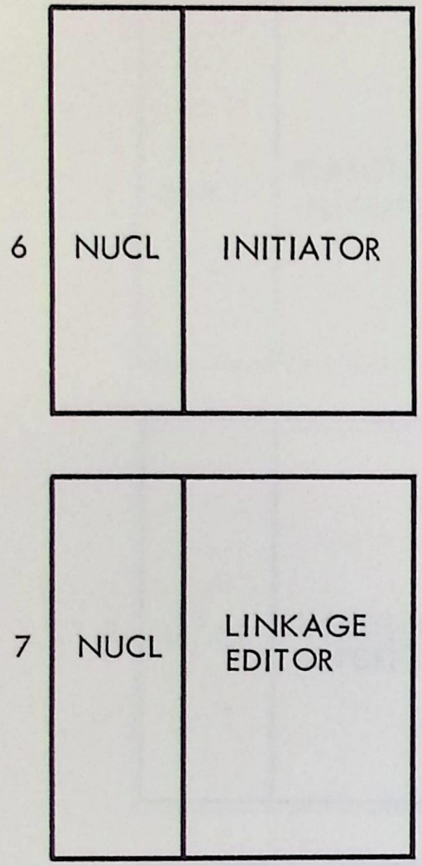
4	NUCL	TERMINATOR

THE TERMINATOR RELEASES FOR UNRESTRICTED USE BY SUBSEQUENT STEPS THE I/O DEVICES AND DISK SPACE WHICH HAD BEEN TEMPORARILY REQUESTED FOR THE COMPILERS USE. (THE TERMINATOR SHOULD NOT RELEASE FOR UNRESTRICTED USE, THE DISK SPACE ASSIGNED FOR THE COMPILER OUTPUT)

5	NUCL	READER/ INTERPRETER

THE READER/INTERPRETER ASSEMBLES FOR THE INITIATOR, THE CODED INFORMATION FROM THE EXEC AND DD CARDS (THESE ARE THE EXEC AND DD CARDS FOR THE LINKAGE EDITING)

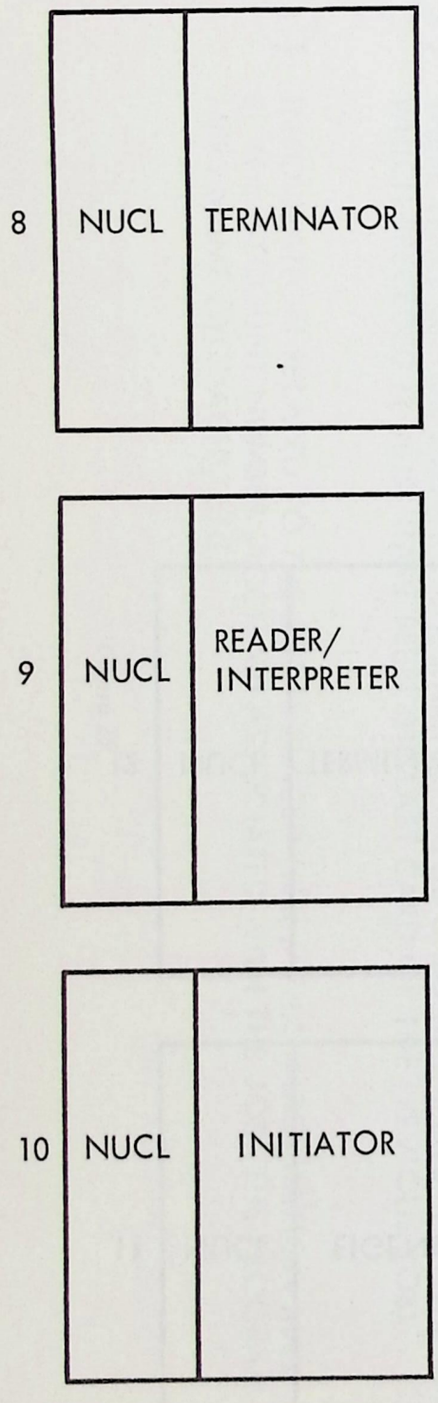
Figure 24b.



THE INITIATOR ASSURES THE AVAILABILITY OF I/O DEVICES, INCLUDING DISK SPACE, FOR THE LINKAGE EDITOR. IT THEN ASSIGNS THESE I/O DEVICES AND DISK SPACE TO THE LINKAGE EDITOR

THE LINKAGE EDITOR TAKES THE OUTPUT OF THE COMPILER AND FROM IT PRODUCES AN EXECUTABLE PROGRAM WHICH IS WRITTEN ONTO DISK. THE TRACK ADDRESS OF WHERE IN THE SET THIS PROGRAM IS WRITTEN, IS PLACED INTO THE DIRECTORY OF THE SET.

Figure 24c.

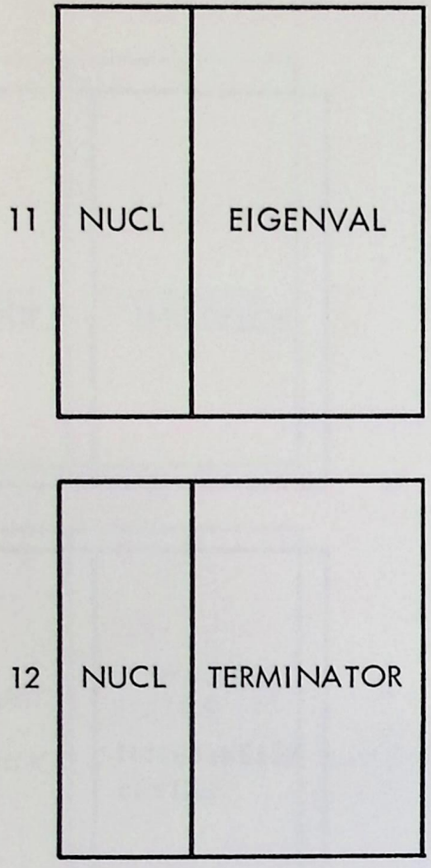


THE TERMINATOR RELEASES FOR UNRESTRICTED USE BY SUBSEQUENT STEPS, THE I/O DEVICES WHICH HAD BEEN ASSIGNED TO THE LINKAGE EDITOR. (THE TERMINATOR SHOULD NOT RELEASE FOR UNRESTRICTED USE, THE DISK SPACE TAKEN BY THE LINKAGE EDITOR OUTPUT)

THE READER/INTERPRETER ASSEMBLES FOR THE INITIATOR, THE CODED INFORMATION FROM THE EXEC AND DD CARDS. (THESE ARE THE EXEC AND DD CARDS FOR THE PROGRAM JUST COMPILED AND LINK EDITED EIGENVAL)

THE INITIATOR ASSURES THE AVAILABILITY OF I/O DEVICES AND DISK SPACE FOR THE PROGRAM "EIGENVAL." IT THEN ASSIGNS THESE DEVICES AND DISK SPACE TO THE PROGRAM

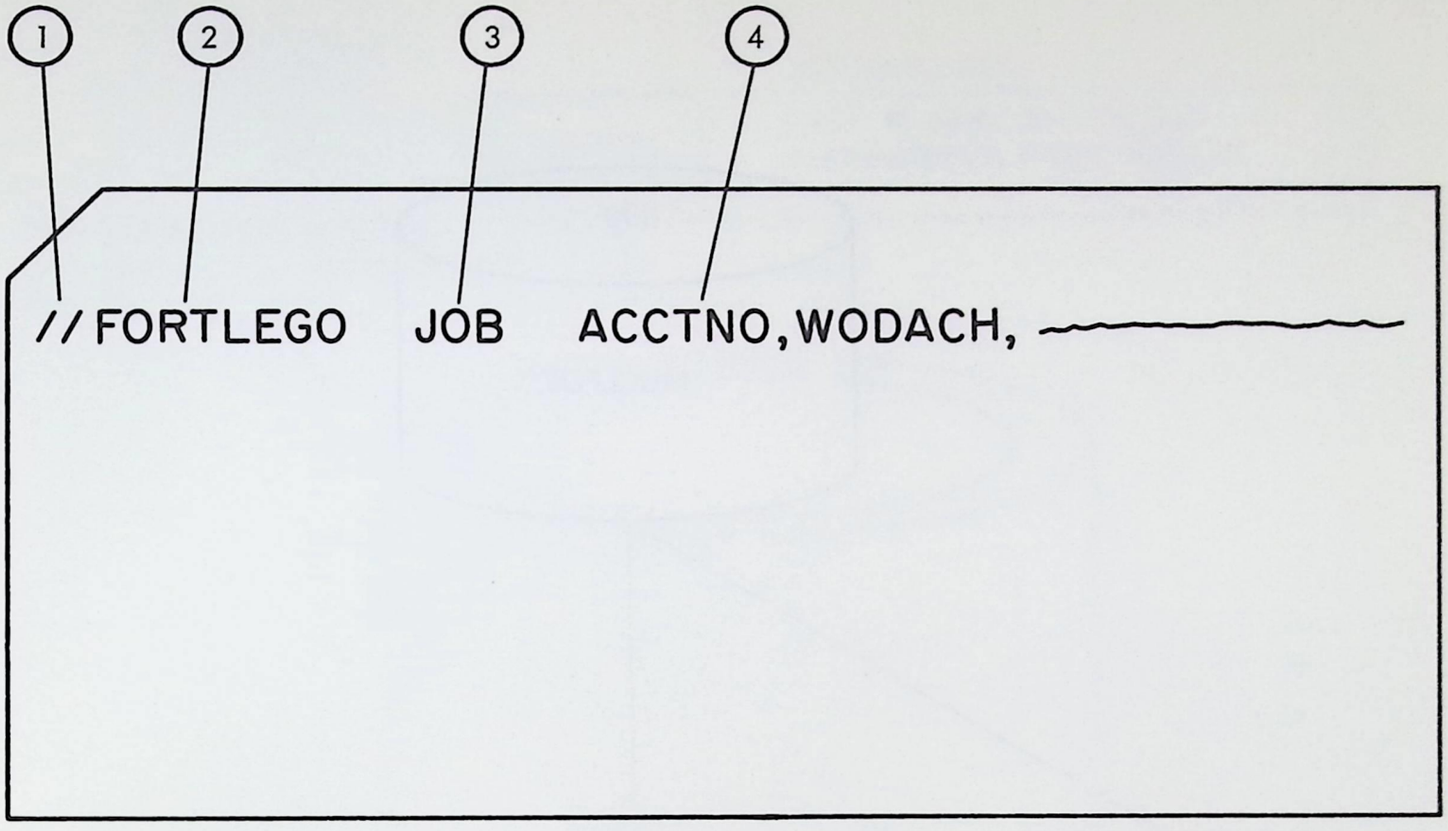
Figure 24d.



THE PROGRAM EIGENVAL PERFORMS ITS COMPUTATIONS

SAME AS BEFORE

Figure 24e.



(1) THE SLASHES IN COLUMN 1 AND 2 ARE NEEDED TO IDENTIFY THIS CARD AS ONE PROVIDING INFORMATION TO THE CONTROL PROGRAM

(2) THIS REPRESENTS A JOB NAME THIS NAME IS NORMALLY PRINTED ON THE CONSOLE TYPEWRITER WHEN THIS JOB HAS BEEN STARTED

(3) THESE THREE LETTERS IDENTIFY THE CARD AS A JOB CARD (IT IMPLIES THAT THE CARD WHICH PRECEDED IT MUST HAVE BEEN THE LAST CARD OF THE PREVIOUS JOB)

(4) INFORMATION RELATED TO THE JOB IS PLACED HERE. THIS INFORMATION MAY BE THE ACCOUNT NUMBER (ACCTNO) ASSOCIATED WITH THE JOB, THE PROGRAMMERS NAME (WODACH), ETC.

Figure 25.

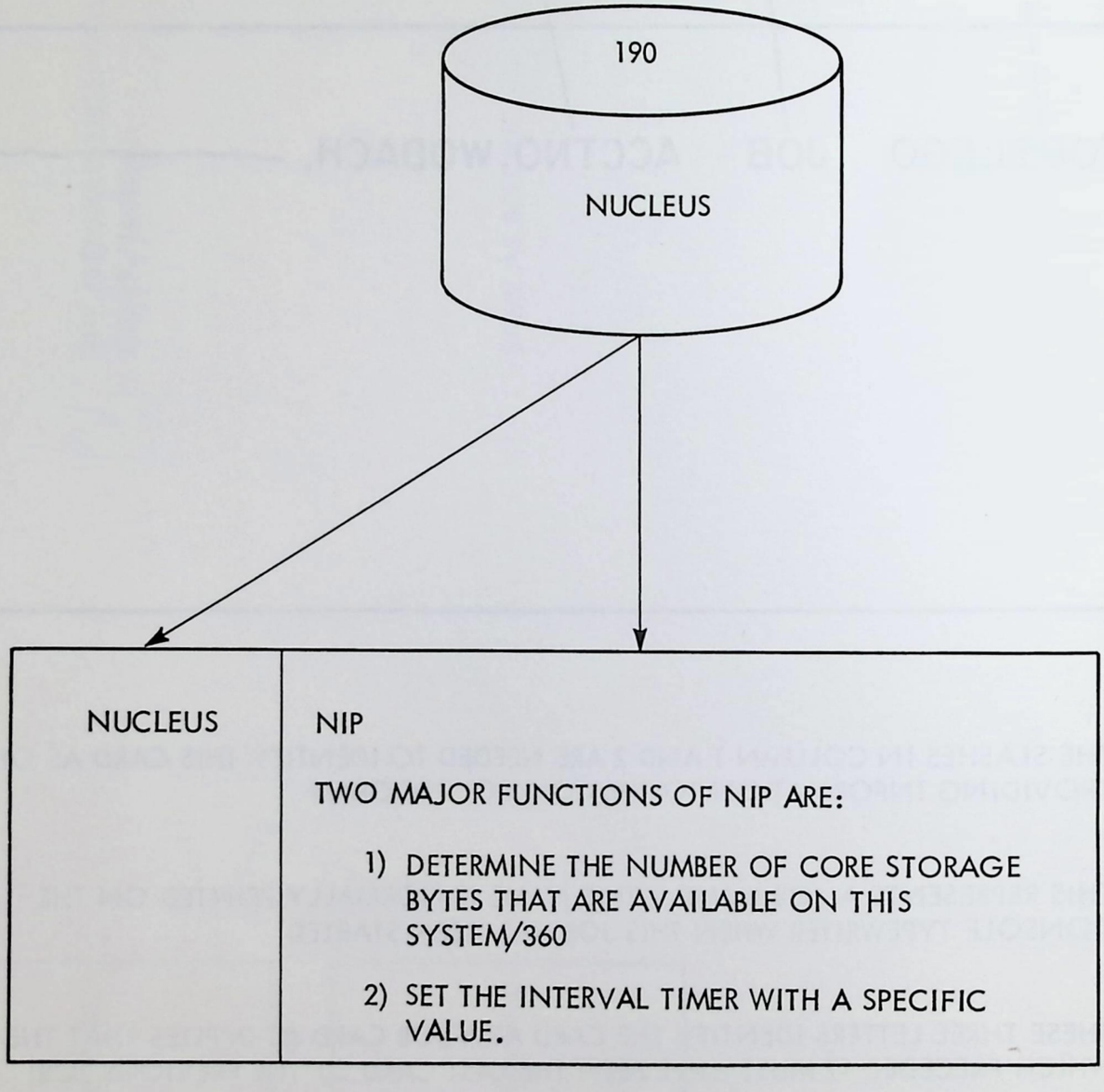

190
NUCLEUS
NUCLEUS
NIP
TWO MAJOR FUNCTIONS OF NIP ARE:
1) DETERMINE THE NUMBER OF CORE STORAGE BYTES THAT ARE AVAILABLE ON THIS SYSTEM/360
2) SET THE INTERVAL TIMER WITH A SPECIFIC VALUE.

Figure 26.

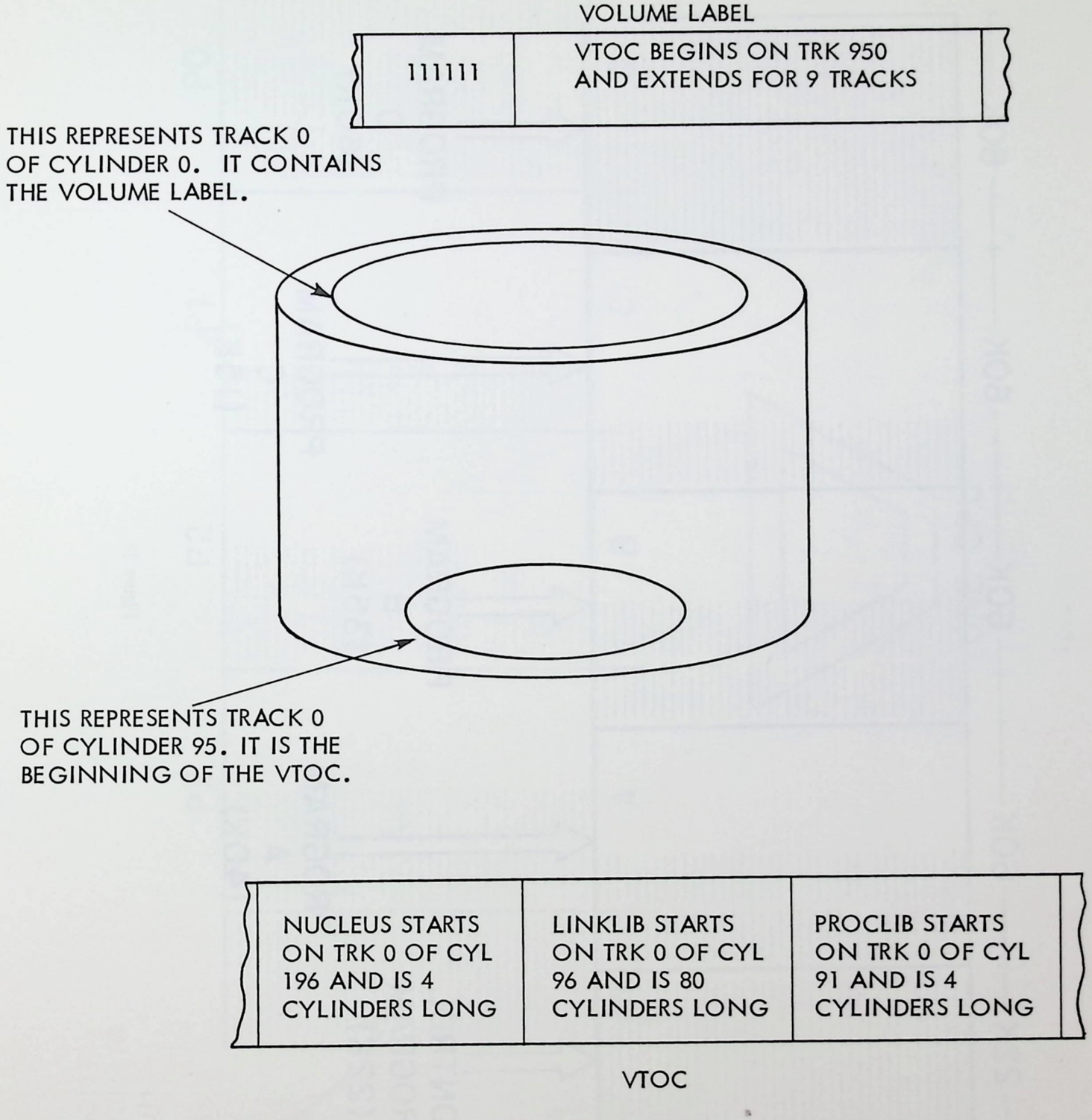

VOLUME LABEL
111111
VTOC BEGINS ON TRK 950
AND EXTENDS FOR 9 TRACKS
THIS REPRESENTS TRACK 0
OF CYLINDER 0. IT CONTAINS
THE VOLUME LABEL.
THIS REPRESENTS TRACK 0
OF CYLINDER 95. IT IS THE
BEGINNING OF THE VTOC.
NUCLEUS STARTS
ON TRK 0 OF CYL
196 AND IS 4
CYLINDERS LONG
LINKLIB STARTS
ON TRK 0 OF CYL
96 AND IS 80
CYLINDERS LONG
PROCLIB STARTS
ON TRK 0 OF CYL
91 AND IS 4
CYLINDERS LONG
VTOC

Figure 27.

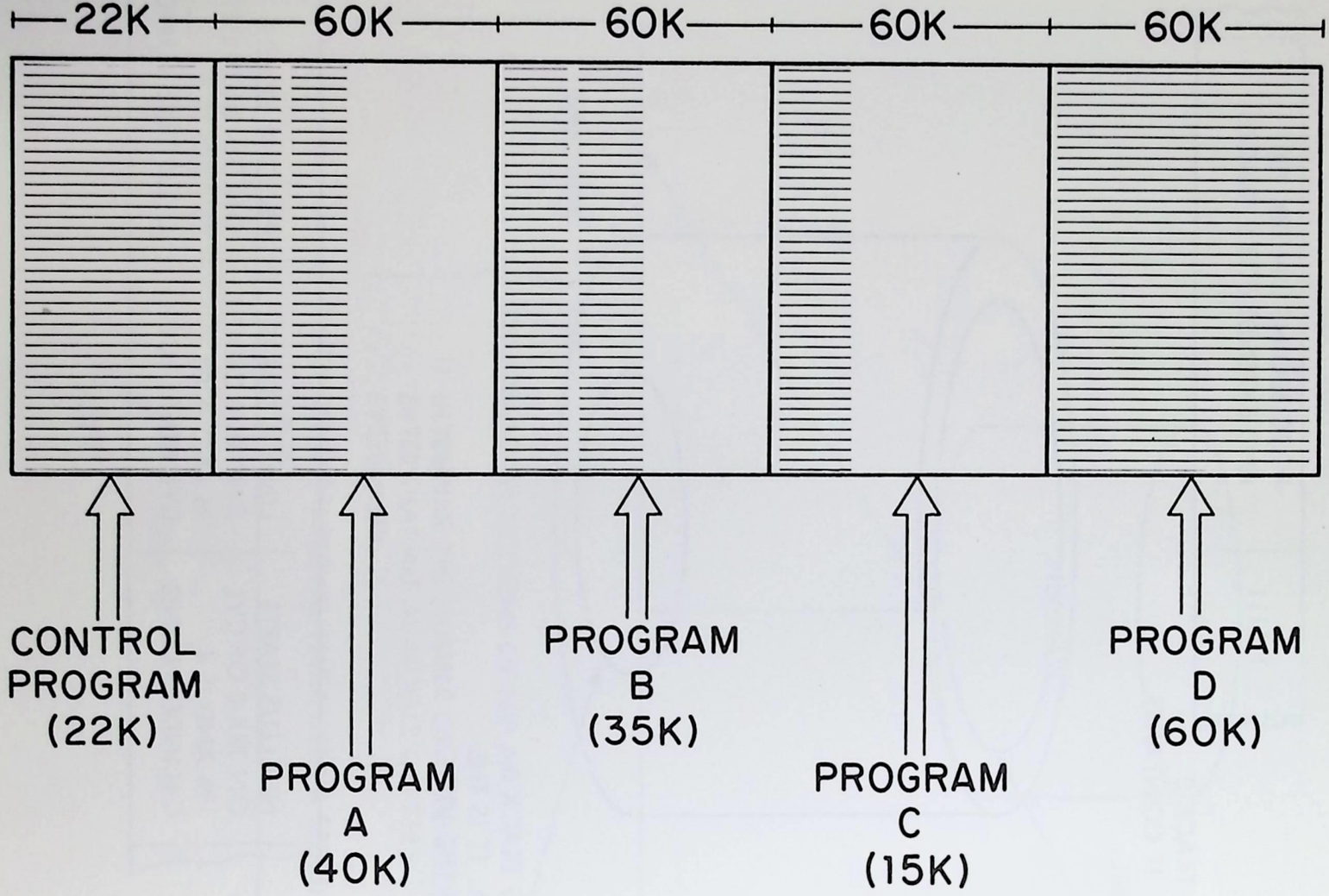

22K
60K
60K
60K
60K
CONTROL PROGRAM (22K)
PROGRAM A (40K)
PROGRAM B (35K)
PROGRAM C (15K)
PROGRAM D (60K)

Figure 28.

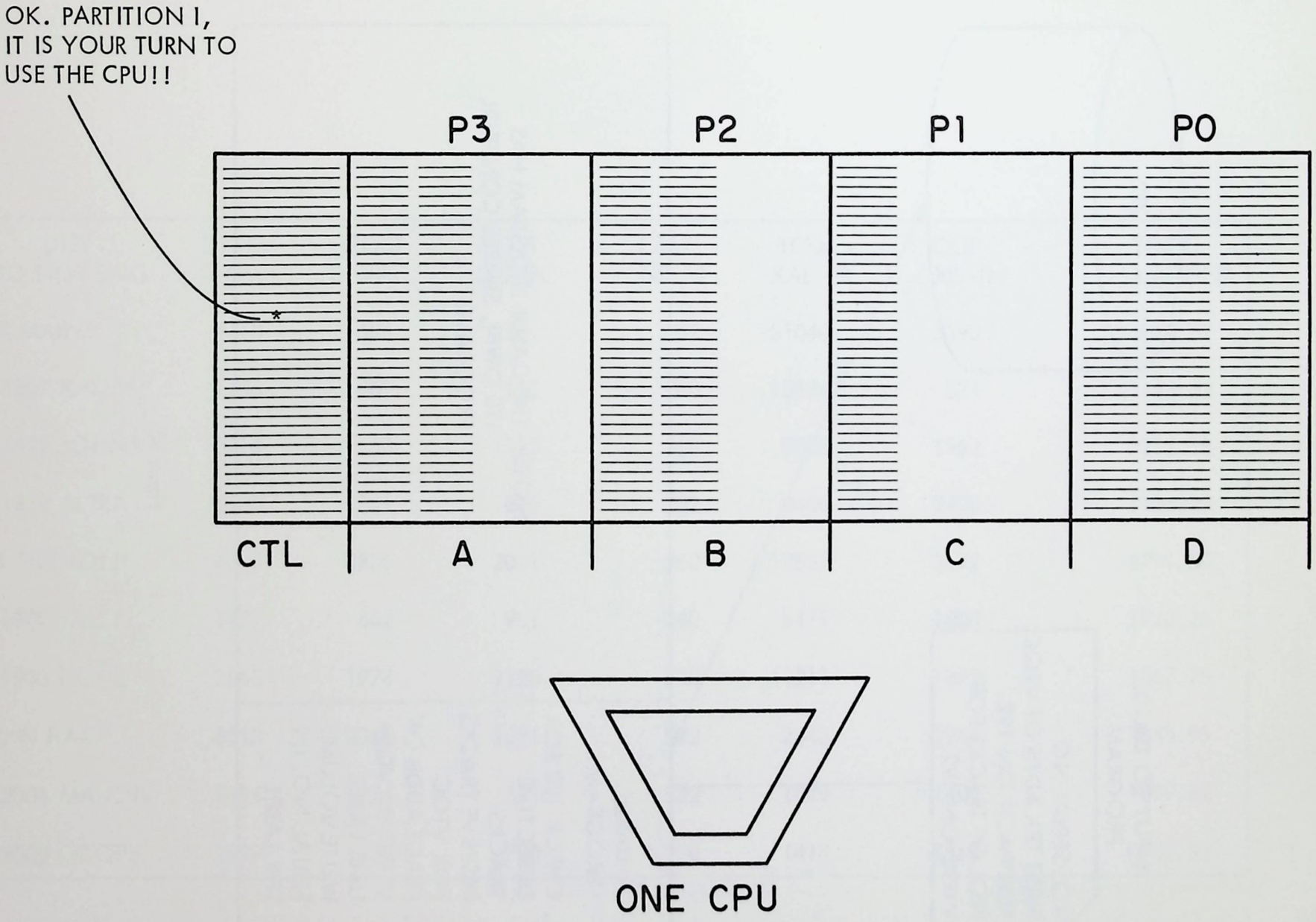

OK. PARTITION 1,
IT IS YOUR TURN TO
USE THE CPU!!
P3
P2
P1
P0
CTL
A
B
C
D
ONE CPU

Figure 29.

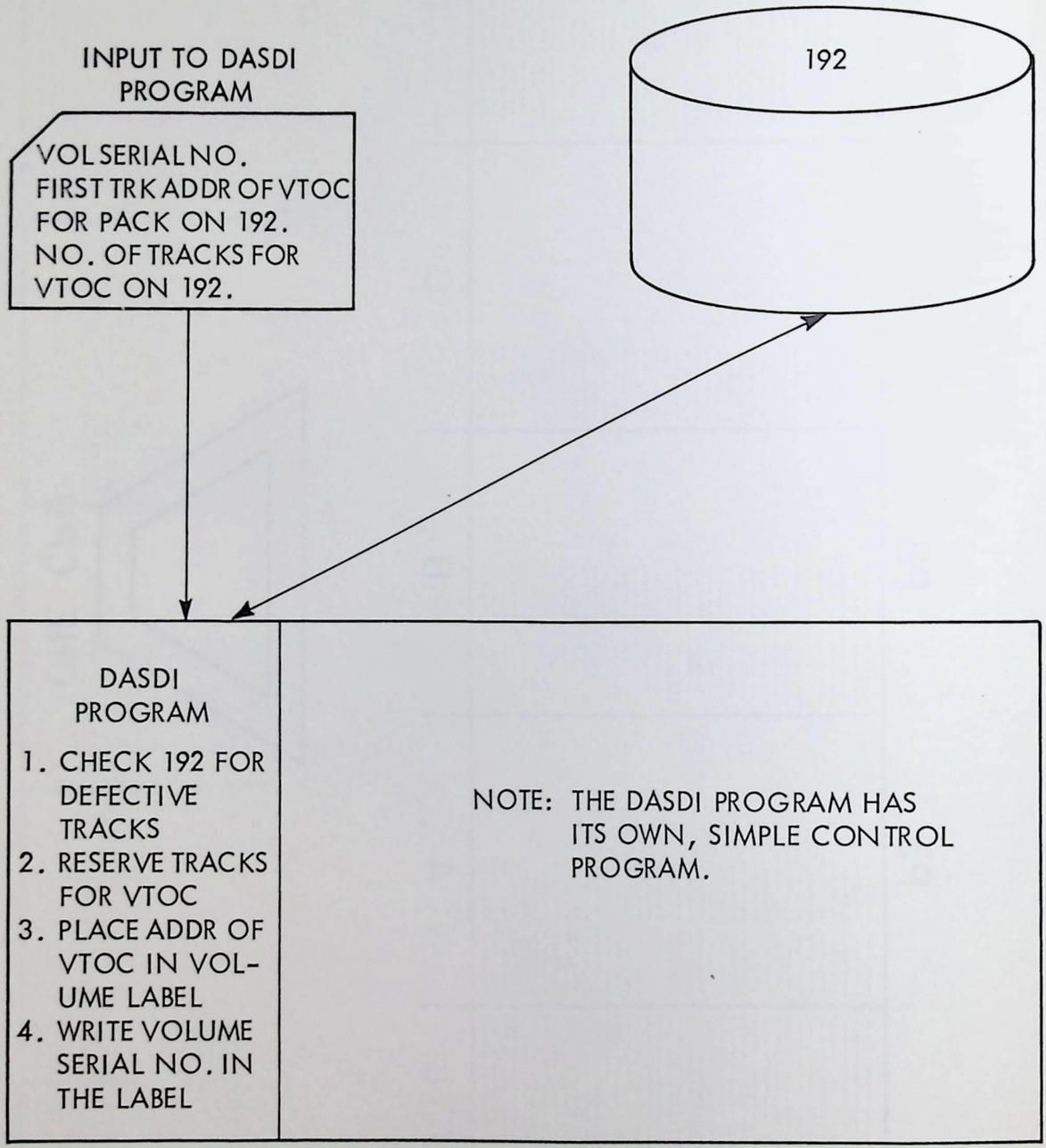

INPUT TO DASDI PROGRAM
VOL SERIAL NO.
FIRST TRK ADDR OF VTOC FOR PACK ON 192.
NO. OF TRACKS FOR VTOC ON 192.
192
DASDI PROGRAM
1. CHECK 192 FOR DEFECTIVE TRACKS
2. RESERVE TRACKS FOR VTOC
3. PLACE ADDR OF VTOC IN VOL-UME LABEL
4. WRITE VOLUME SERIAL NO. IN THE LABEL
NOTE: THE DASDI PROGRAM HAS ITS OWN, SIMPLE CONTROL PROGRAM.

Figure 30.

DIST NO NEW ENG	DIODE 1N3611	POST DF30RC	POST DF39BC	LAMP NE-51	TERM XAE-18	CLIP 6005-IN	TOTAL AMOUNT
18 MAINE	7368	1686	2161	667	31040	5193	4814.09
1807 KALEN	2186	982	192	200	13624	831	1463.62
1812 JOHNS	3214	563	1123	165	9016	1962	2214.18
1819 ALTRA	1968	1841	846	302	8400	2400	1136.29
19 VERMONT	4342	2836	2071	960	17631	3672	3791.00
1902 WILLI	1479	862	951	240	6419	1800	1923.25
1903 BAINE	2863	1974	1120	720	11211	1872	1867.75
20 N HAMPS	6513	2046	1091	522	2443	2964	2888.95
2001 MAHON	3614	924	321	522	1029	1402	1899.62
2002 COOPE	2899	1122	720	000	1414	1562	0989.33

Figure 31. Sample sales report printout

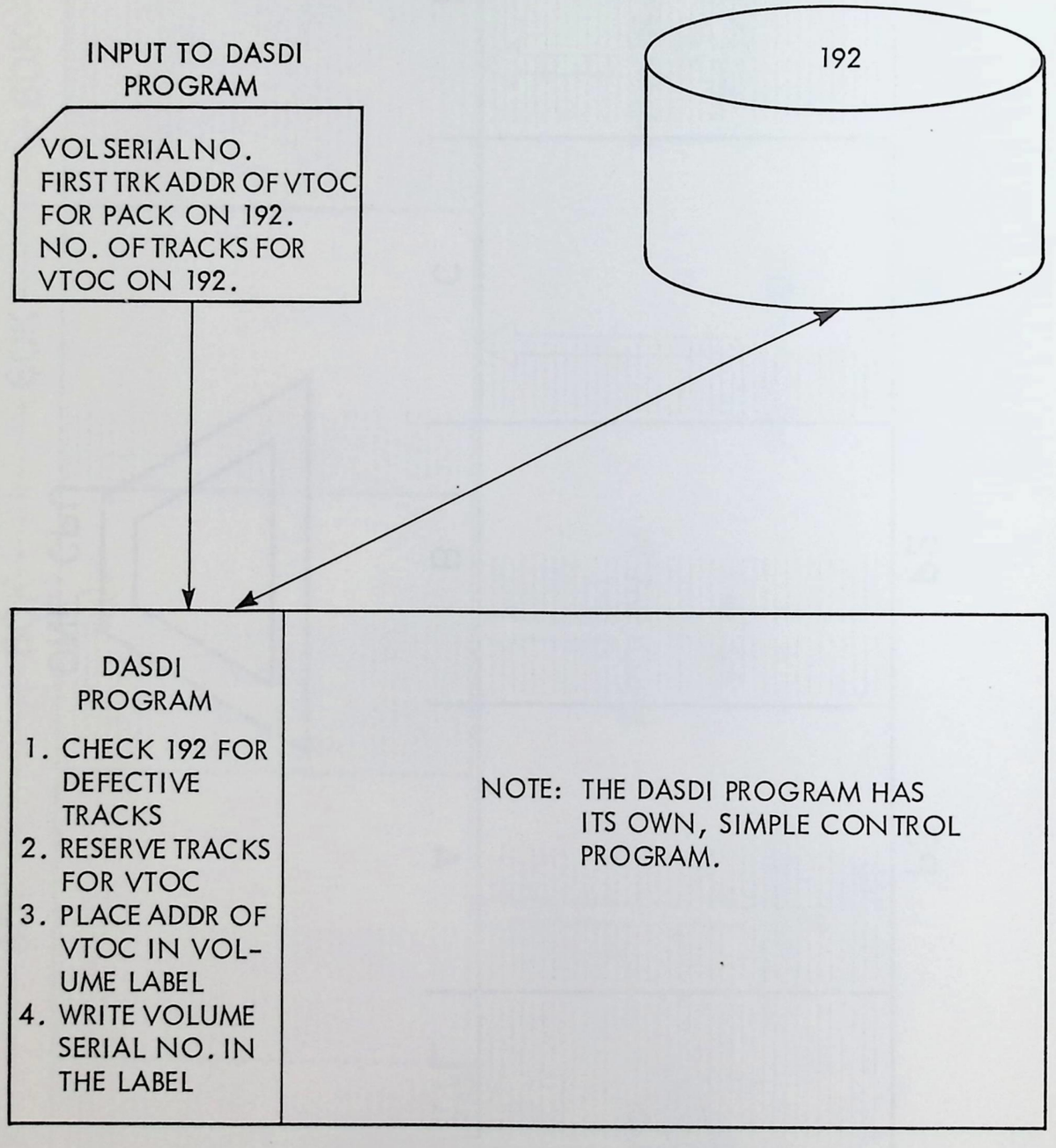

INPUT TO DASDI PROGRAM
VOL SERIAL NO.
FIRST TRK ADDR OF VTOC FOR PACK ON 192.
NO. OF TRACKS FOR VTOC ON 192.
192
DASDI PROGRAM
1. CHECK 192 FOR DEFECTIVE TRACKS
2. RESERVE TRACKS FOR VTOC
3. PLACE ADDR OF VTOC IN VOL-UME LABEL
4. WRITE VOLUME SERIAL NO. IN THE LABEL
NOTE: THE DASDI PROGRAM HAS ITS OWN, SIMPLE CONTROL PROGRAM.

Figure 30.

DIST NO NEW ENG	DIODE 1N3611	POST DF30RC	POST DF39BC	LAMP NE-51	TERM XAE-18	CLIP 6005-IN	TOTAL AMOUNT
18 MAINE	7368	1686	2161	667	31040	5193	4814.09
1807 KALEN	2186	982	192	200	13624	831	1463.62
1812 JOHNS	3214	563	1123	165	9016	1962	2214.18
1819 ALTRA	1968	1841	846	302	8400	2400	1136.29
19 VERMONT	4342	2836	2071	960	17631	3672	3791.00
1902 WILLI	1479	862	951	240	6419	1800	1923.25
1903 BAINE	2863	1974	1120	720	11211	1872	1867.75
20 N HAMPS	6513	2046	1091	522	2443	2964	2888.95
2001 MAHON	3614	924	321	522	1029	1402	1899.62
2002 COOPE	2899	1122	720	000	1414	1562	0989.33

Figure 31. Sample sales report printout

JOBNAME	ACCT NO.	PROGRAMMER'S NAME
SLSRPORT	(790,AID)	W. O. WADCH

TYPE OF RUN	RUN FREQUENCY	USE NUCLEUS
☒ PROD ☐ TEST	MONTHLY	☒ REGULAR ☐ 02 ☐ 03

Device	In	Out	Unit Address	Vol.Ser.No.	COMMENTS
CD RDR	✓		00C	—	JOB CTRL CARDS AND INPUT DATA
DISK	✓		190	111111	SYPRES PACK
PRINTER		✓	00E	—	USE UNLINED STOCK – TAG
					REPORT FOR "DEPT 790-ATTN: SALES
					MANAGER"

SPECIAL INSTRUCTIONS: 1. USE CARRIAGE CONTROL TAPE #3

2- USE PRINT POSITIONS 1 THRU 50.

3- PRINT 6 LINES/INCH

4- LOAD DATA DECK AFTER JOB CONTROL CARD DECK.

Figure 32. Run sheet – program to print sales report

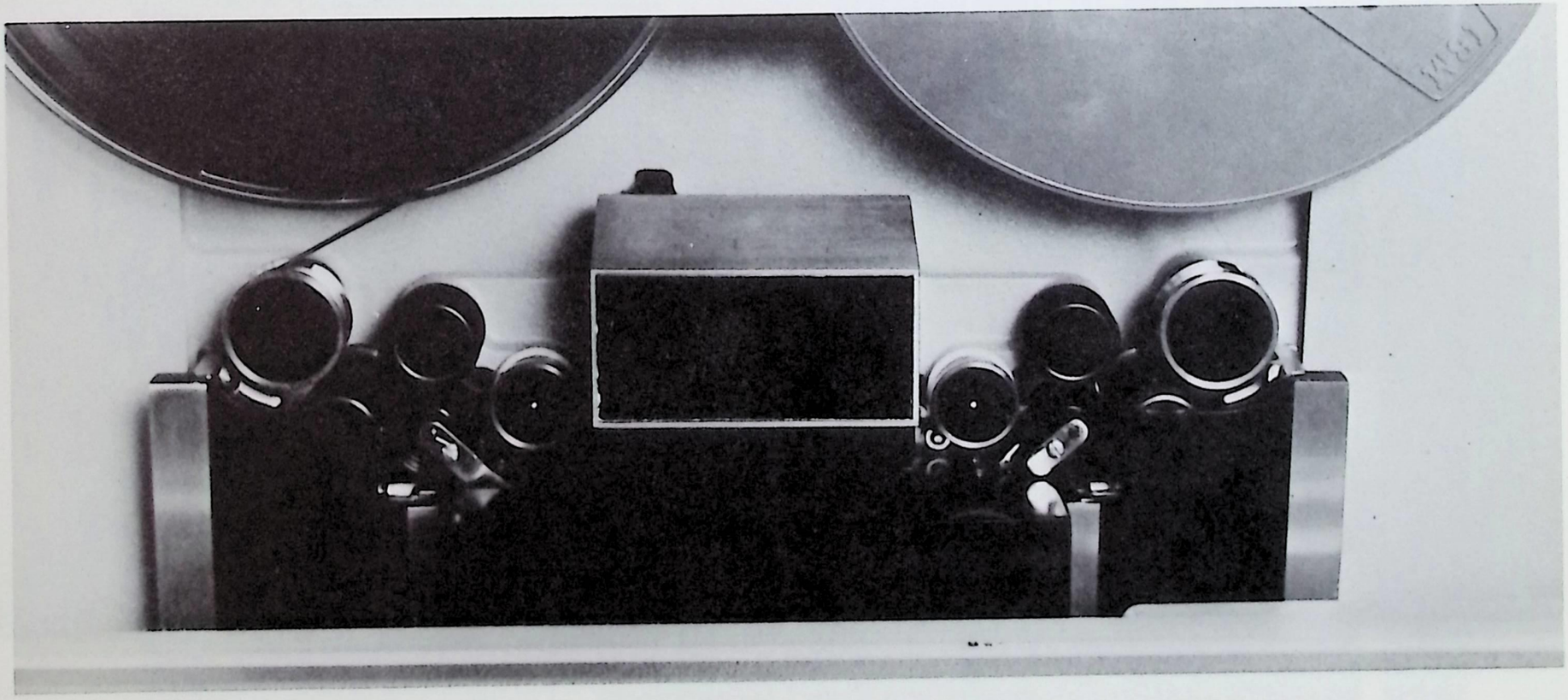


Figure 33. Tape head in down position

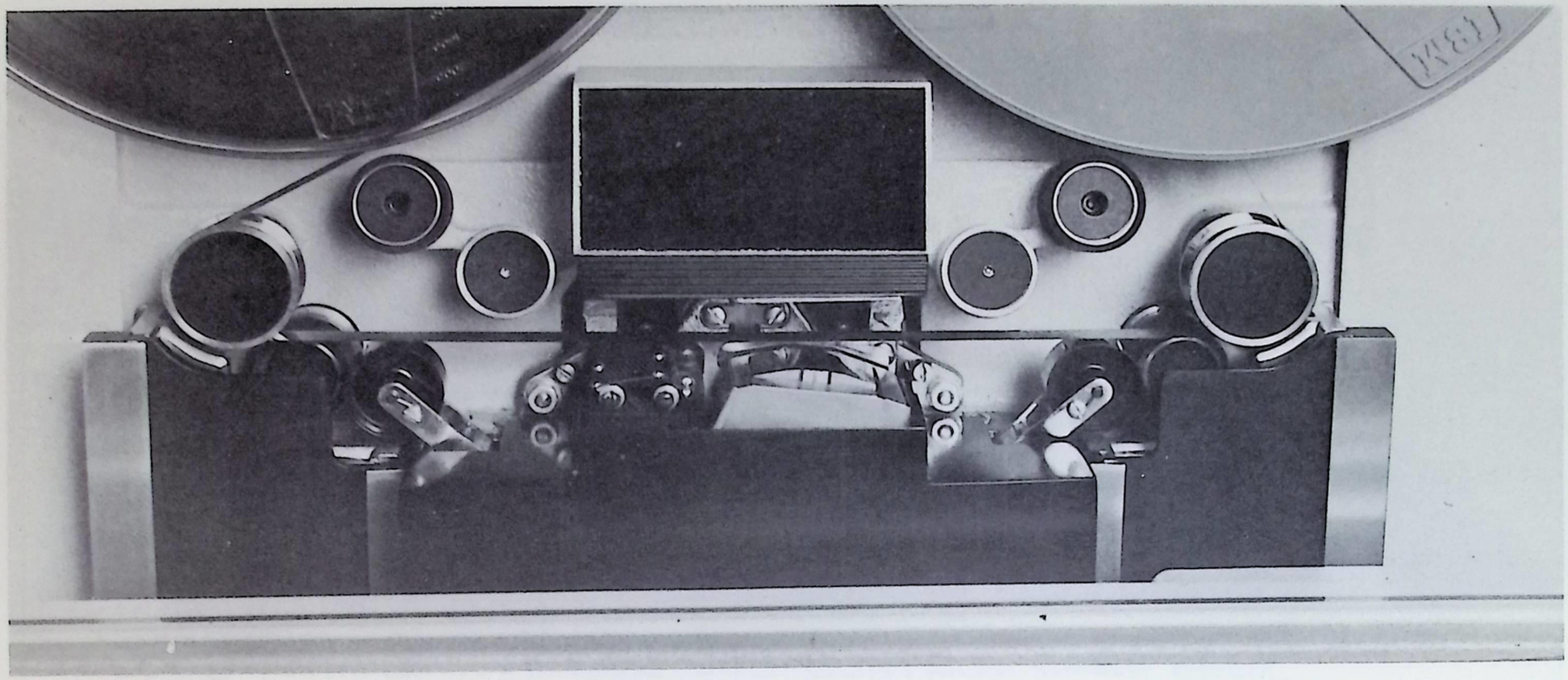


Figure 34. Tape head in up position

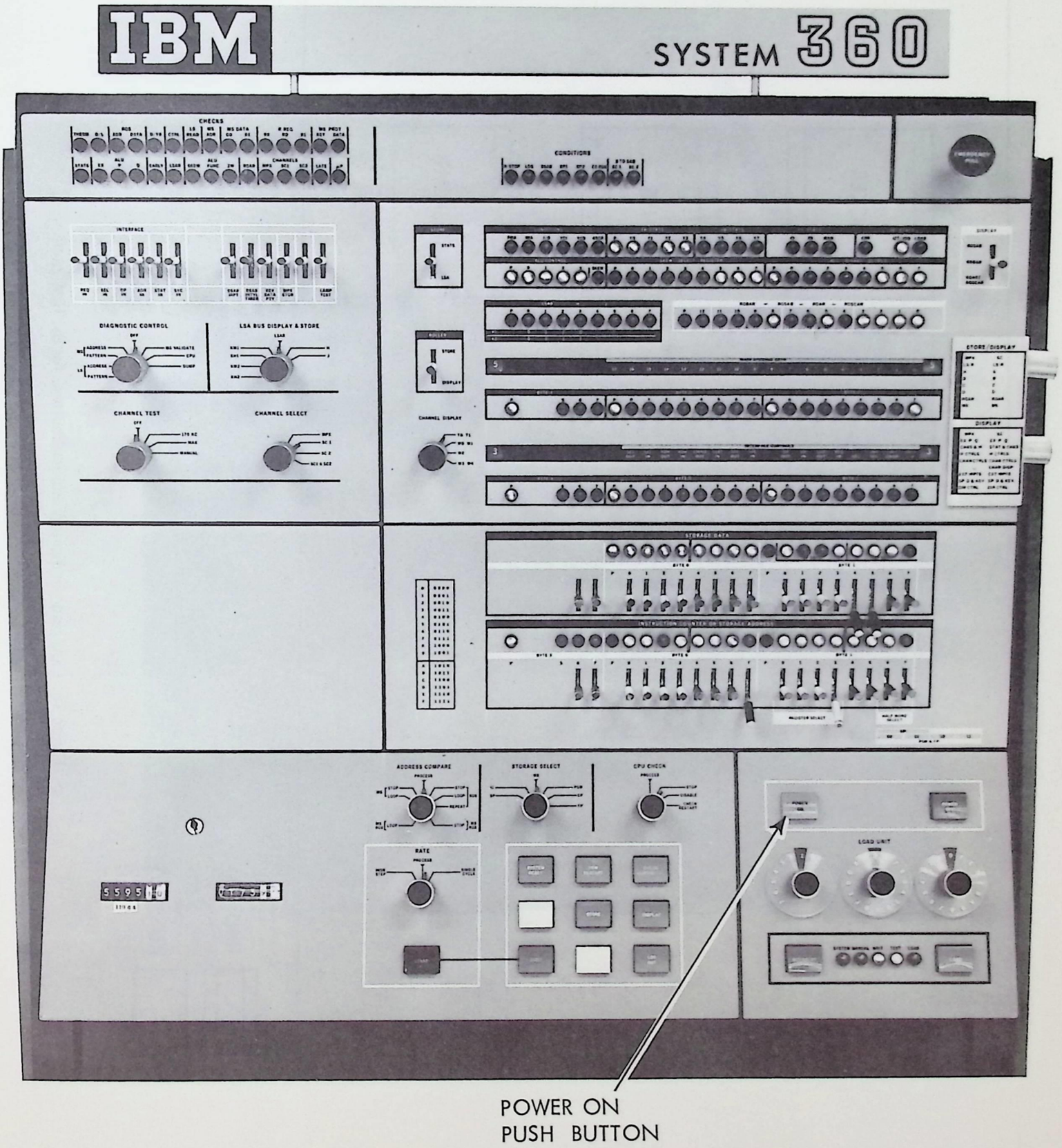


Figure 35. IBM System/360 Model 40 system control panel

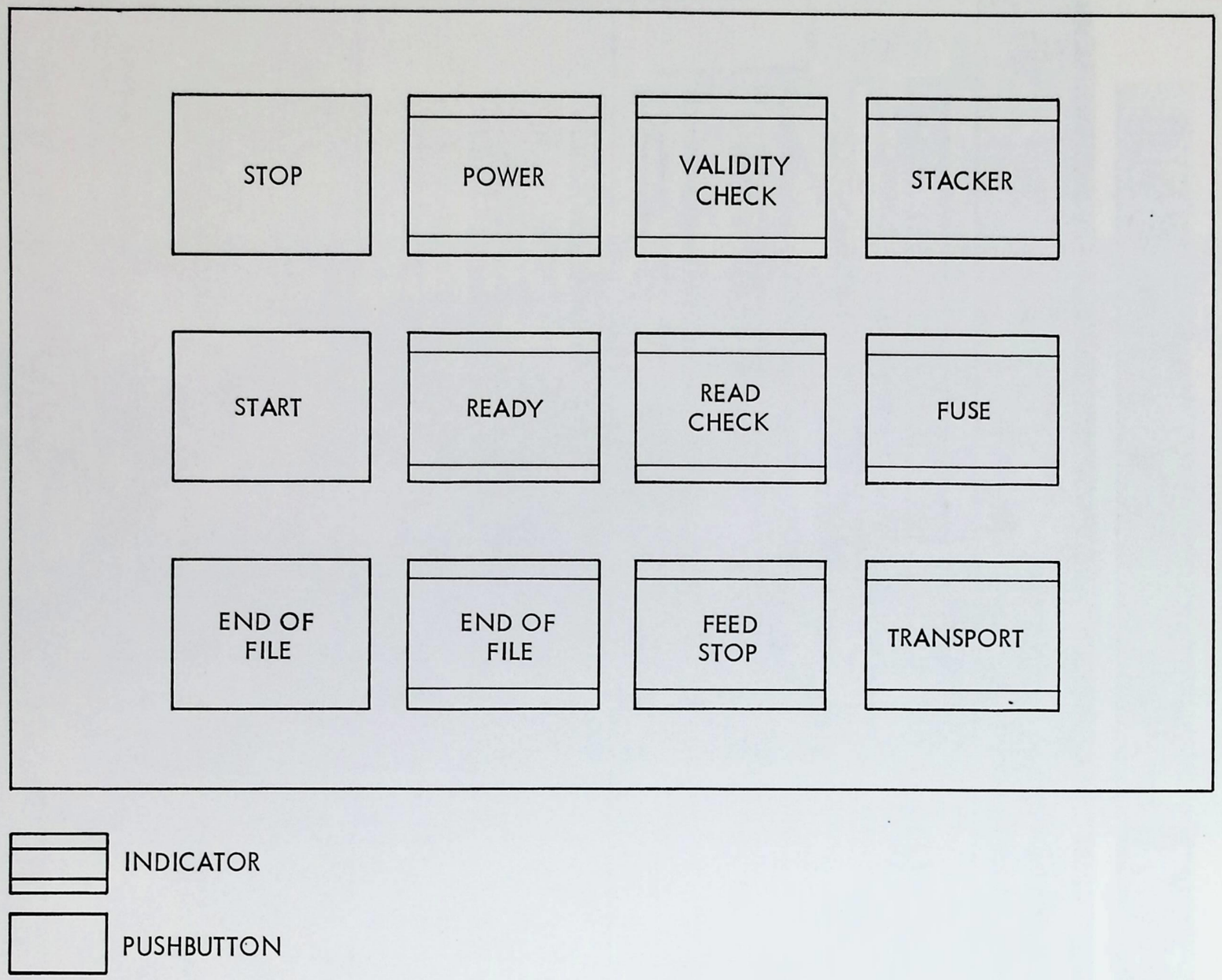


Figure 36. Card reader indicators and pushbuttons for the IBM 2540

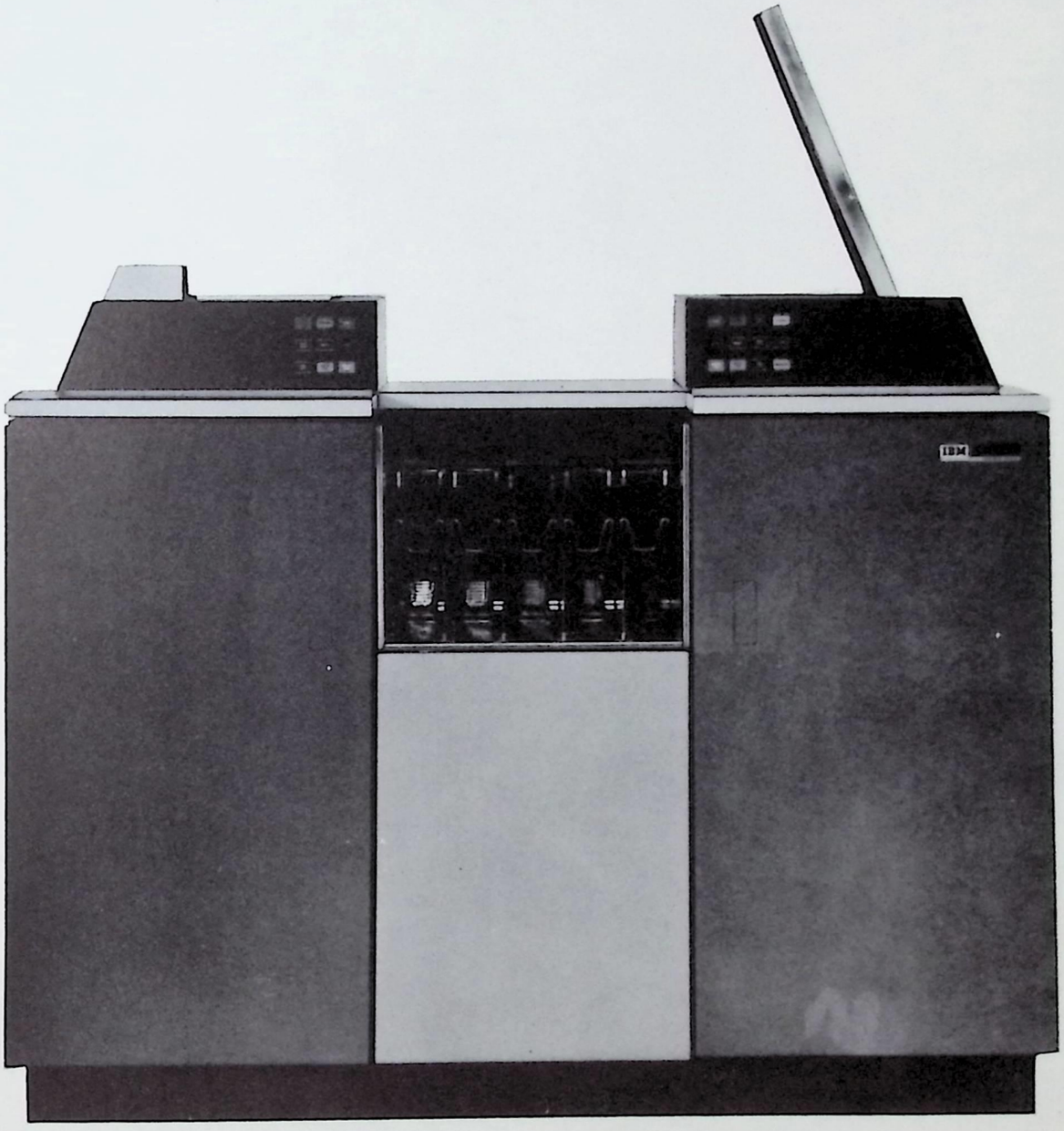


Figure 37a. IBM 2540 Card Read Punch

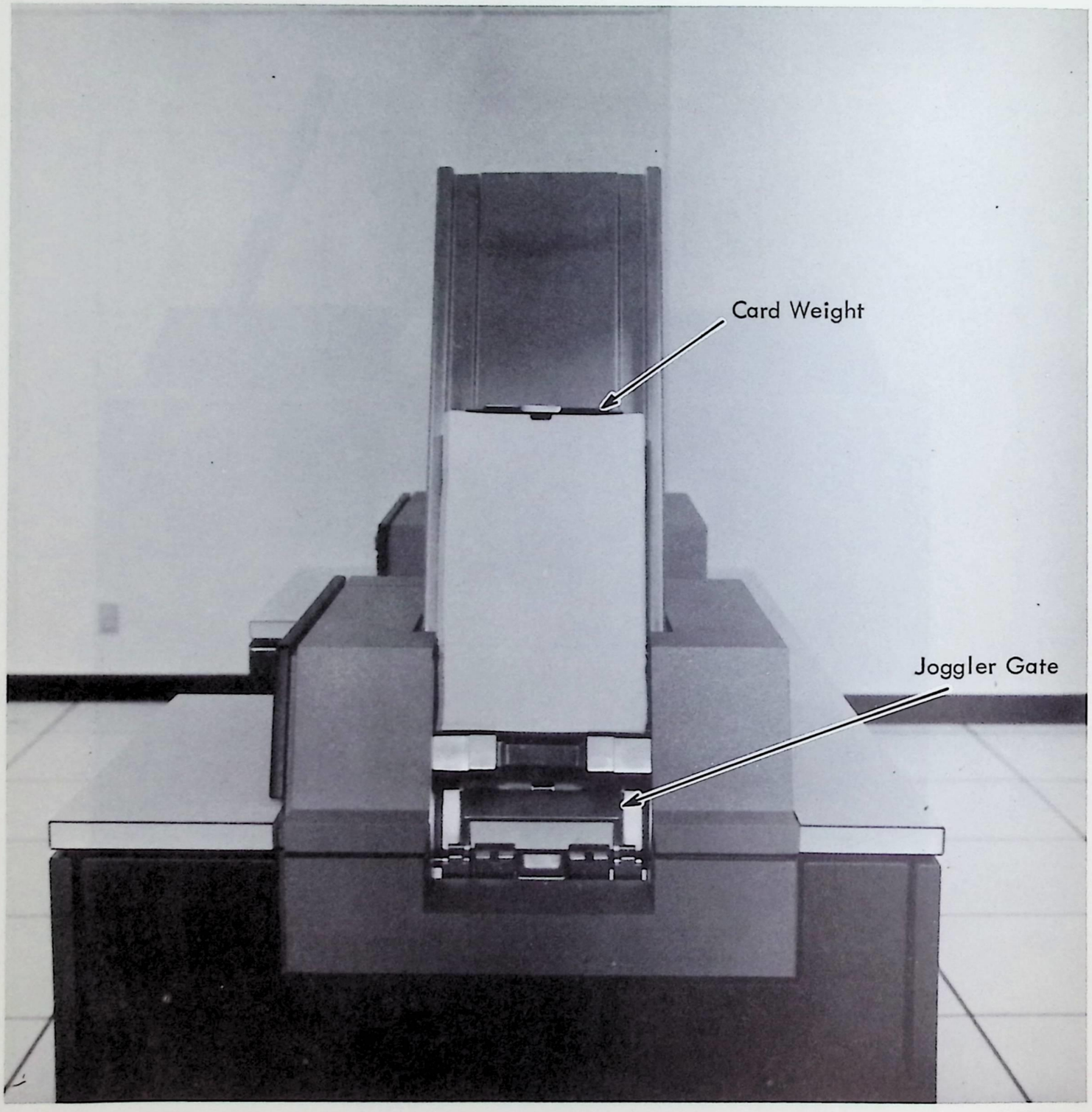


Figure 37b. Card reader file-feed and hopper

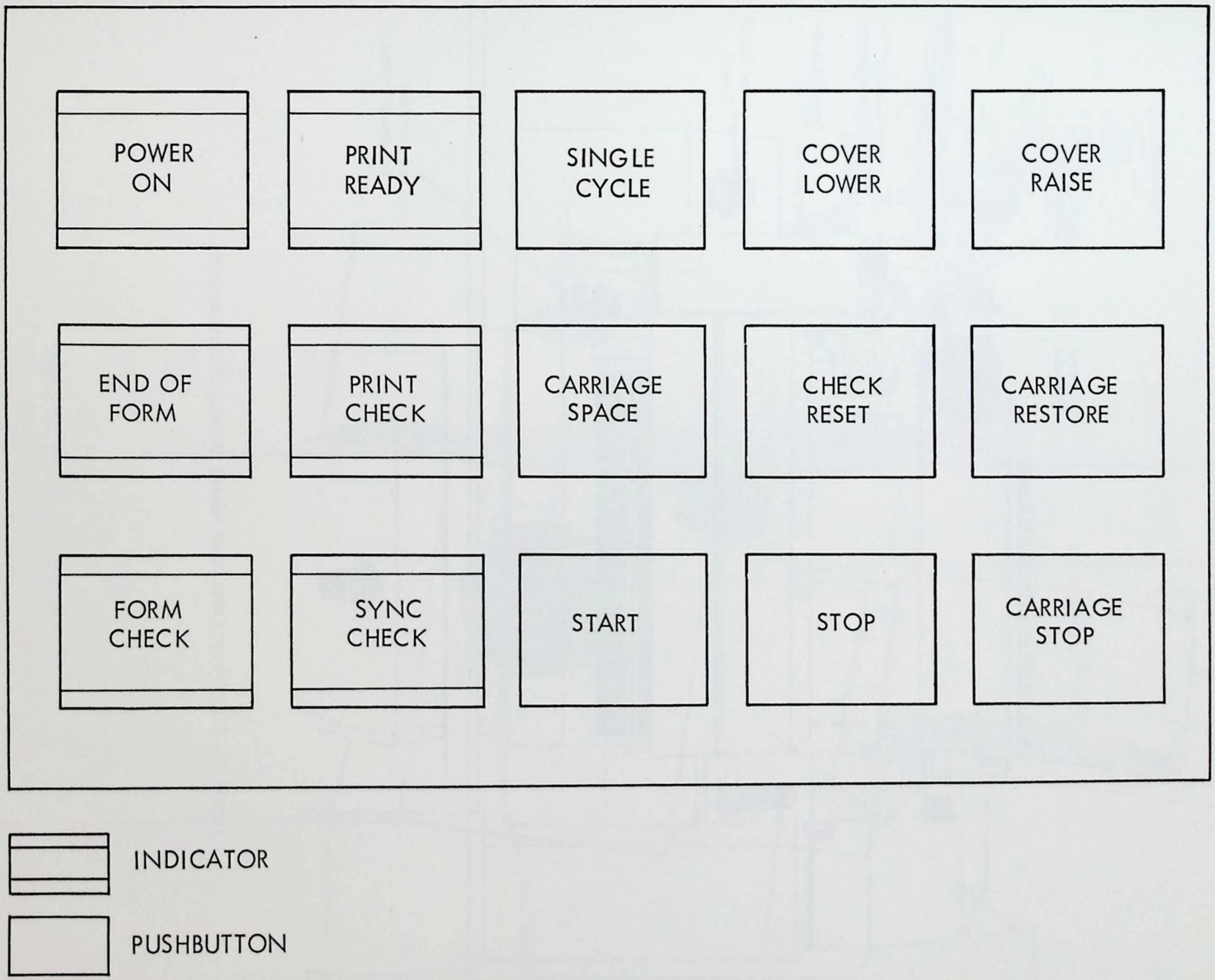


Figure 38. IBM 1403 Printer Model N1 indicators and pushbuttons

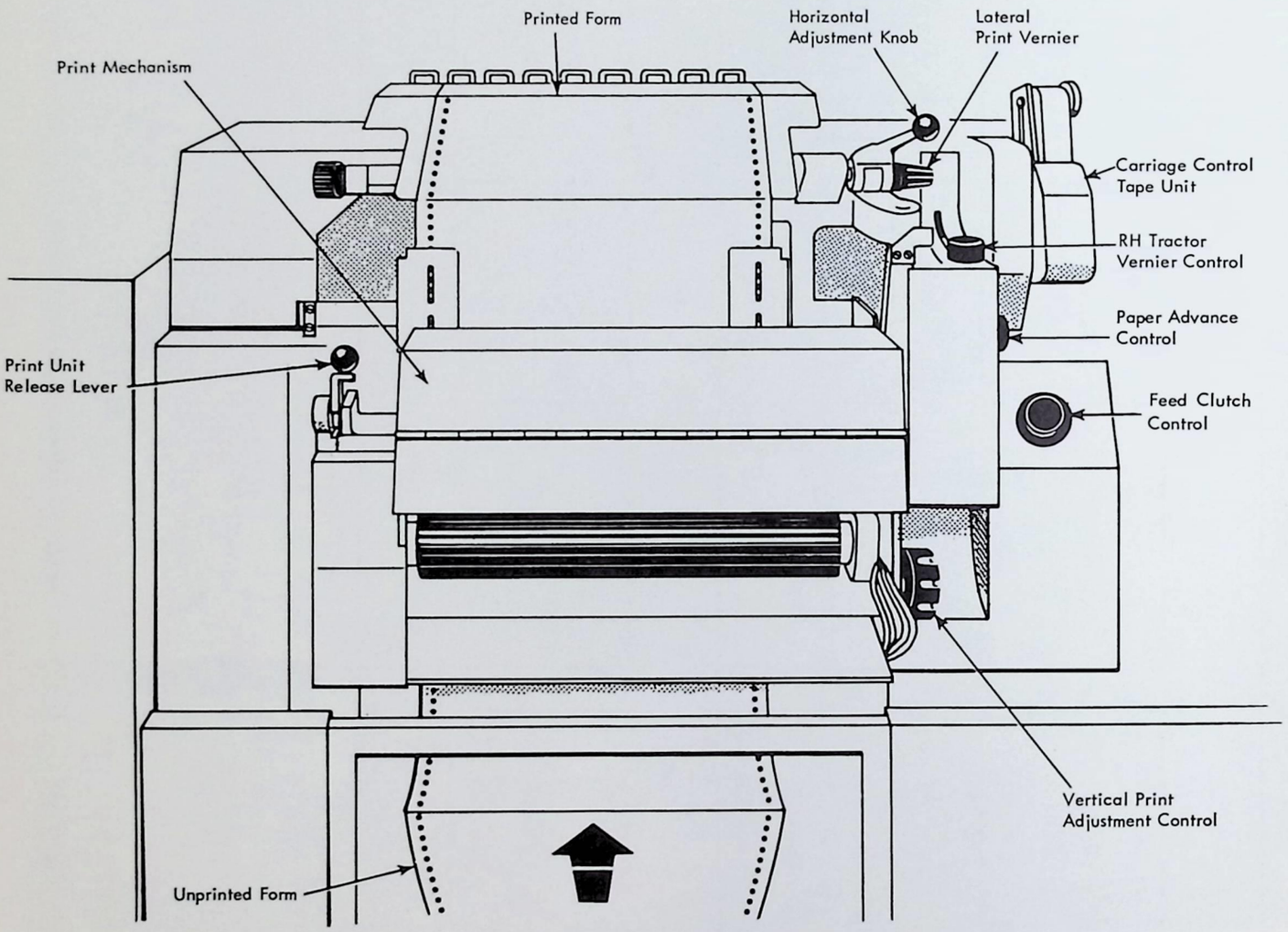


Figure 39. Line printer (with cover raised), showing manual controls

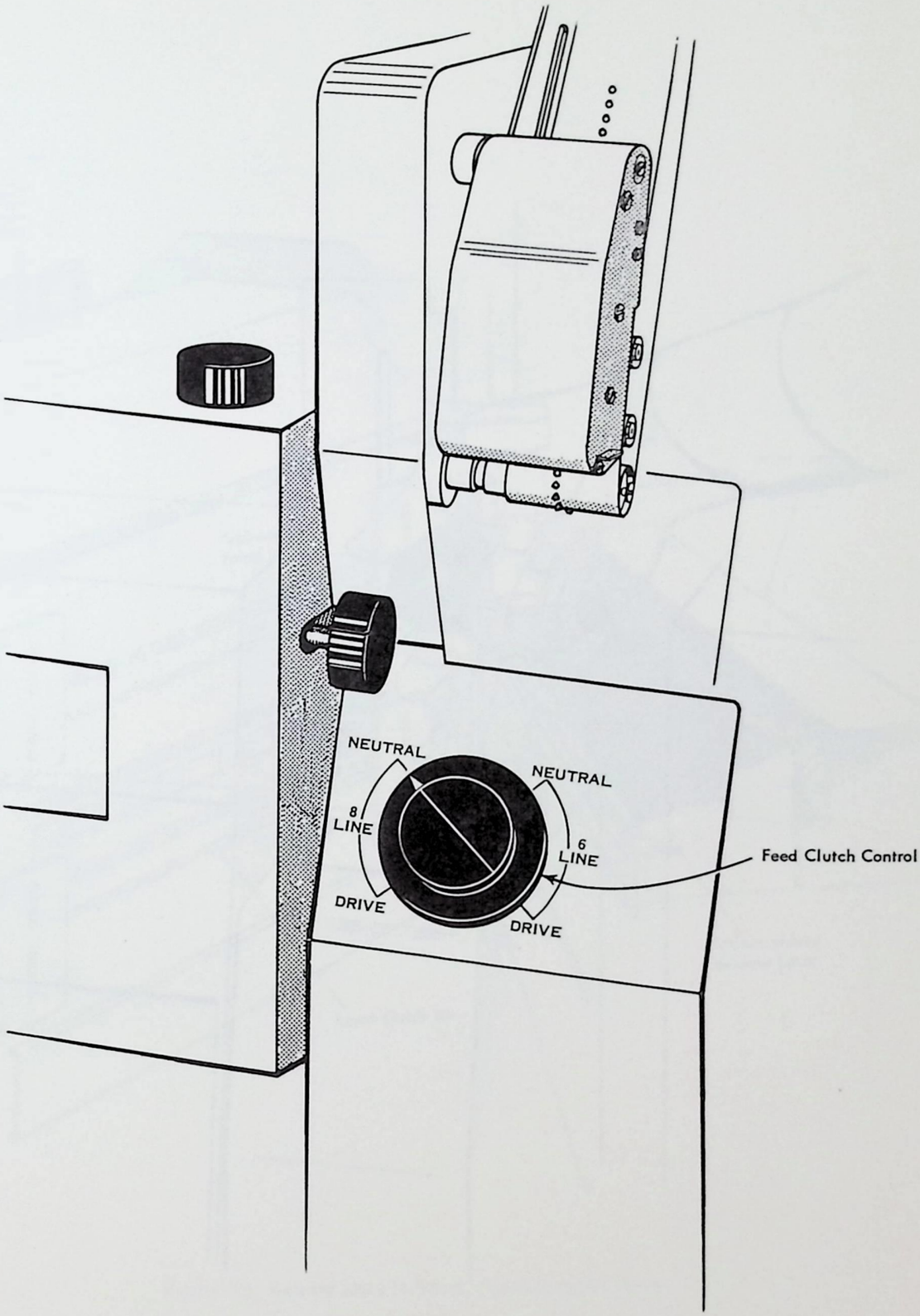


Figure 40. Feed clutch control

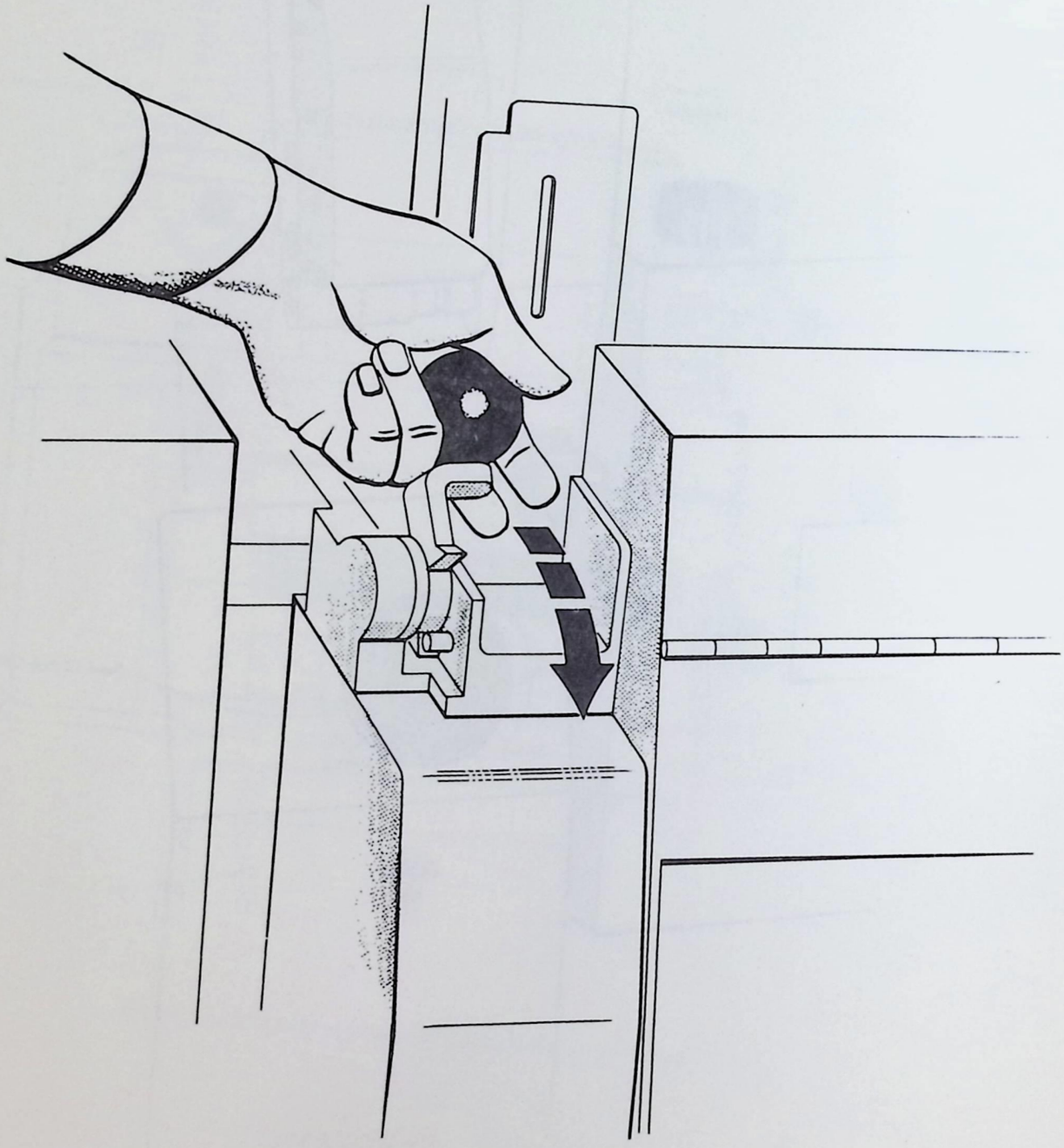


Figure 41. Print unit release lever

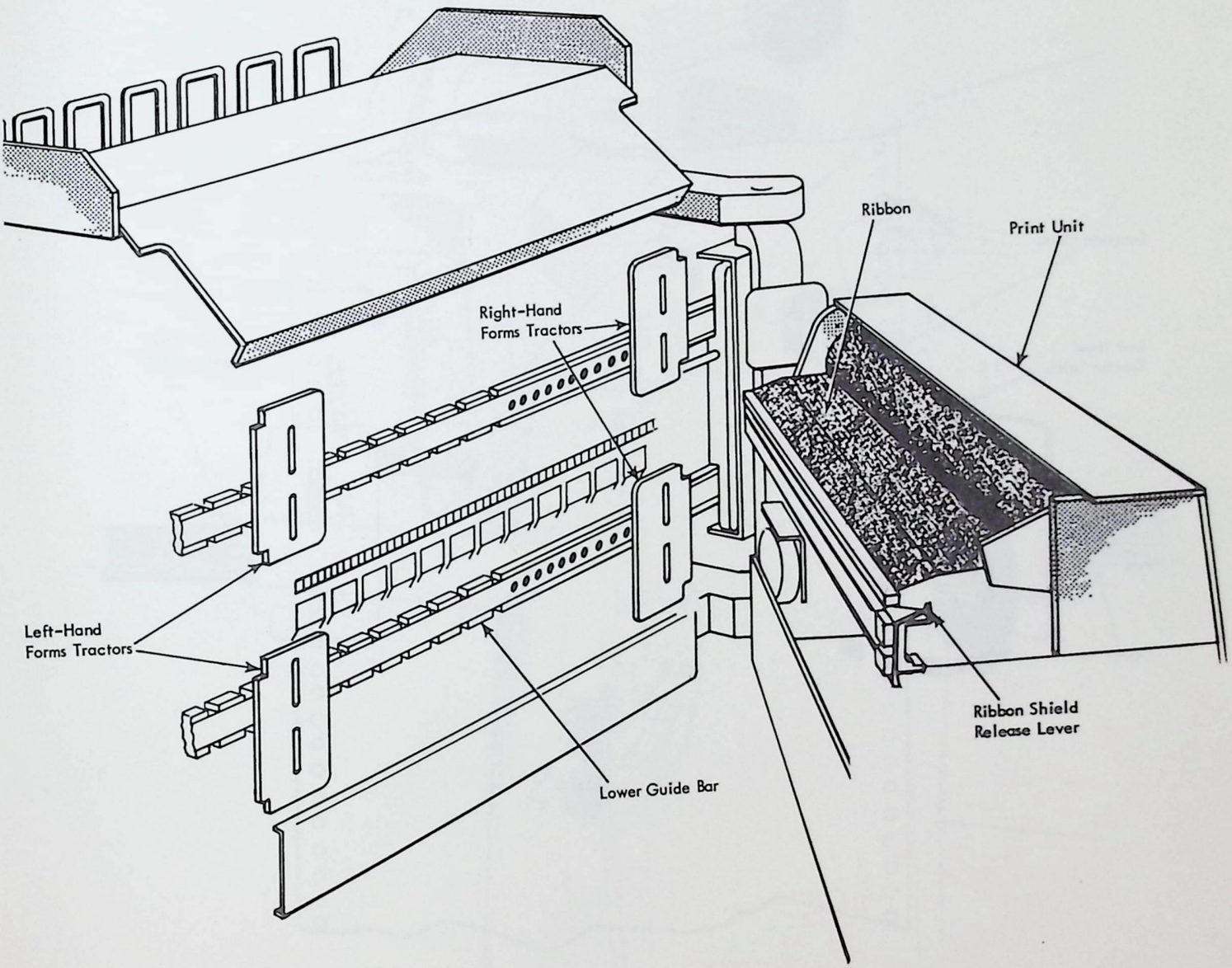


Figure 42. Release lever forward, showing paper drive

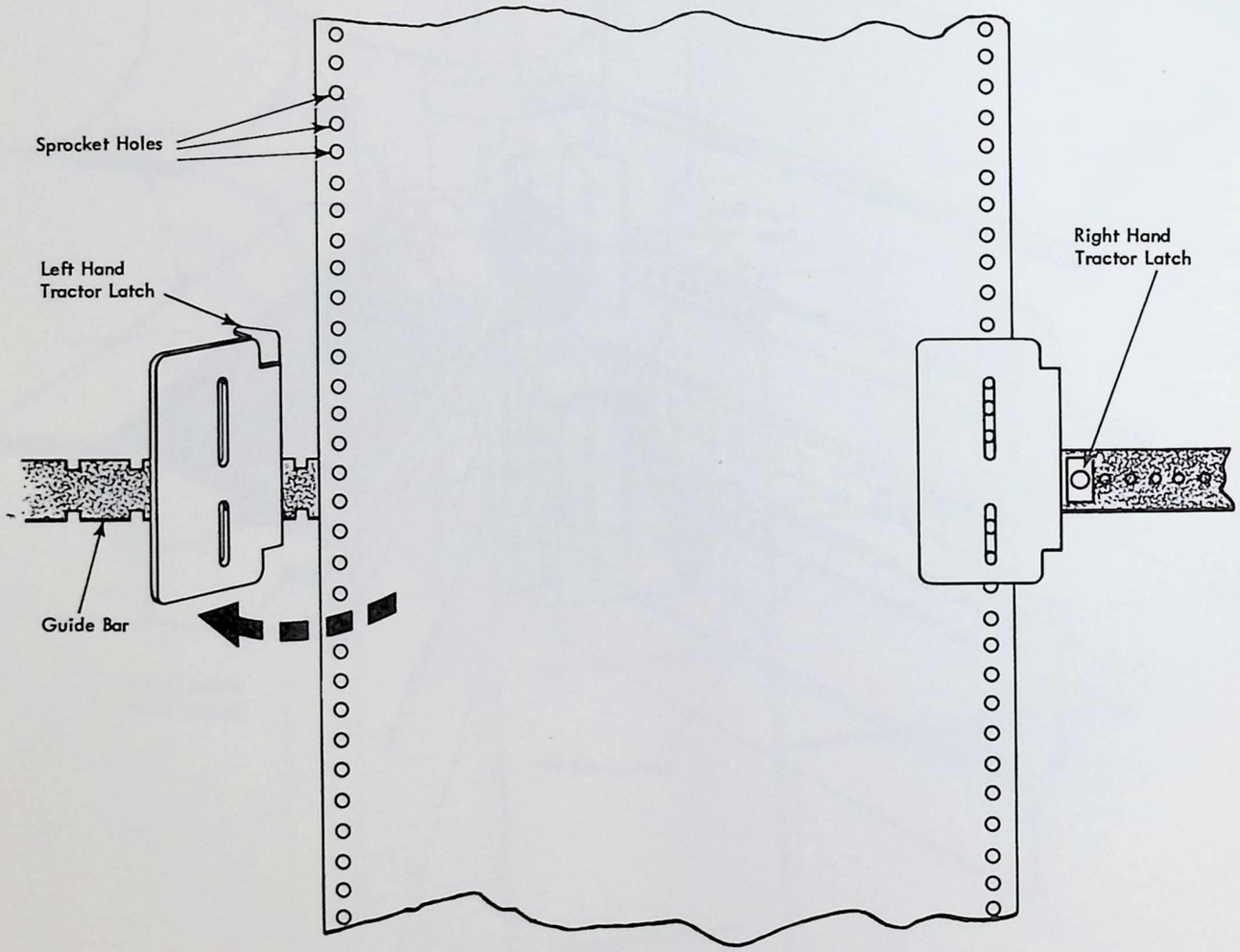


Figure 43. Upper tractors, showing left-hand tractor open

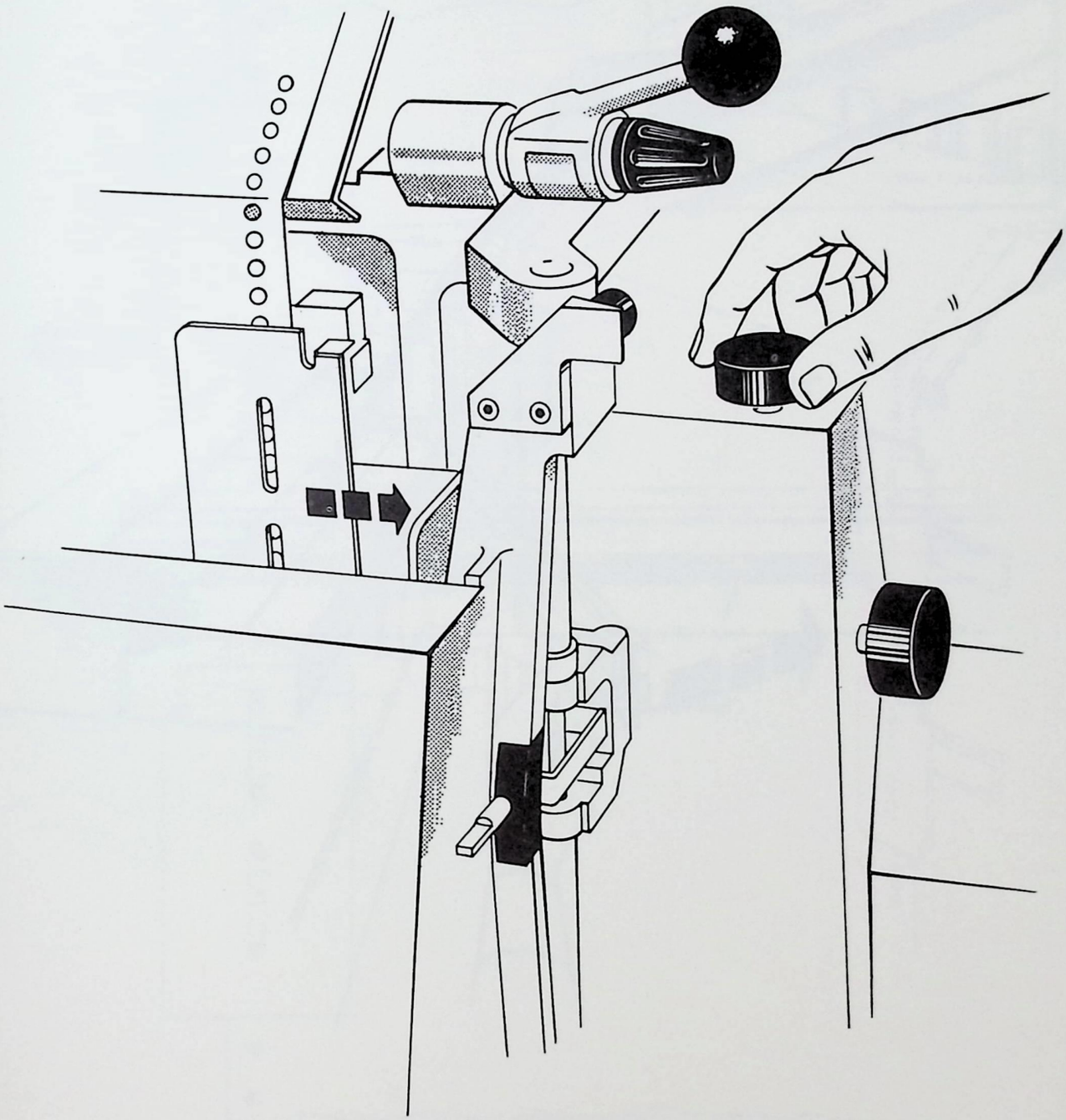


Figure 44. Final adjustment of right-hand tractors

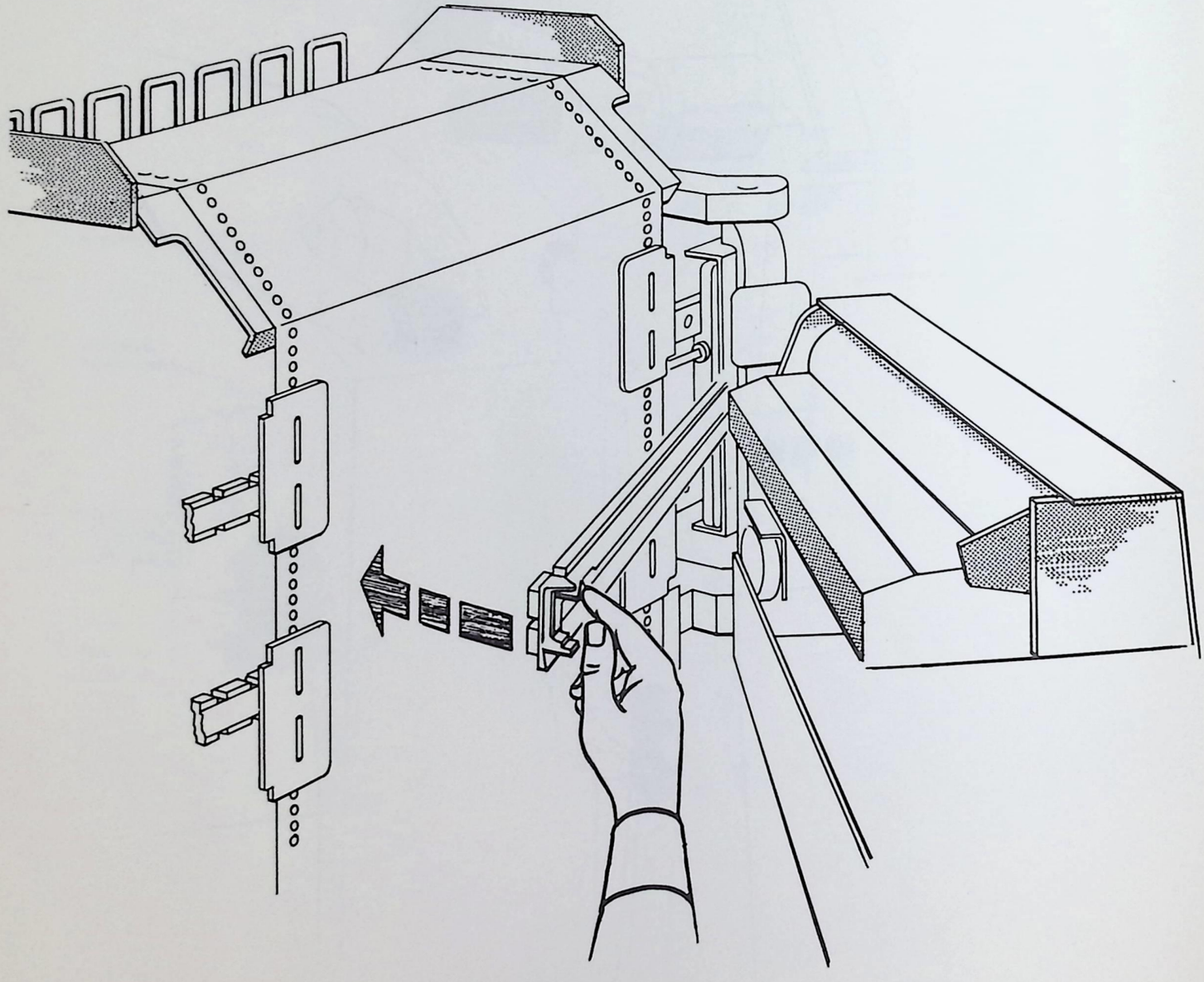


Figure 45. Swinging ribbon shield into position

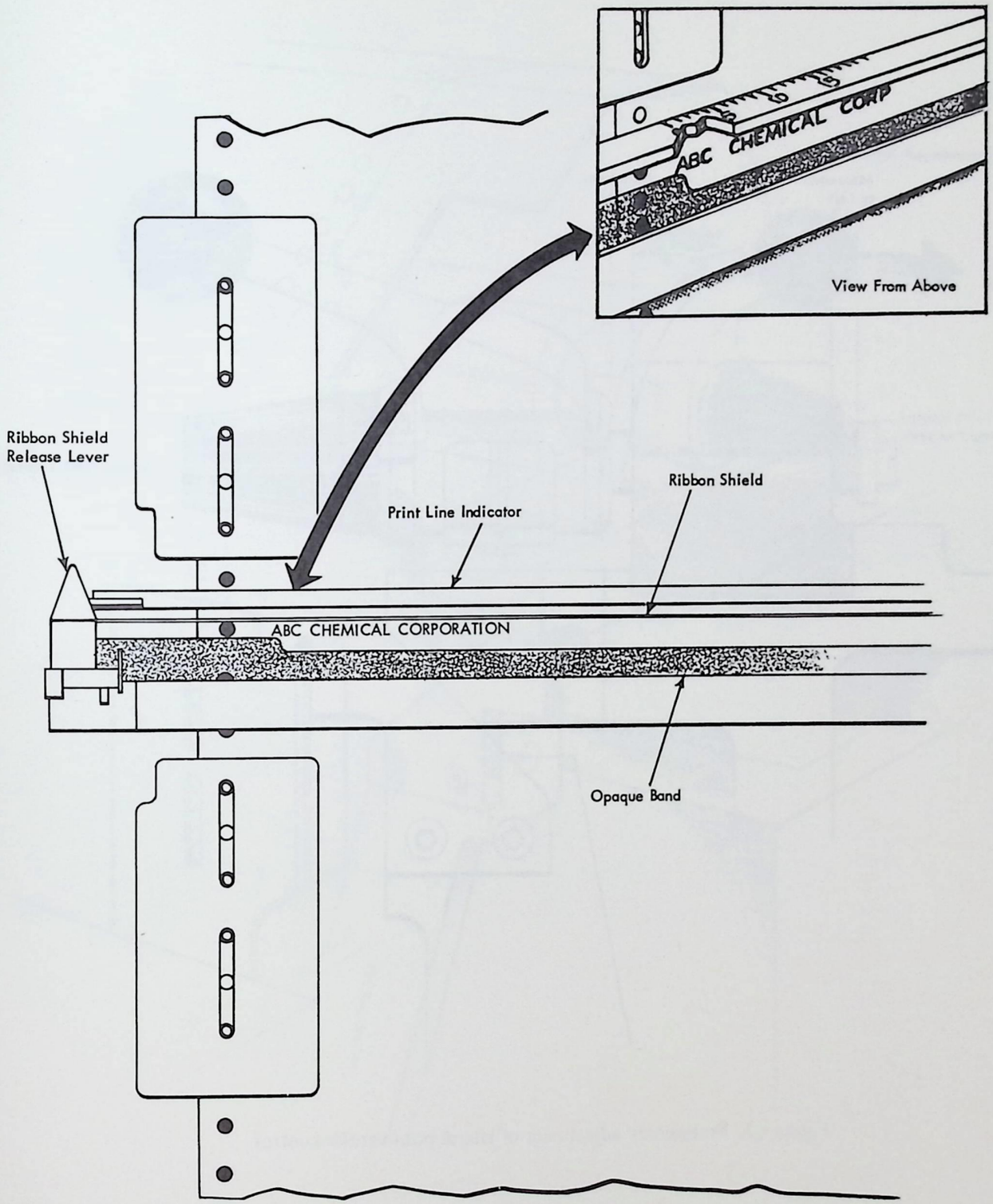


Figure 46. Use of ribbon shield for alignment

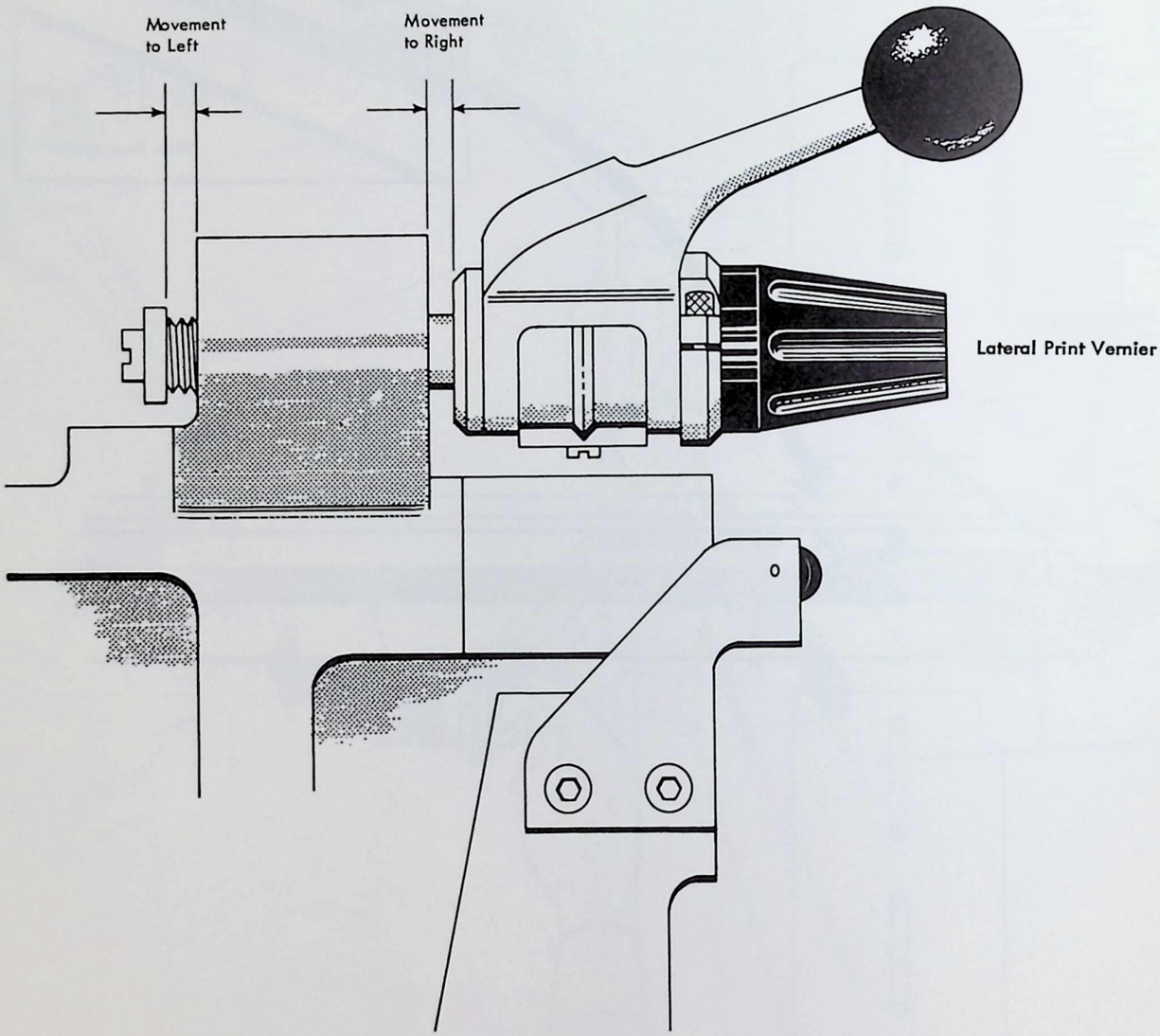


Figure 47. Preliminary adjustment of lateral print vernier control

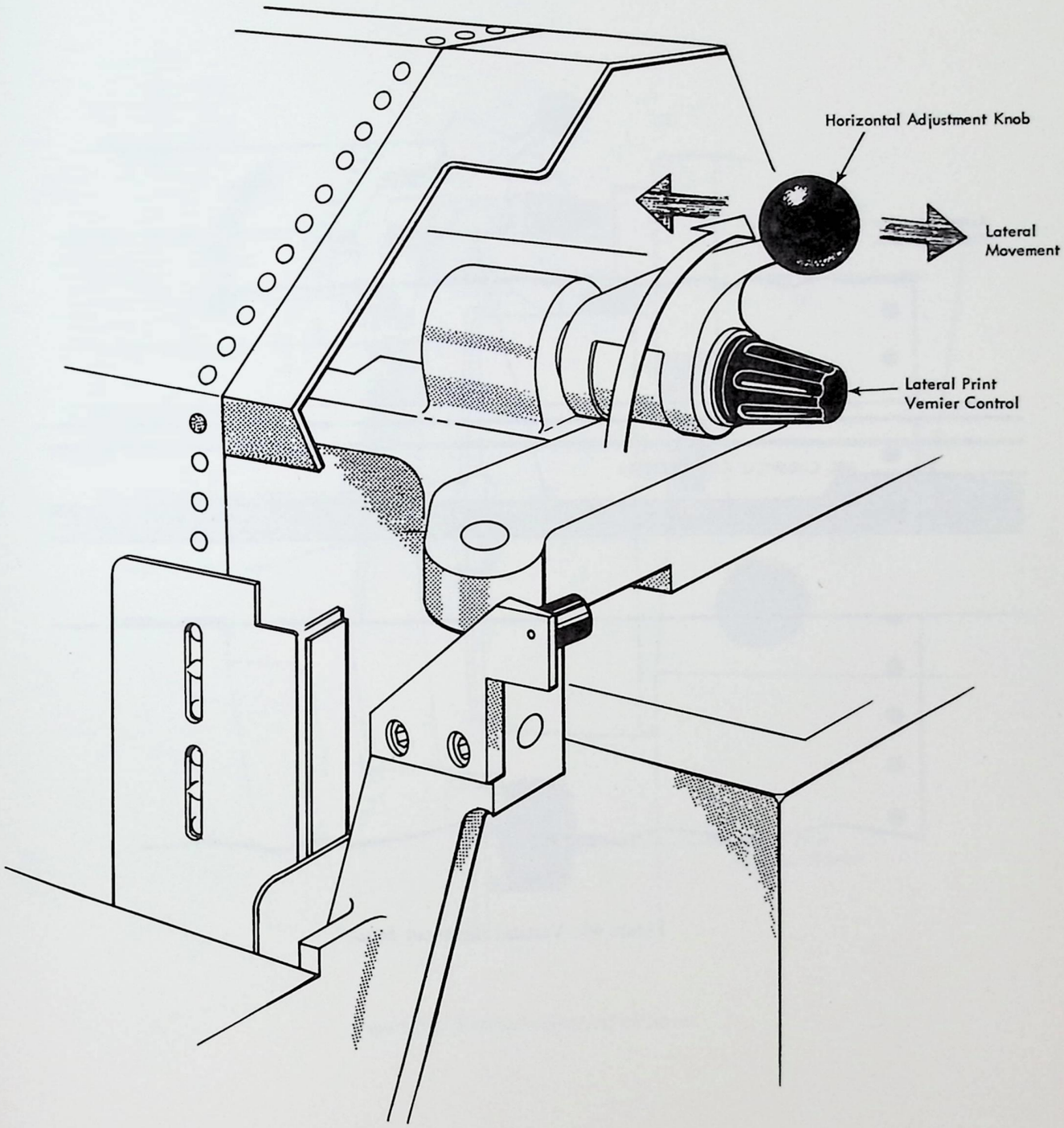


Figure 48. Lateral alignment of print mechanism

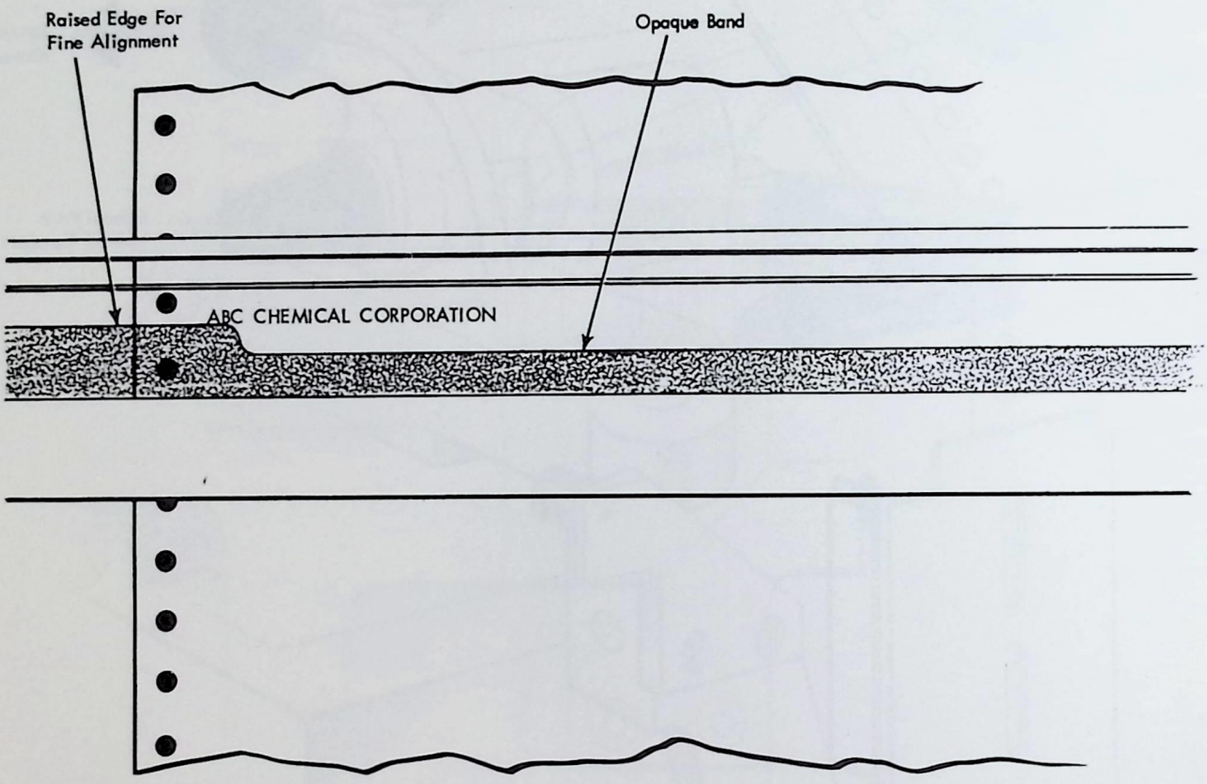


Figure 49. Vertical alignment detail

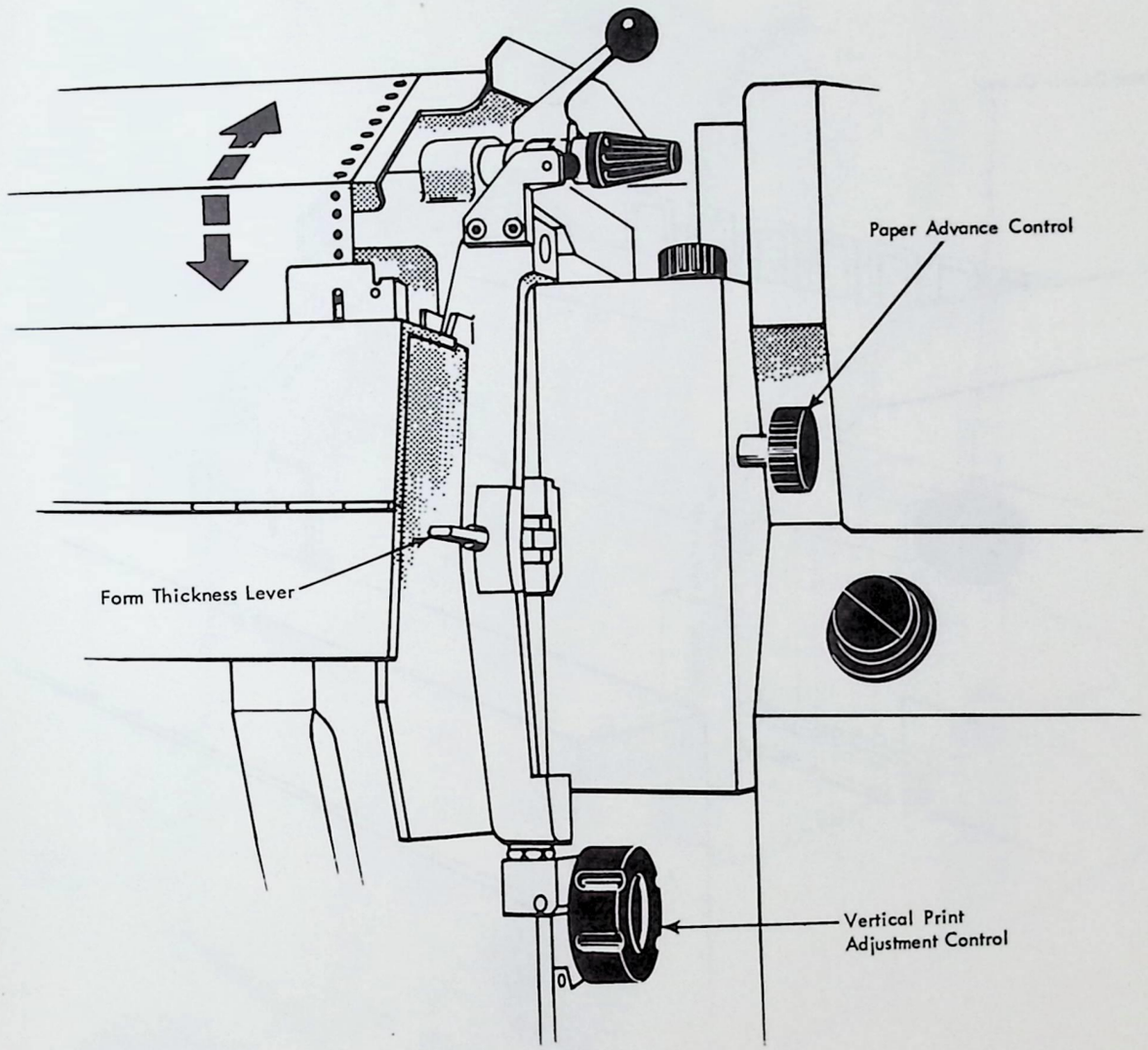


Figure 50. Vertical alignment of forms

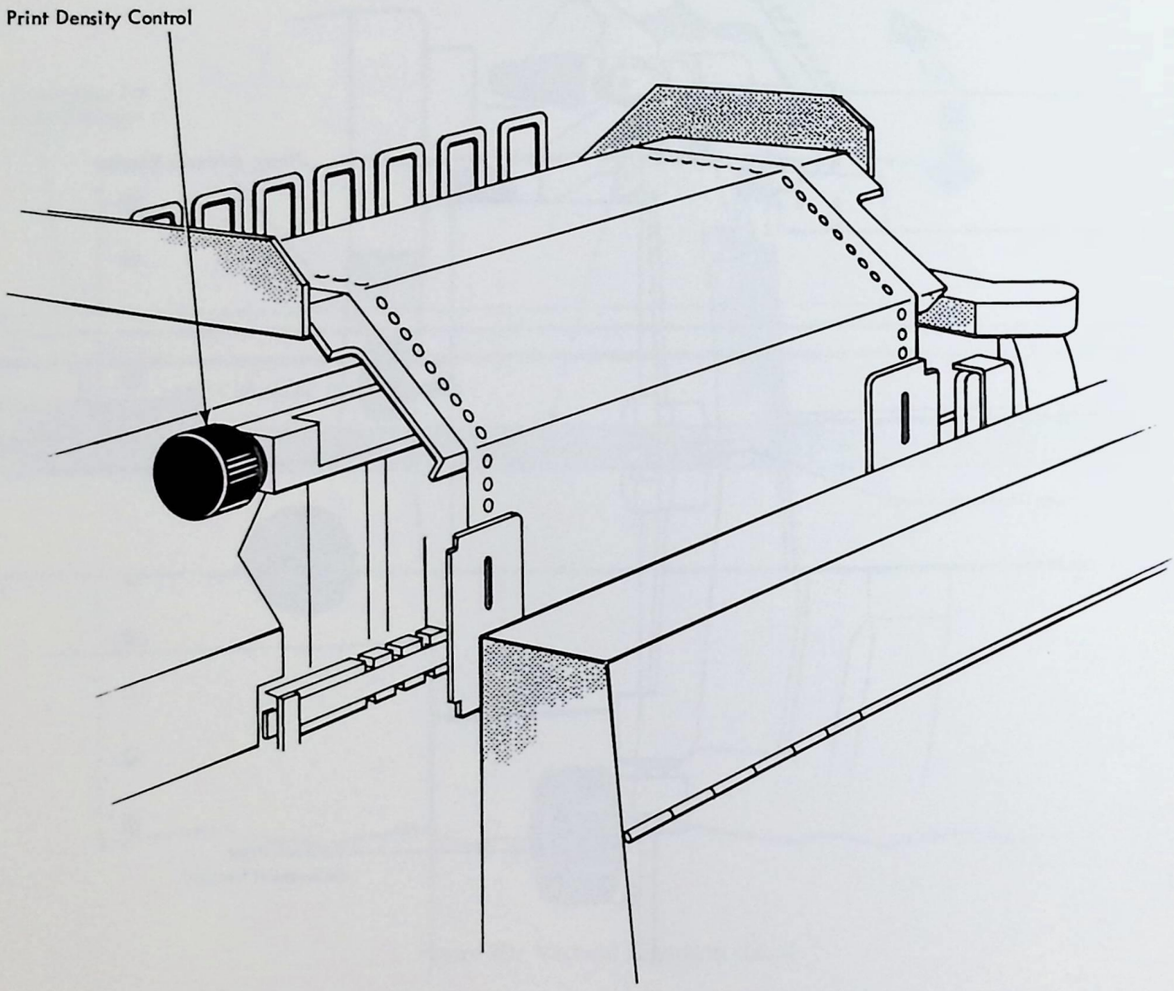


Figure 51. Setting print density

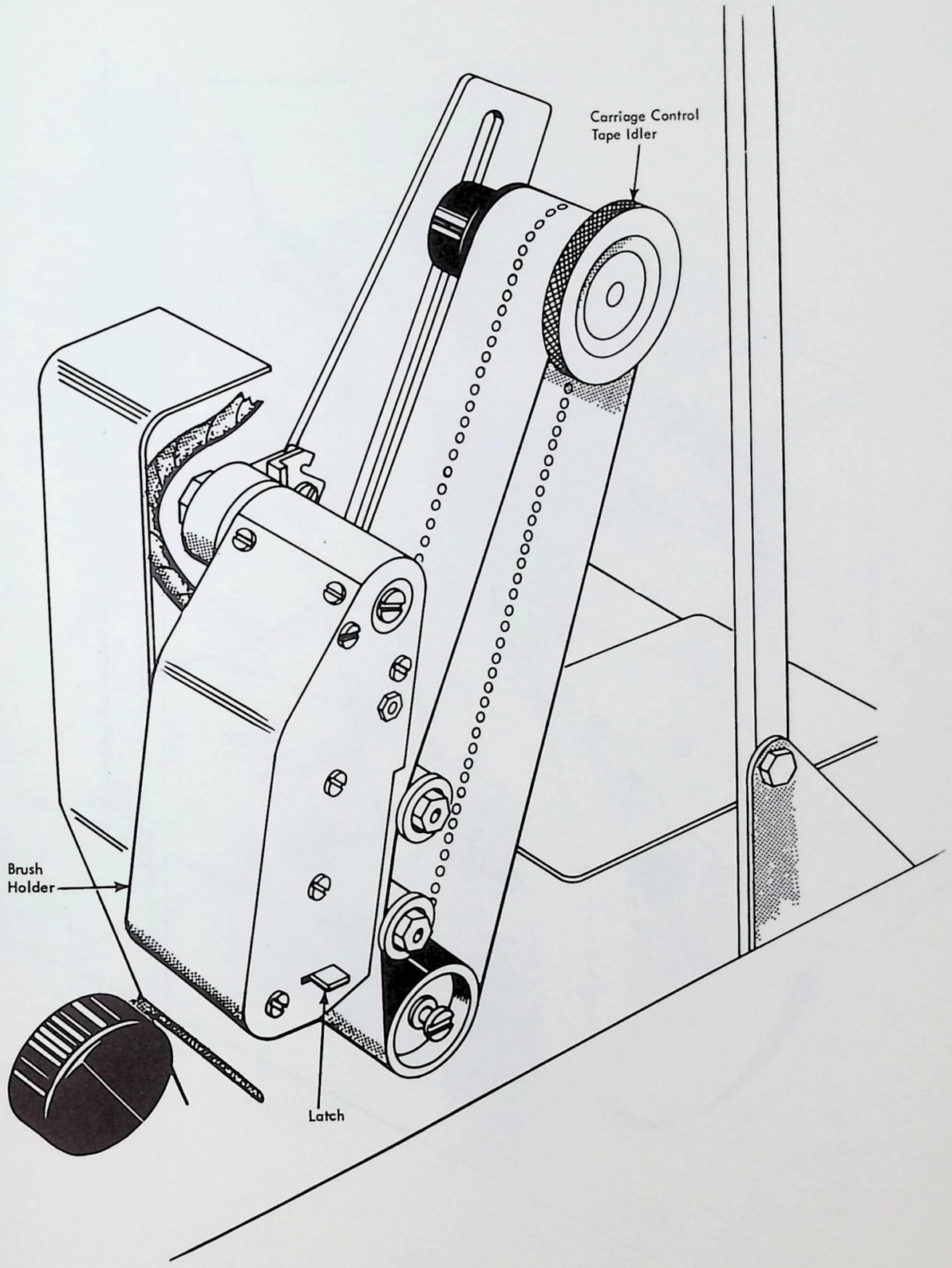


Figure 52. Carriage control tape unit (detailed view)

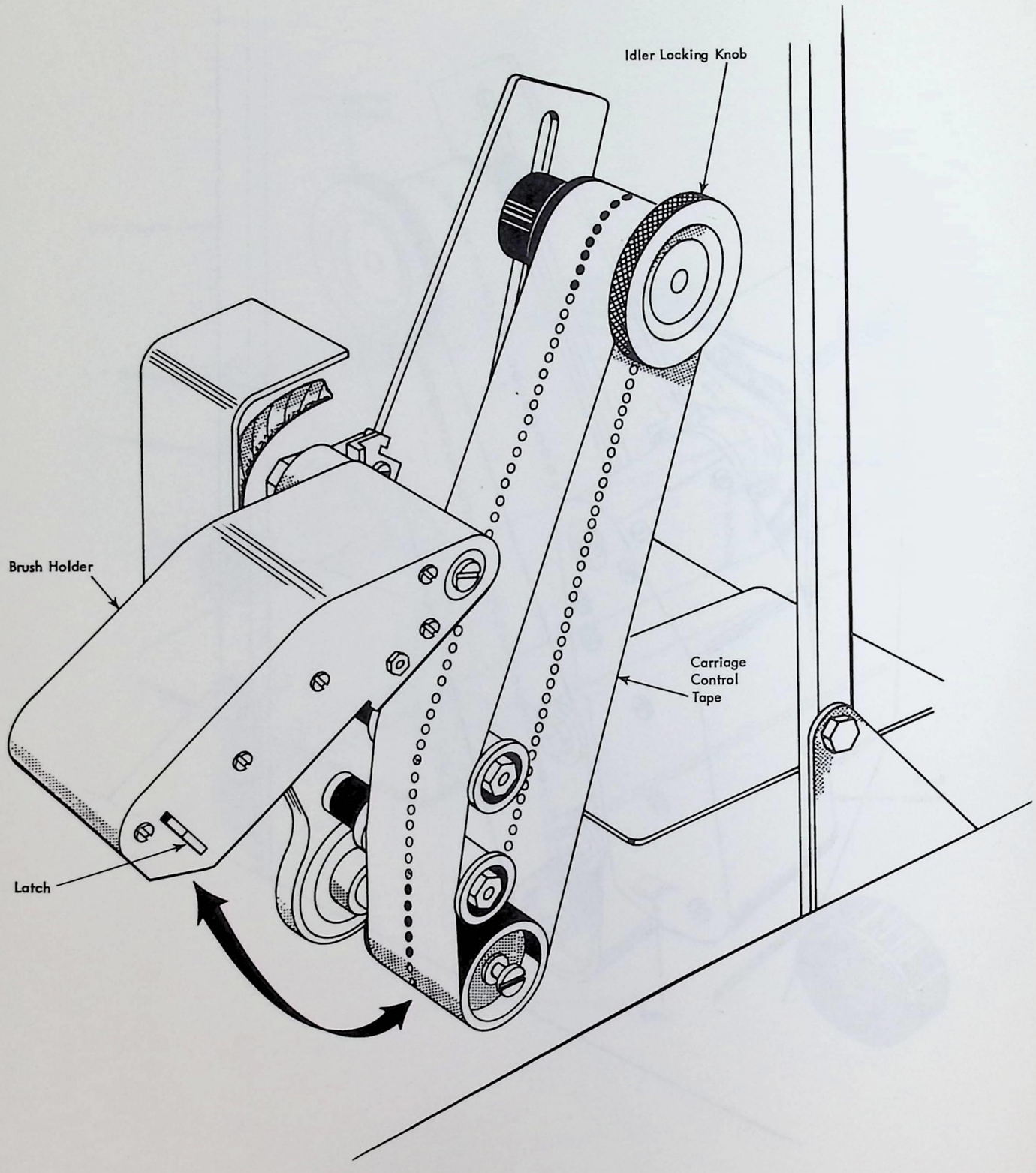


Figure 53. Exposing carriage tape

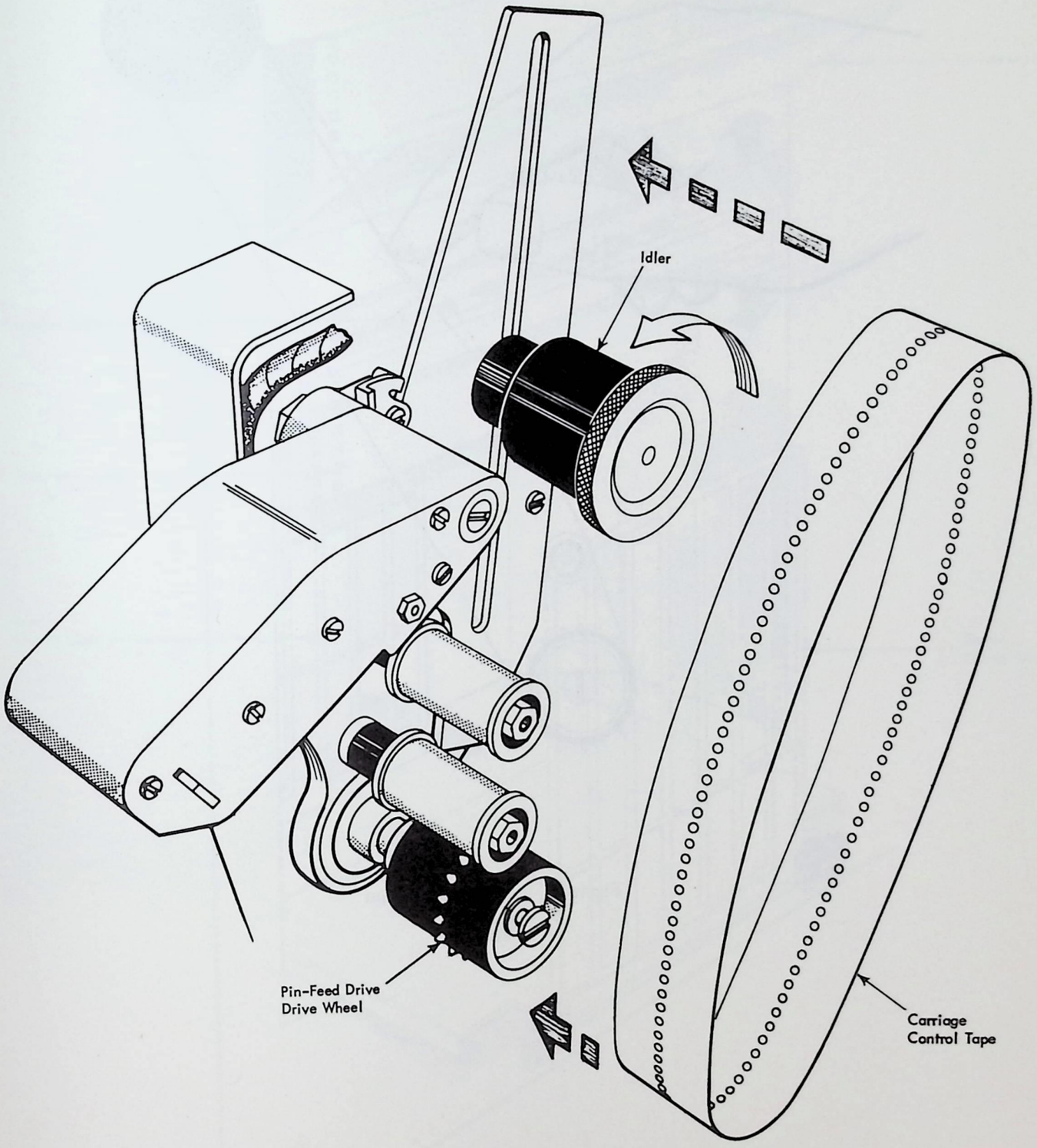


Figure 54. Mounting carriage control tape

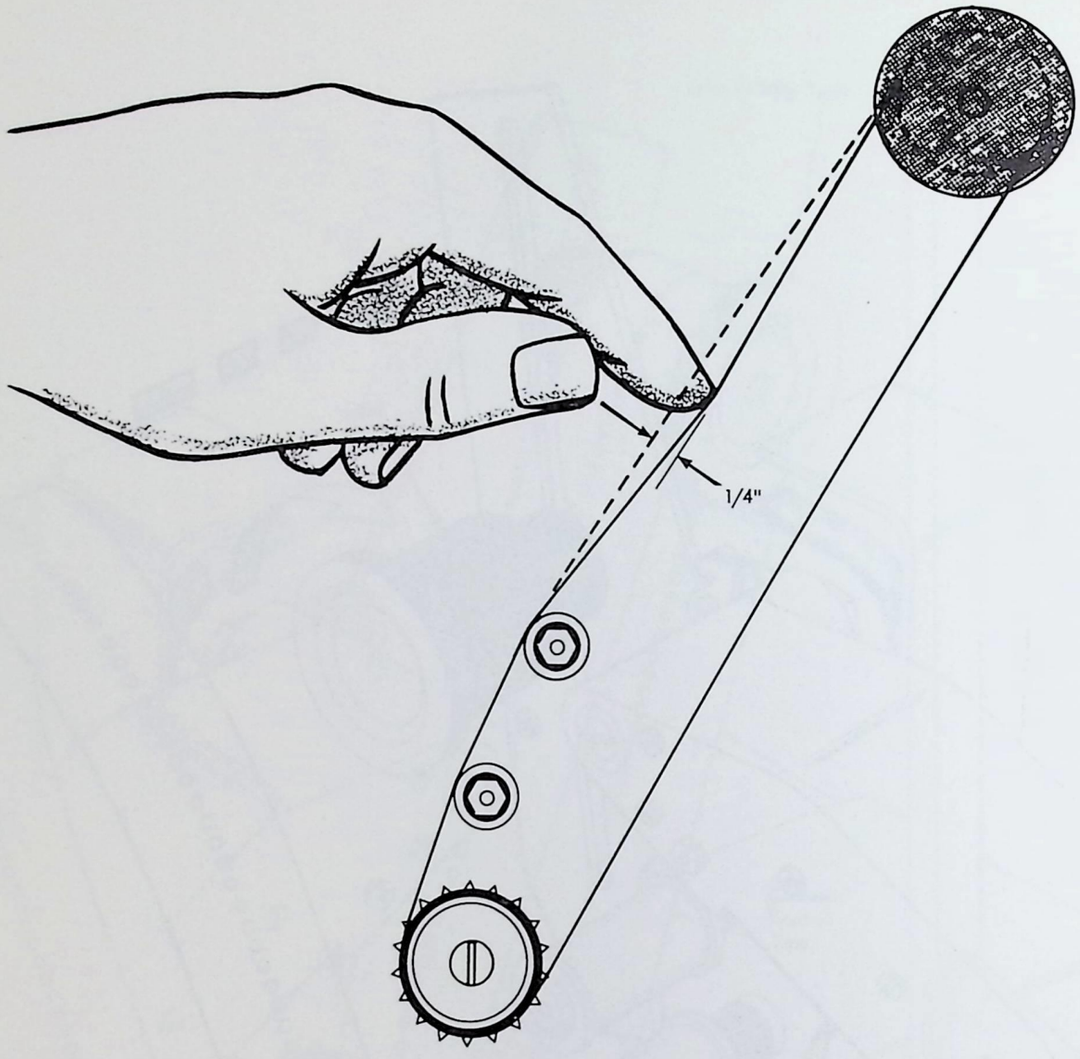


Figure 55. Testing tape tension

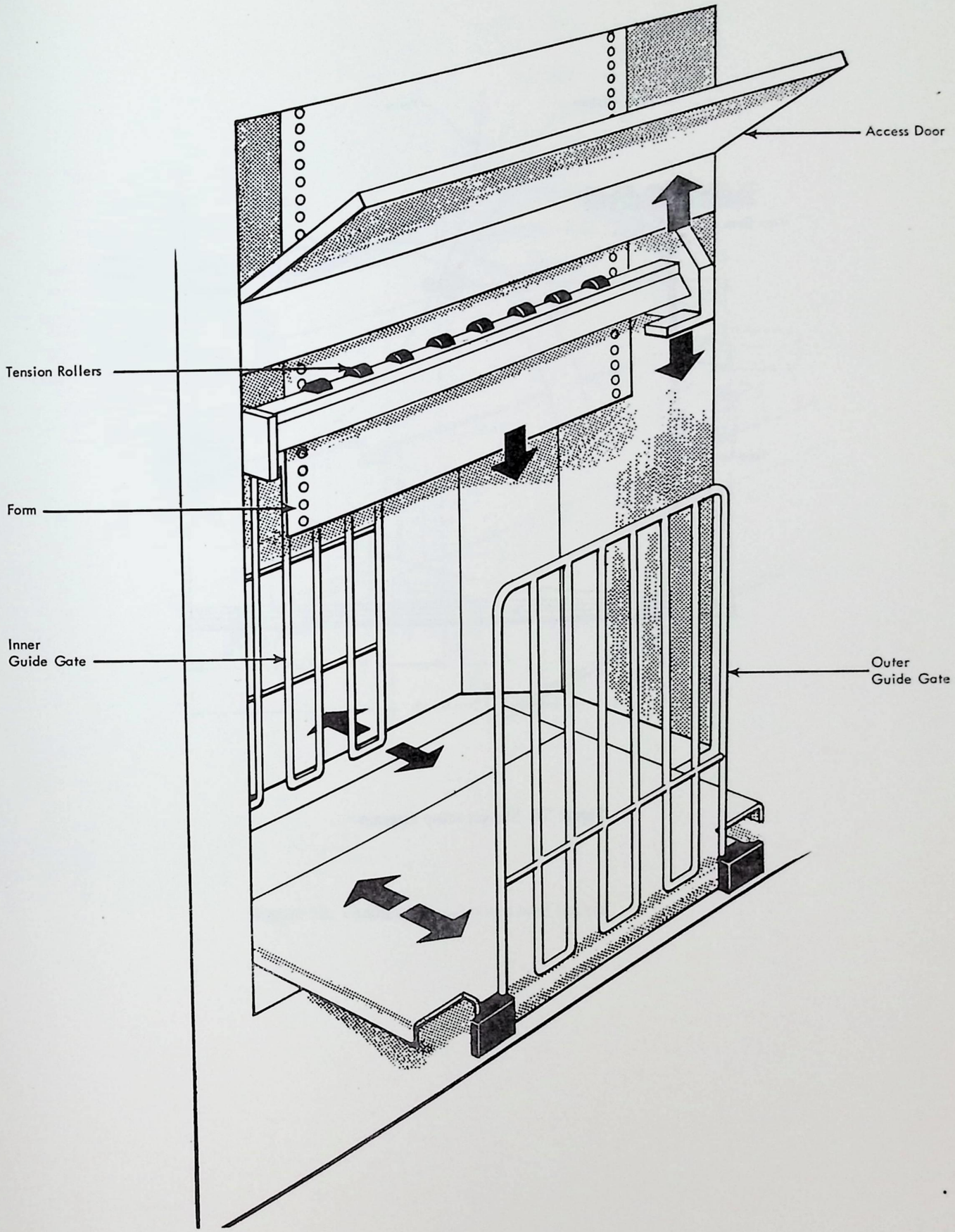


Figure 56. Path of forms into stacker

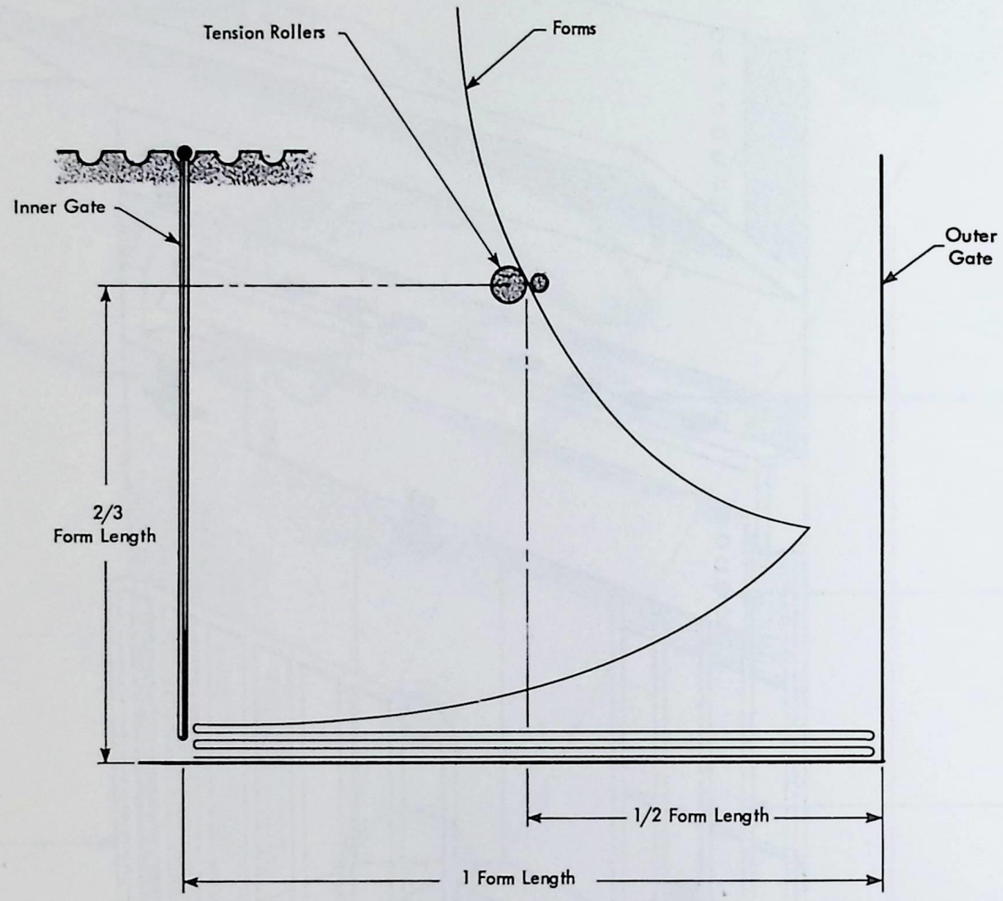


Figure 57. Stacker setup diagram

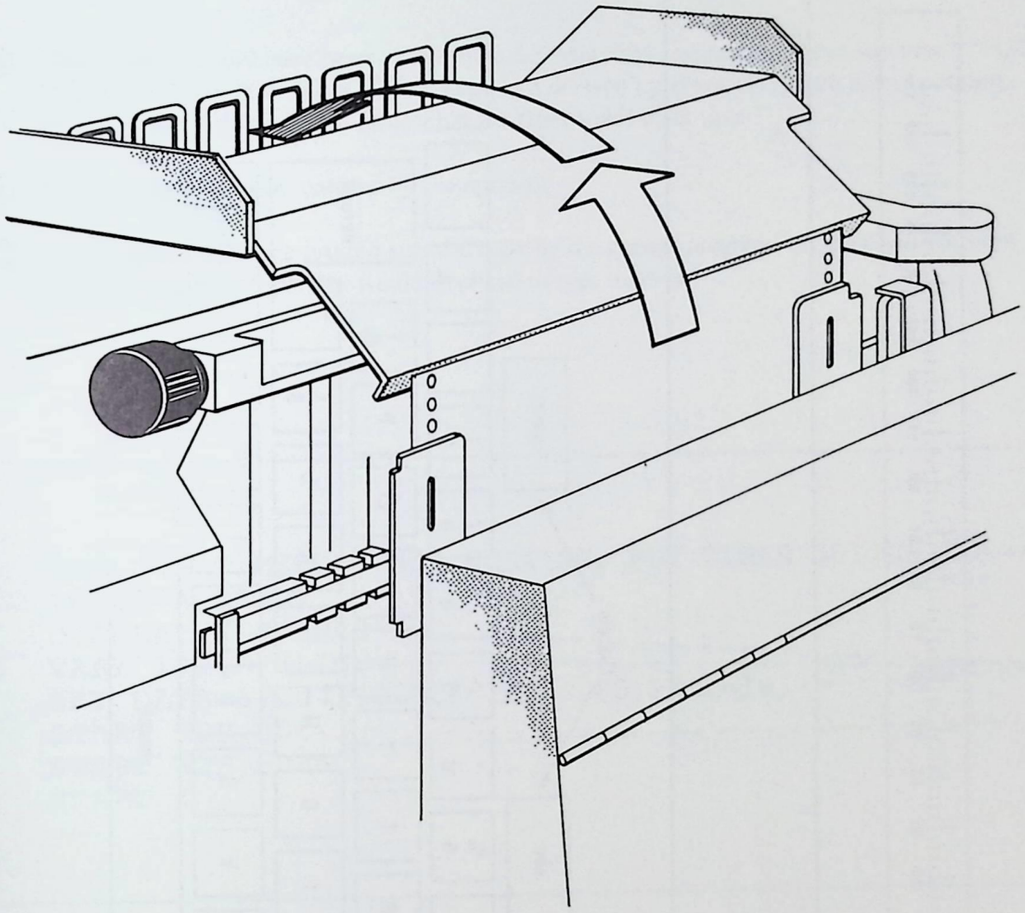


Figure 58. Guiding forms down toward stacker

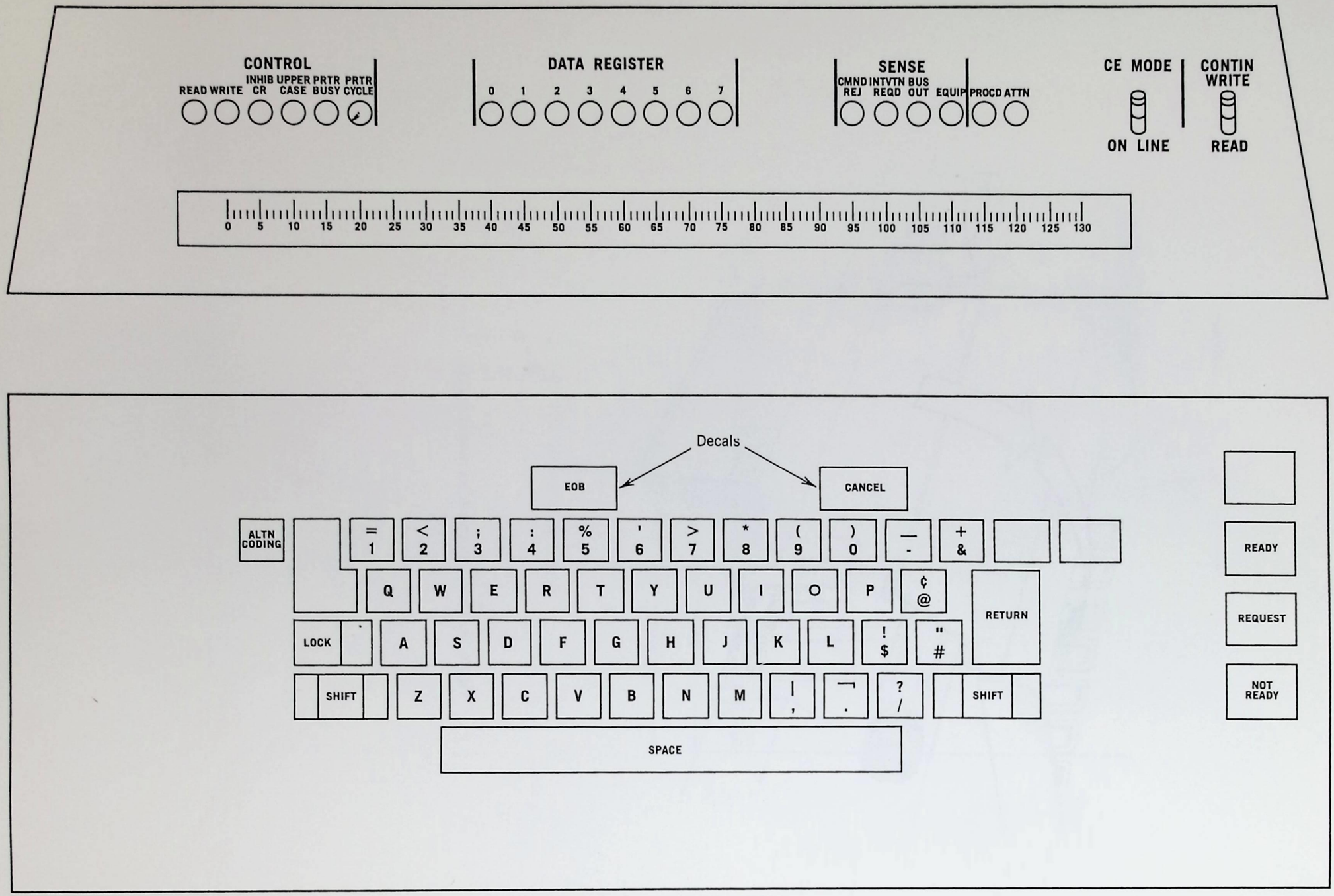


Figure 59. IBM 1052 Model 7 keyboard and switch panel

Ⓐ This message could have been a little more democratic by rephrasing the last sentence: "PUT TIMER SWITCH ON *IF YOU WANT TO.*" Leaving it off won't prevent the system from operating – leaving the timer switch off merely means that the timer won't mark time.

Ⓑ These commands were entered by the operator.

Ⓒ These commands were printed automatically by the control program. (If they had not been printed automatically, the operator would have had to type them in.)

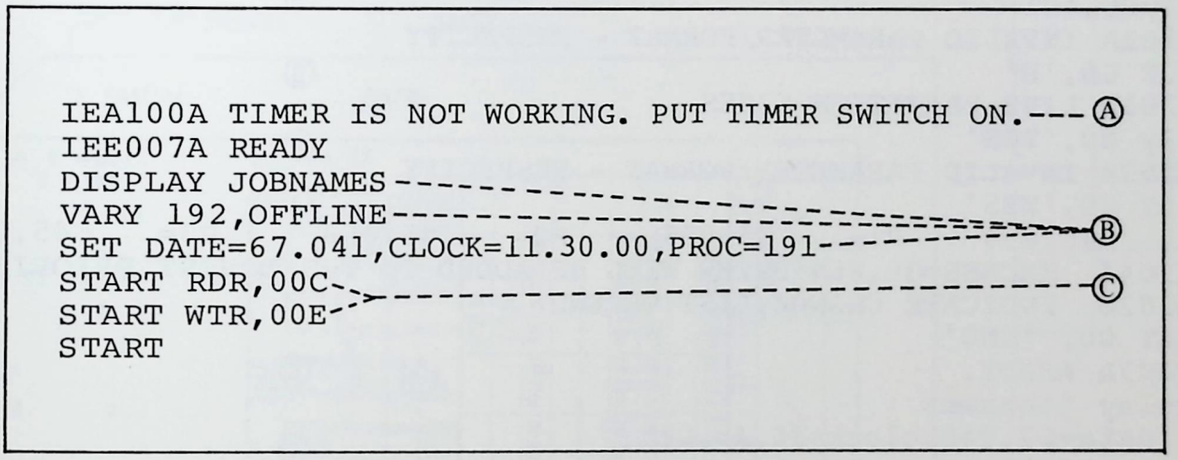


Figure 60. Console typewriter listing for PCP system start procedure

Explanation of encircled numbers:

① ② and ④ The operator typed the word "reply" in lower case. He should have typed it in upper case as shown on line ③ .

③ and ⑤ Prior to receiving the ready message as shown on line ⑥ , all replies must be typed in CAPITAL LETTERS. After the ready message some replies may be typed in small letters.

⑥ The READY message.

⑦ The last entry in a SET command must NOT be a comma.

```
IEA101A SPECIFY SYSTEM PARAMETERS
reply 00,'u'                                          ①
IEA102A INVALID PARAMETER/FORMAT - RESPECIFY
reply00,'U'                                           ②
IEA102A INVALID PARAMETER/FORMAT - RESPECIFY
REPLY 00,'U'                                          ③
IEA201D LIST PARTITION SIZES
reply 00,'YES'                                        ④
IEA102A INVALID PARAMETER/FORMAT - RESPECIFY
REPLY 00,'YES'                                        ⑤
PO=    45,056    P1=    45,056    P2=    45,056    P3=    45,056
IEA204I  EXCESS=36,864 BYTES WILL BE ADDED TO THE LOWEST PRIORITY PARTITION
IEA202D  INDICATE CHANGE,LIST OR END
REPLY 00, 'END'
IEE007A READY.                                        ⑥
display jobnames
set date=67.040,clock=00.45.00                        ⑦
START RDR,00C
START WTR,00E
start
```

Figure 61. Console typewriter listing for MFT system start procedure

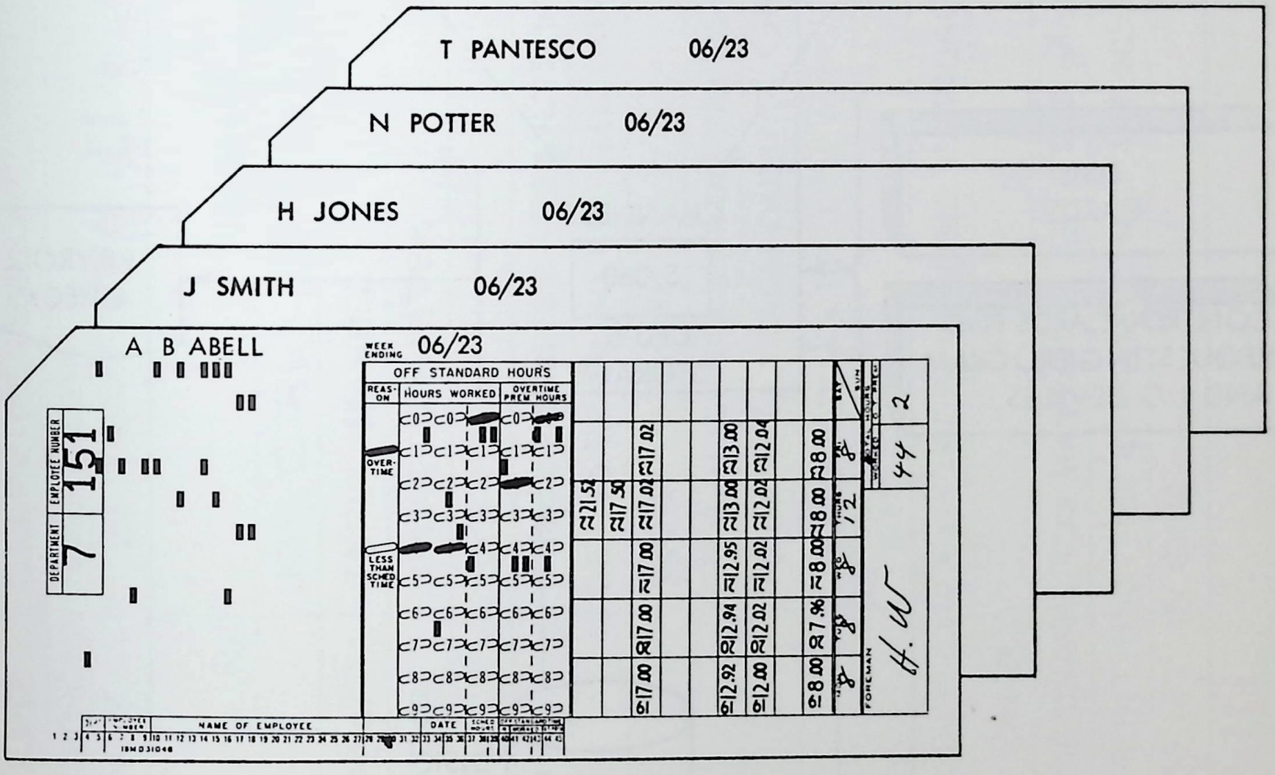


Figure 62. A deck of five time cards

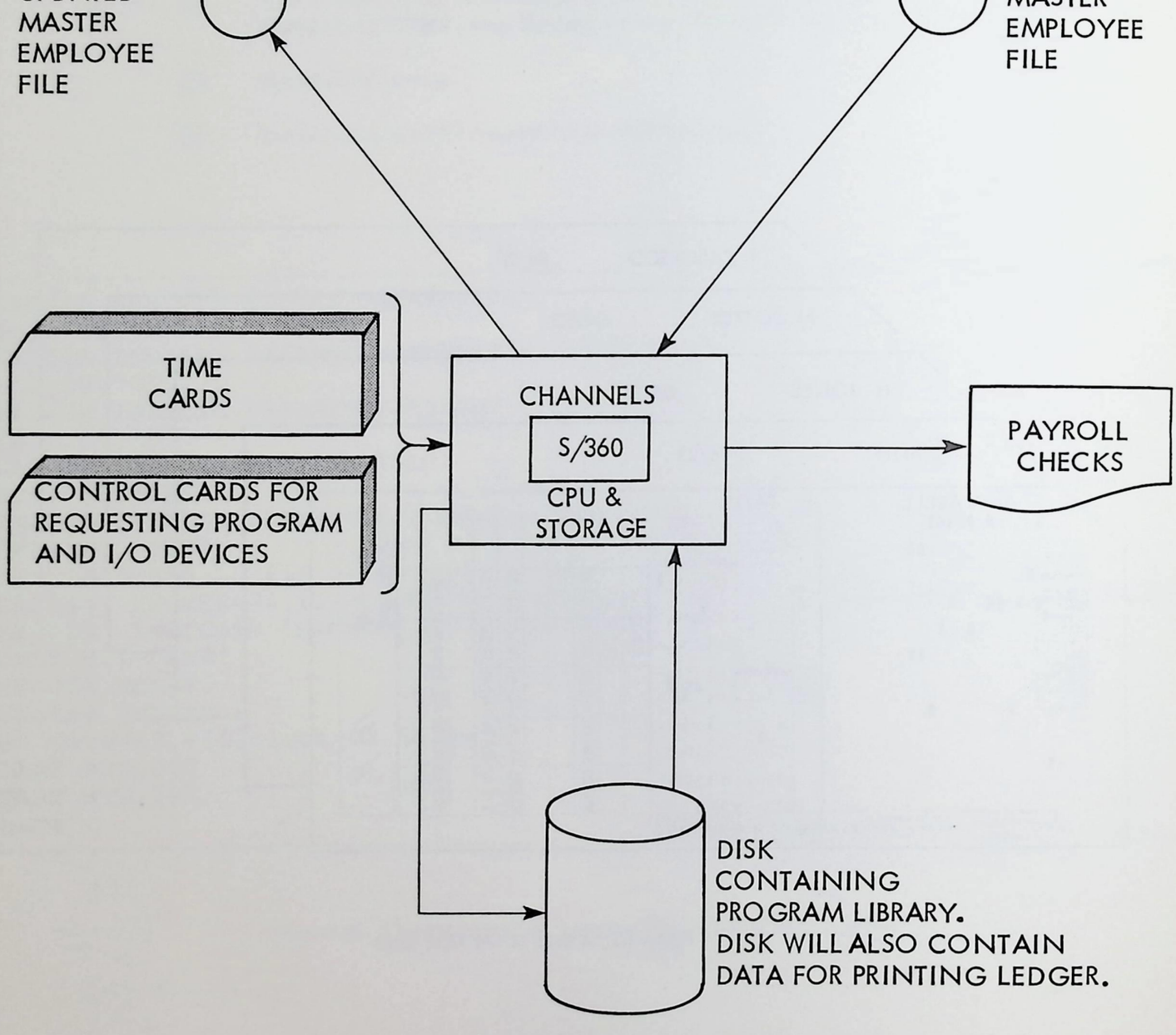


Figure 63. Flowchart of payroll check job

JOBNAME	ACCT NO.	PROGRAMMER'S NAME
PAYROLL	919-CCKPR	CLARK PETERSON

TYPE OF RUN	RUN FREQUENCY	USE NUCLEUS
☒ PROD ☐ TEST	WEEKLY	☒ REGULAR ☐ 02 ☐ 03

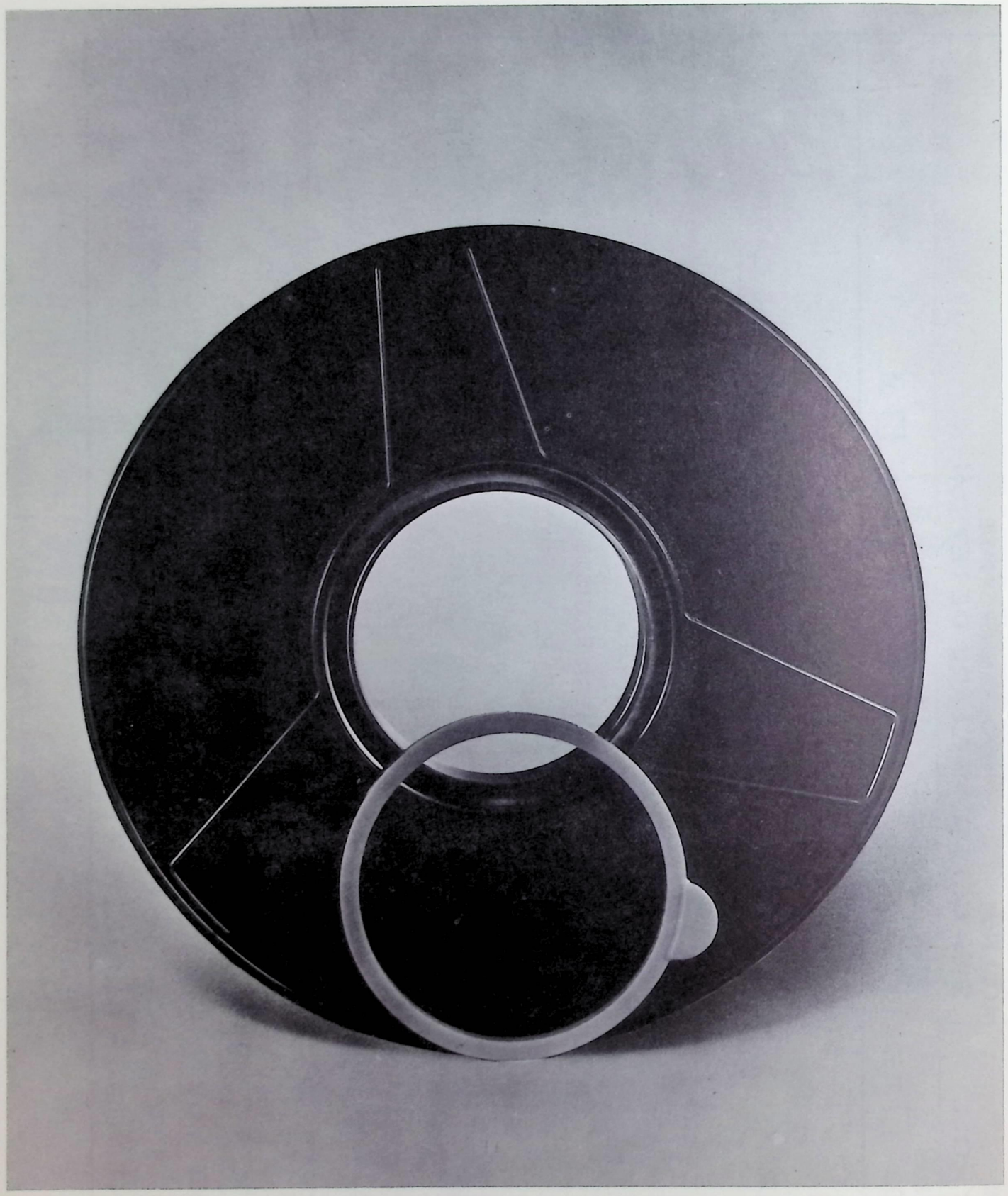
Device	In	Out	Unit Address	Vol. Ser. No.	COMMENTS
CARD RDR	✓		00C	—	JOB CTRL CARDS AND TIME CARDS
TAPE	✓		180	TAPE 01	INPUT MASTER
TAPE		✓	181	TAPE 02	UPDATED MASTER
DISK	✓		190	111111	SYS RES
DISK			190	111111	CHECK REGISTER - RESULTS WRITTEN ON A DATA
					SET TO BE CALLED "CHEKREG" (NEW, KEEP) - USED FOR
					WORK SPACE.
PRINTER		✓	00E	—	OBTAIN CHECKS FROM PAYROLL MASTER. RETURN
					TO SAME (ATTACH DUMMY CHECKS WITH
					LEAD STICKER.)

SPECIAL INSTRUCTIONS: 1. PRINT CHEX 8 LINES/IN - USE CARRIAGE TAPE *6

2. NAME AT PRINT POSITION 8.

3. WHEN YOU RECEIVE THE MESSAGE "00 PAYROLL D TRYAGAIN/CONTINUE": REPLY WITH "TRYAGAIN" TO PRINT ANOTHER DUMMY CHECK (IF NECESSARY) OR "CONTINUE" IF ALIGNMENT IS O.K.

Figure 64. Run sheet for payroll check job



Remember the simple rule: *no ring, no write.* This means that a reel of tape cannot be written on unless the ring is inserted in the reel.

Figure 65. Tape reel showing file protection method

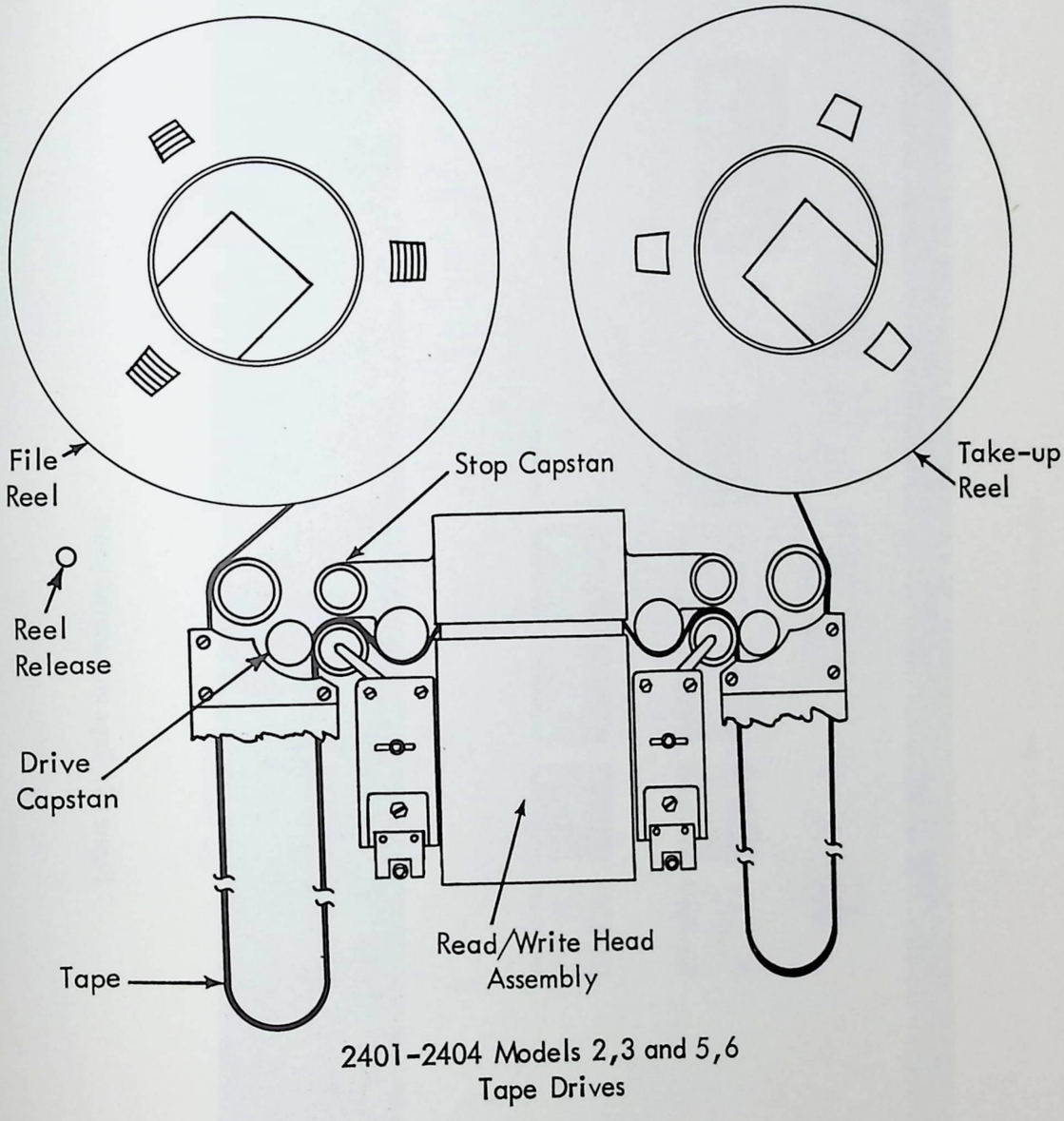


Figure 66. Read/write and erase heads

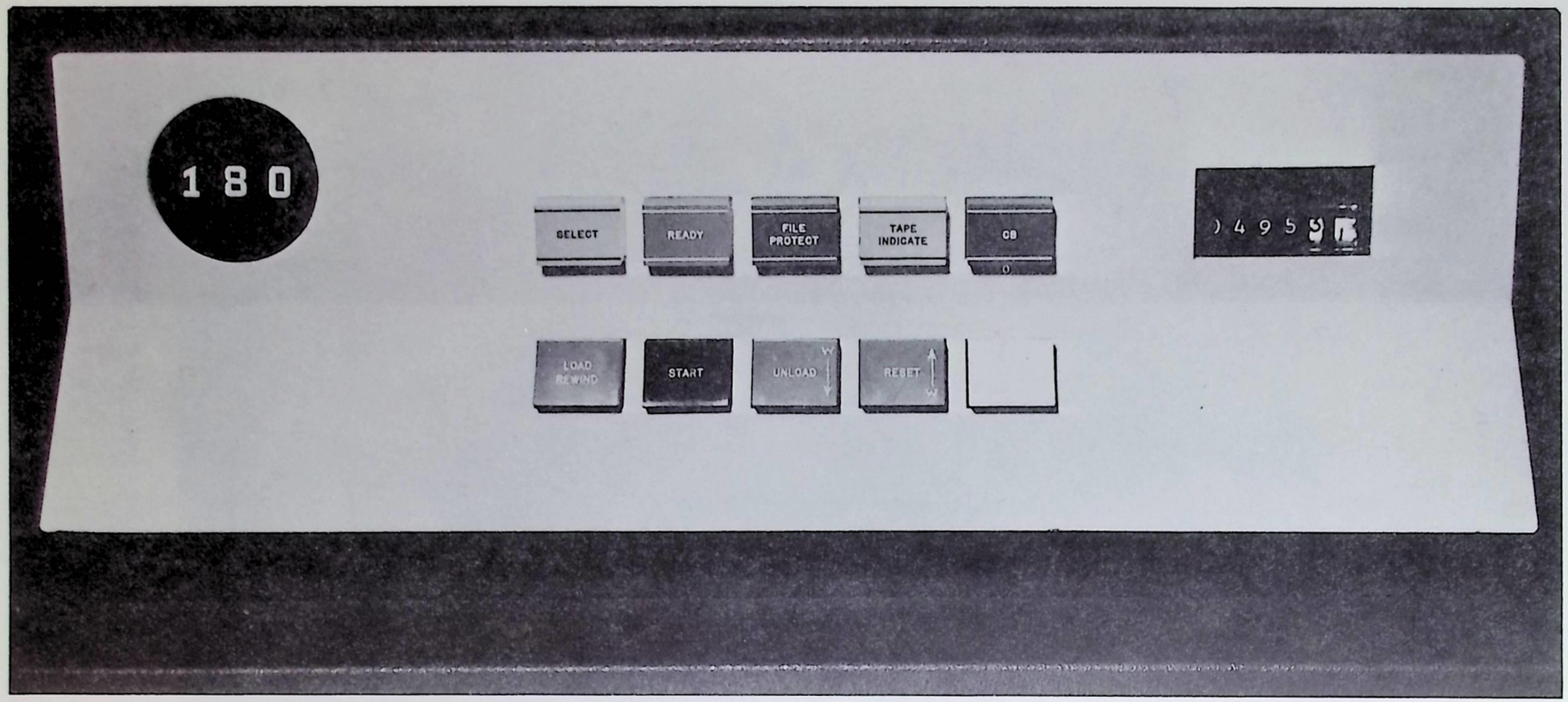


Figure 67. Tape unit control panel

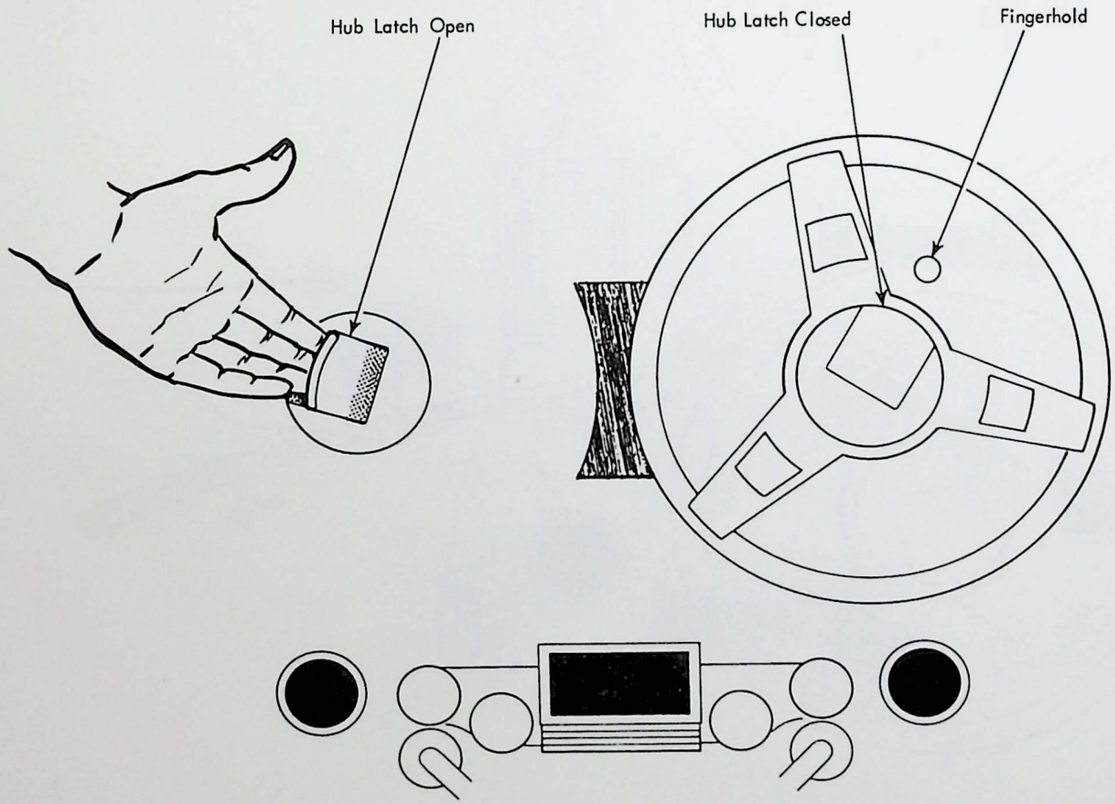


Figure 68. Tape reel hub latches

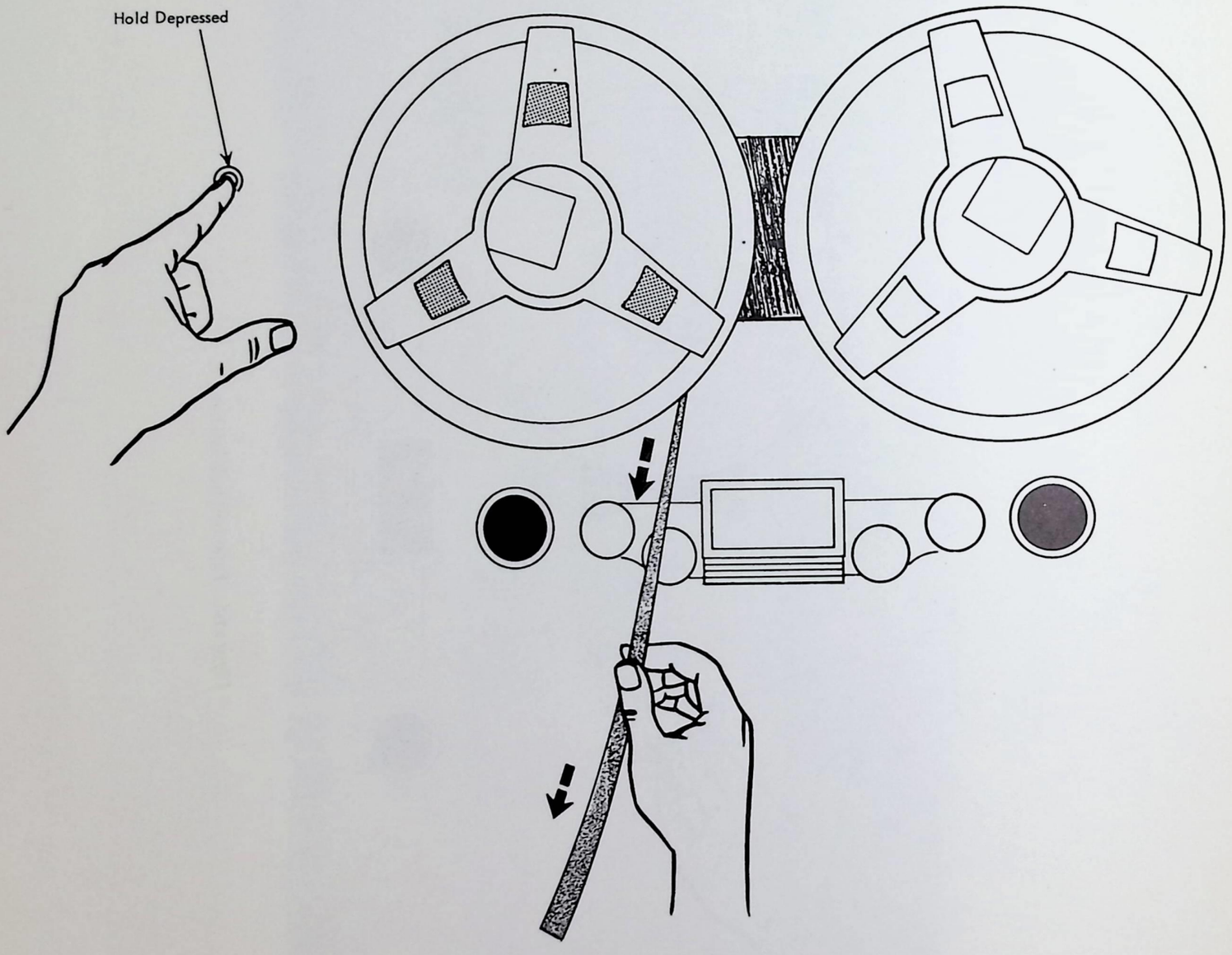


Figure 69. Stripping off tape leader

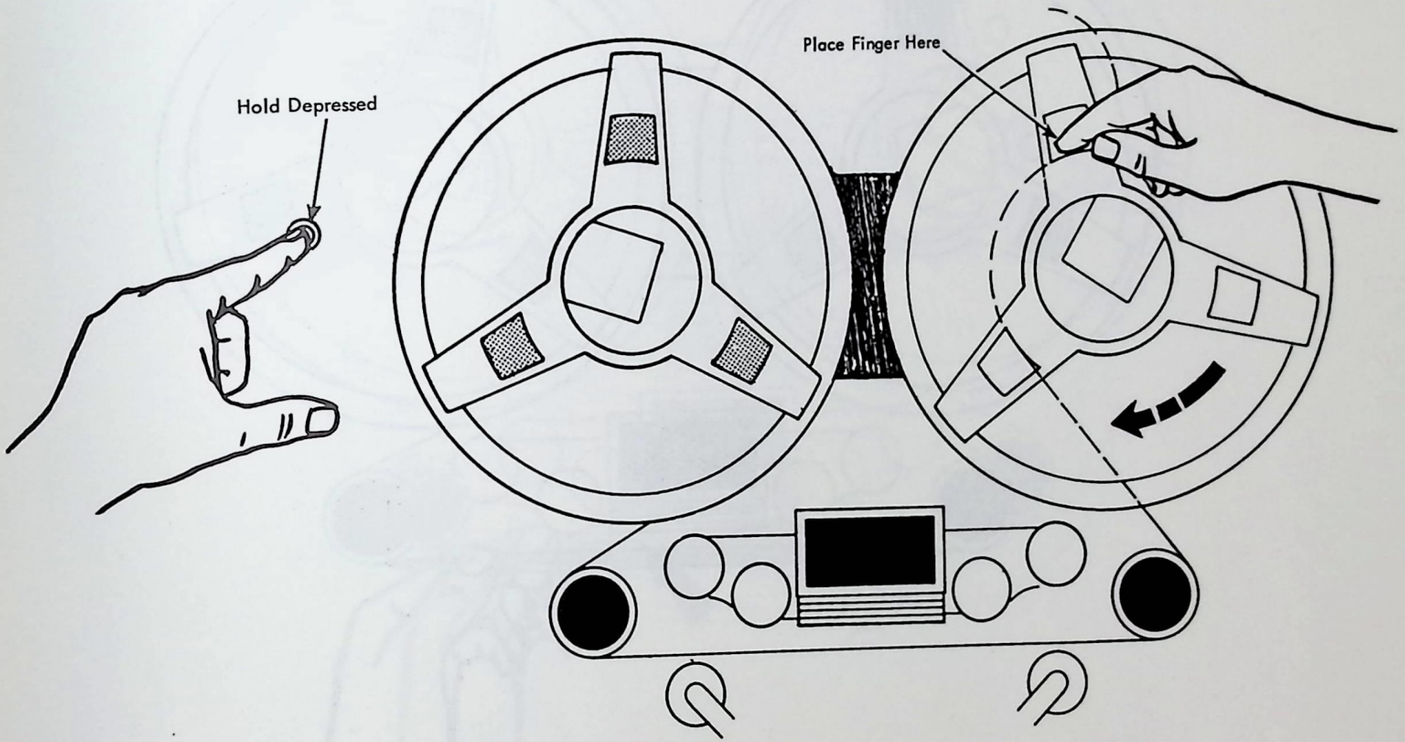


Figure 70. Threading tape

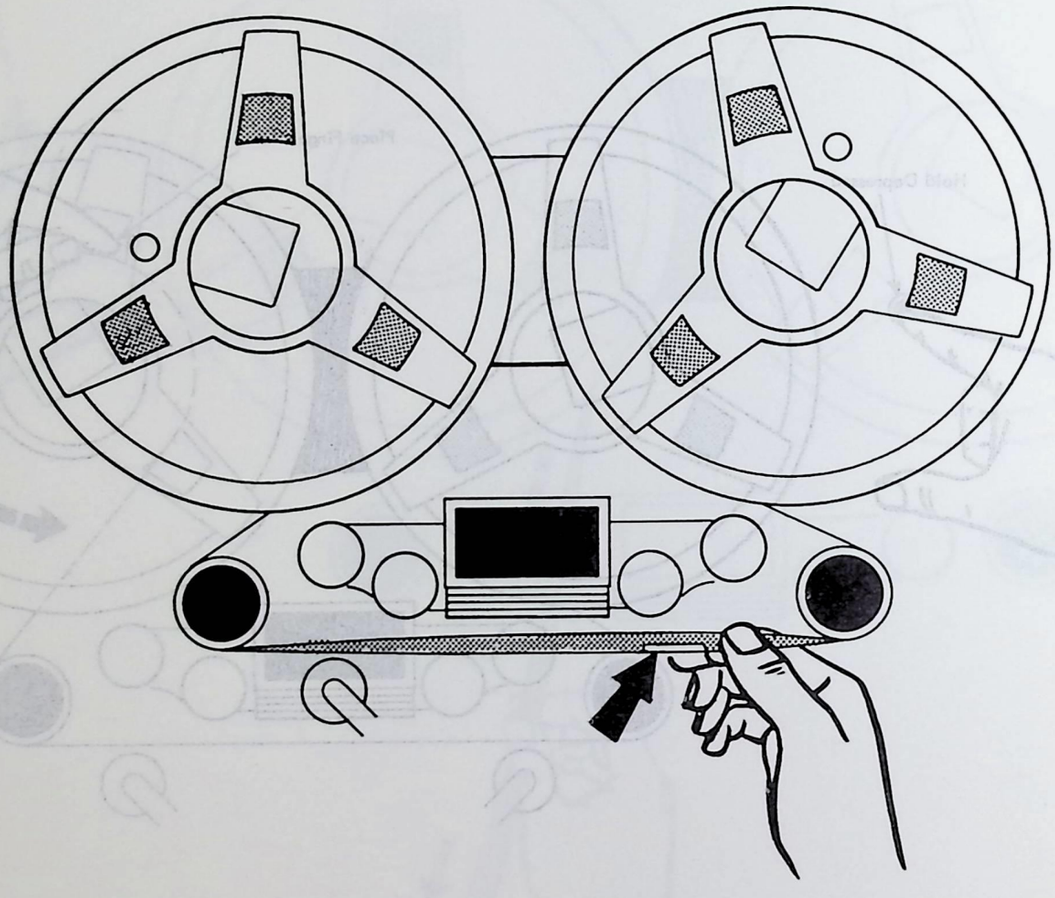


Figure 71. Load-point marker

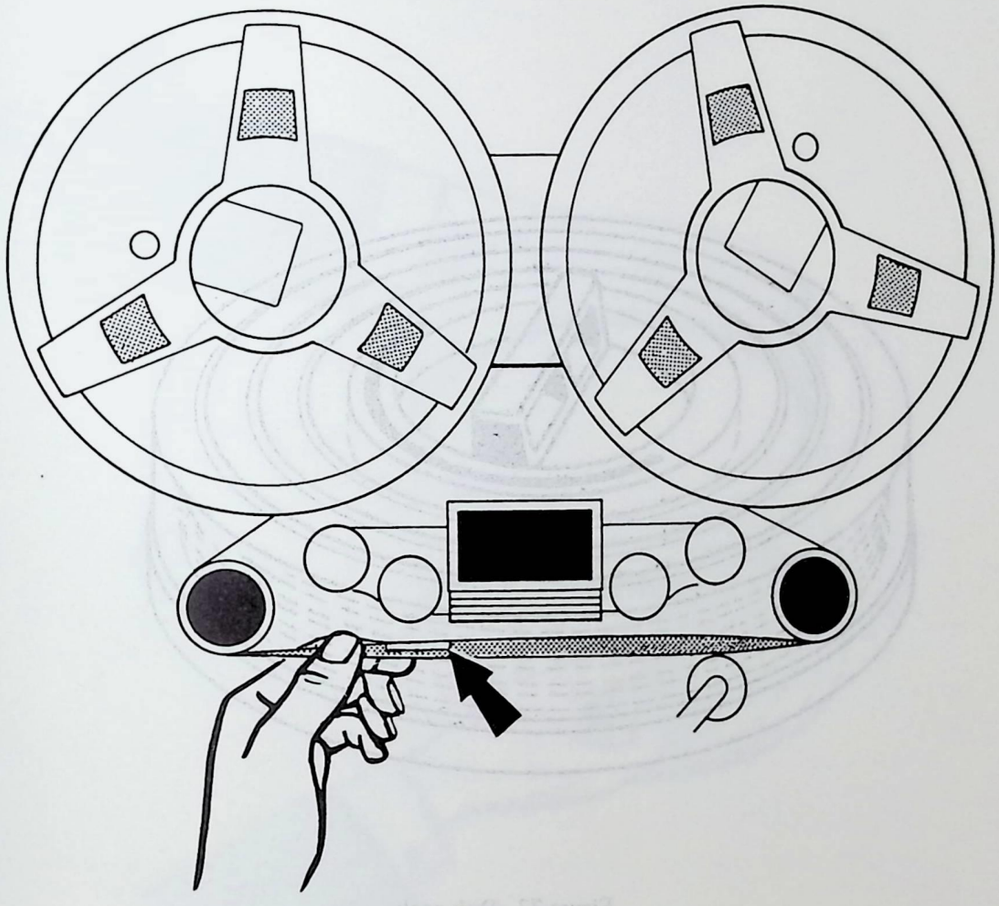


Figure 72. End-of-tape marker

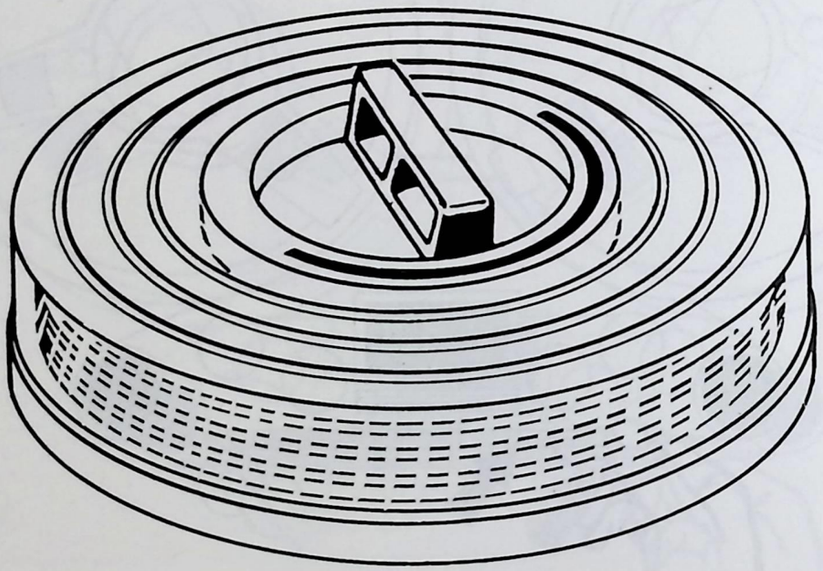


Figure 73. Disk pack

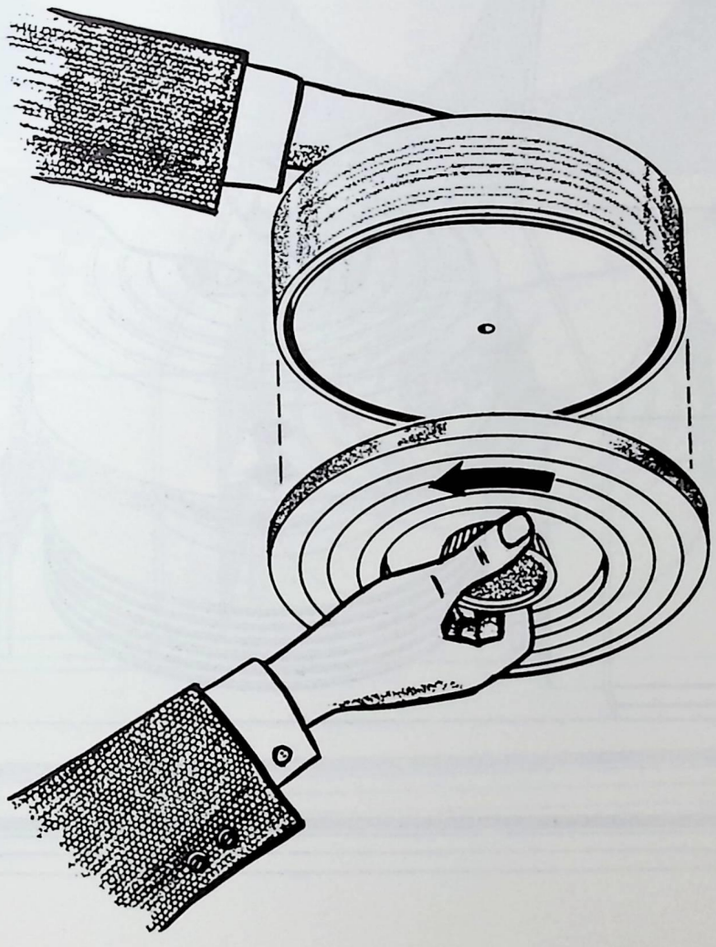


Figure 74. Removing bottom plate

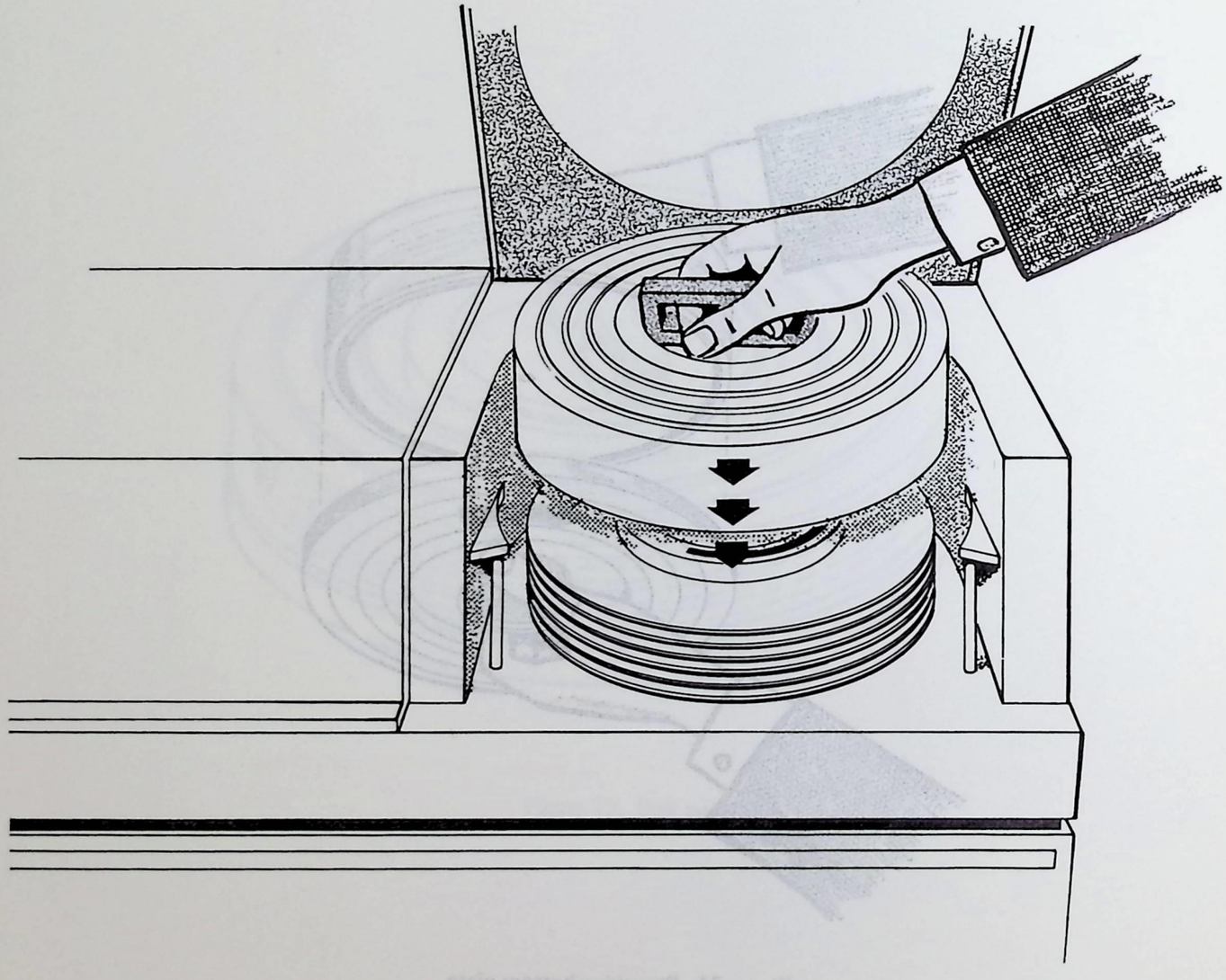


Figure 75. Placing cover over disk pack

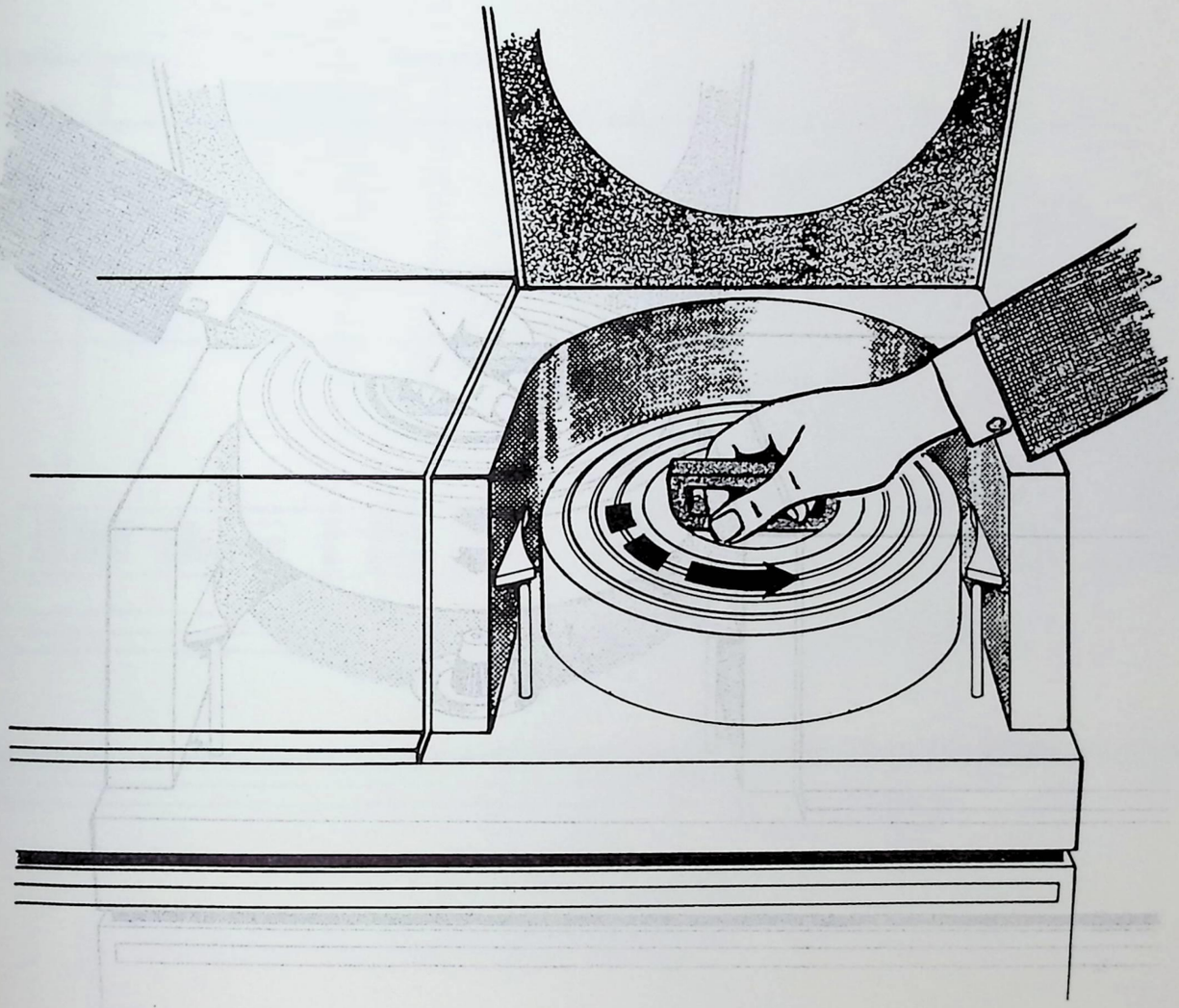


Figure 76. Turning disk pack off spindle

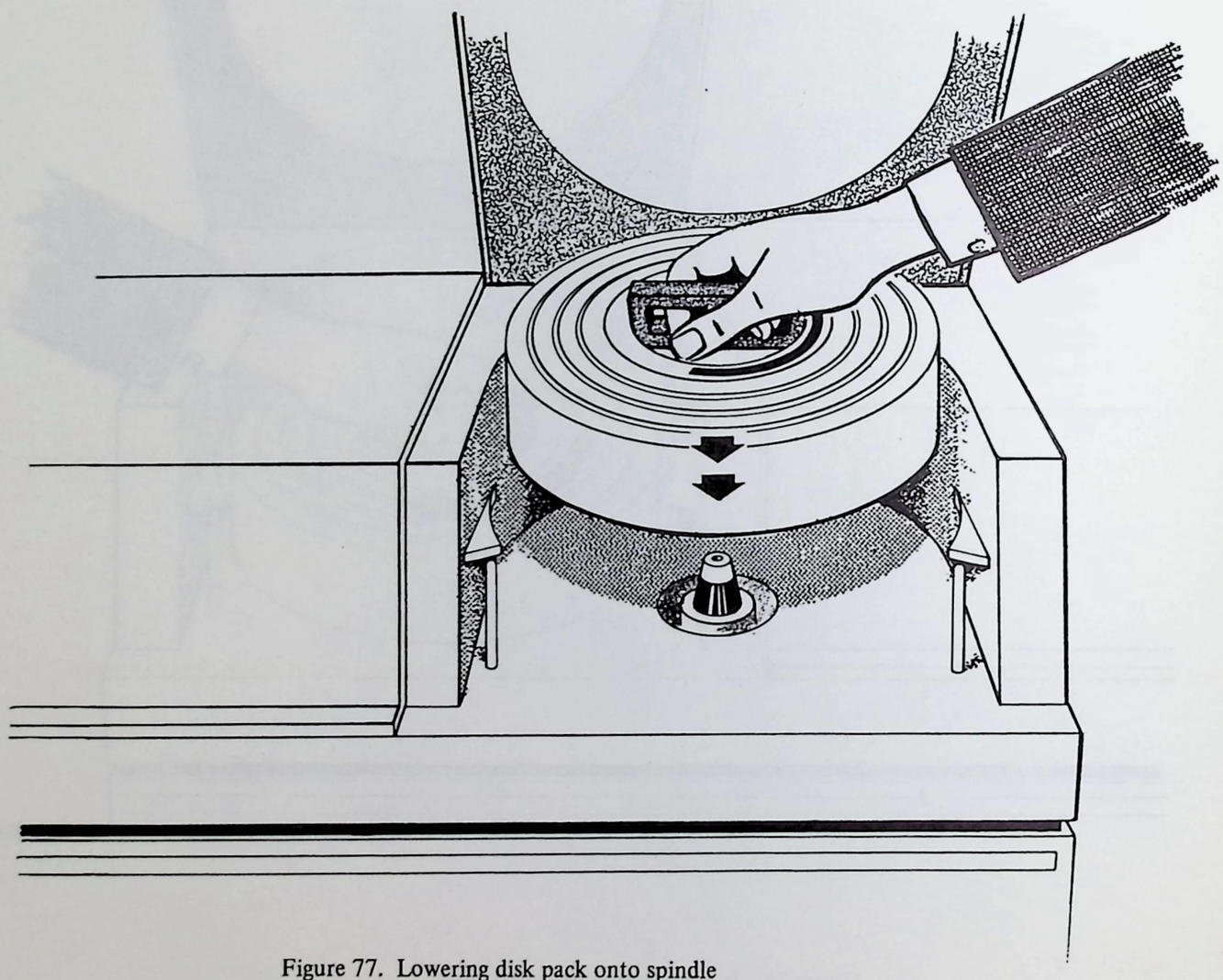


Figure 77. Lowering disk pack onto spindle

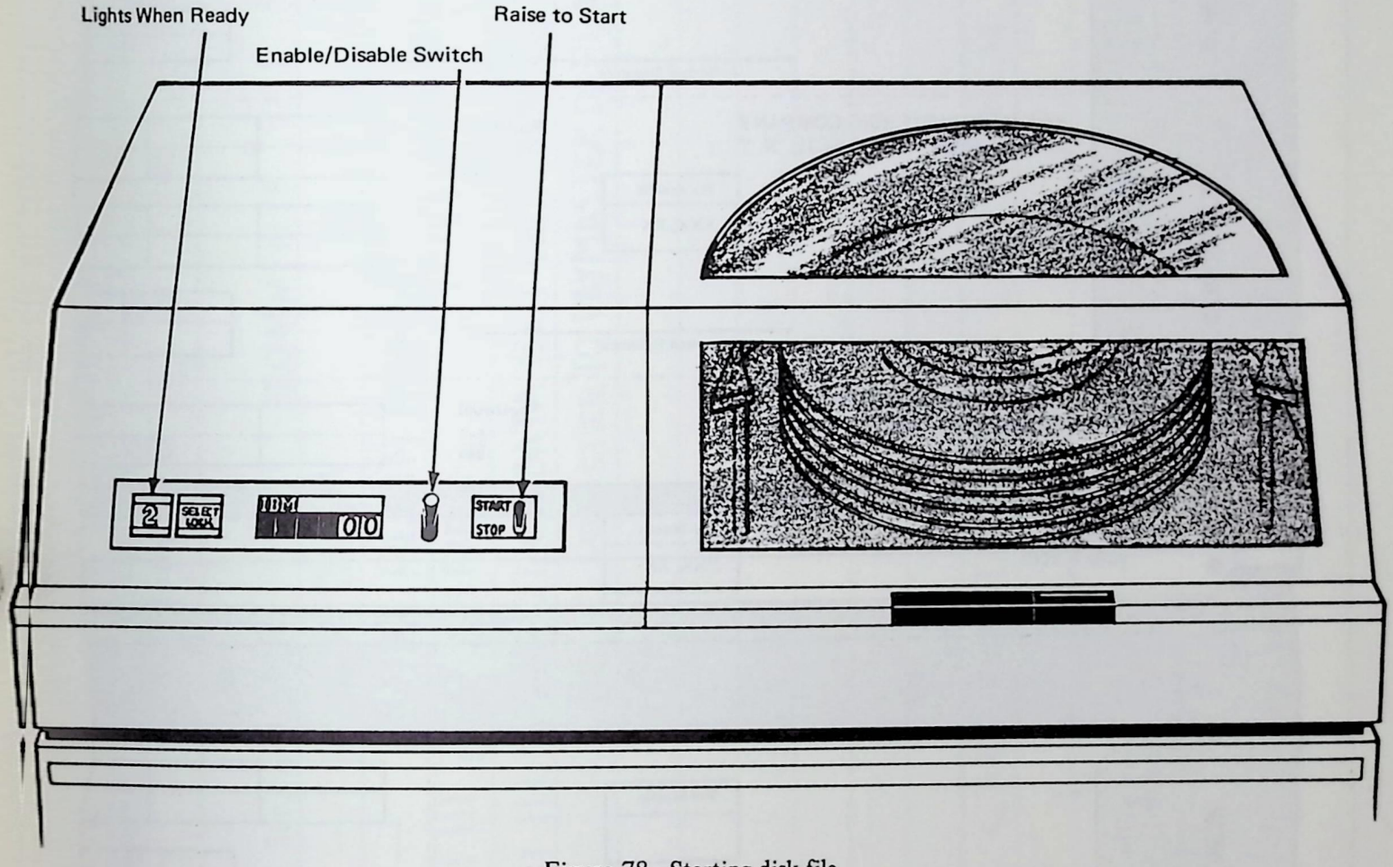


Figure 78. Starting disk file

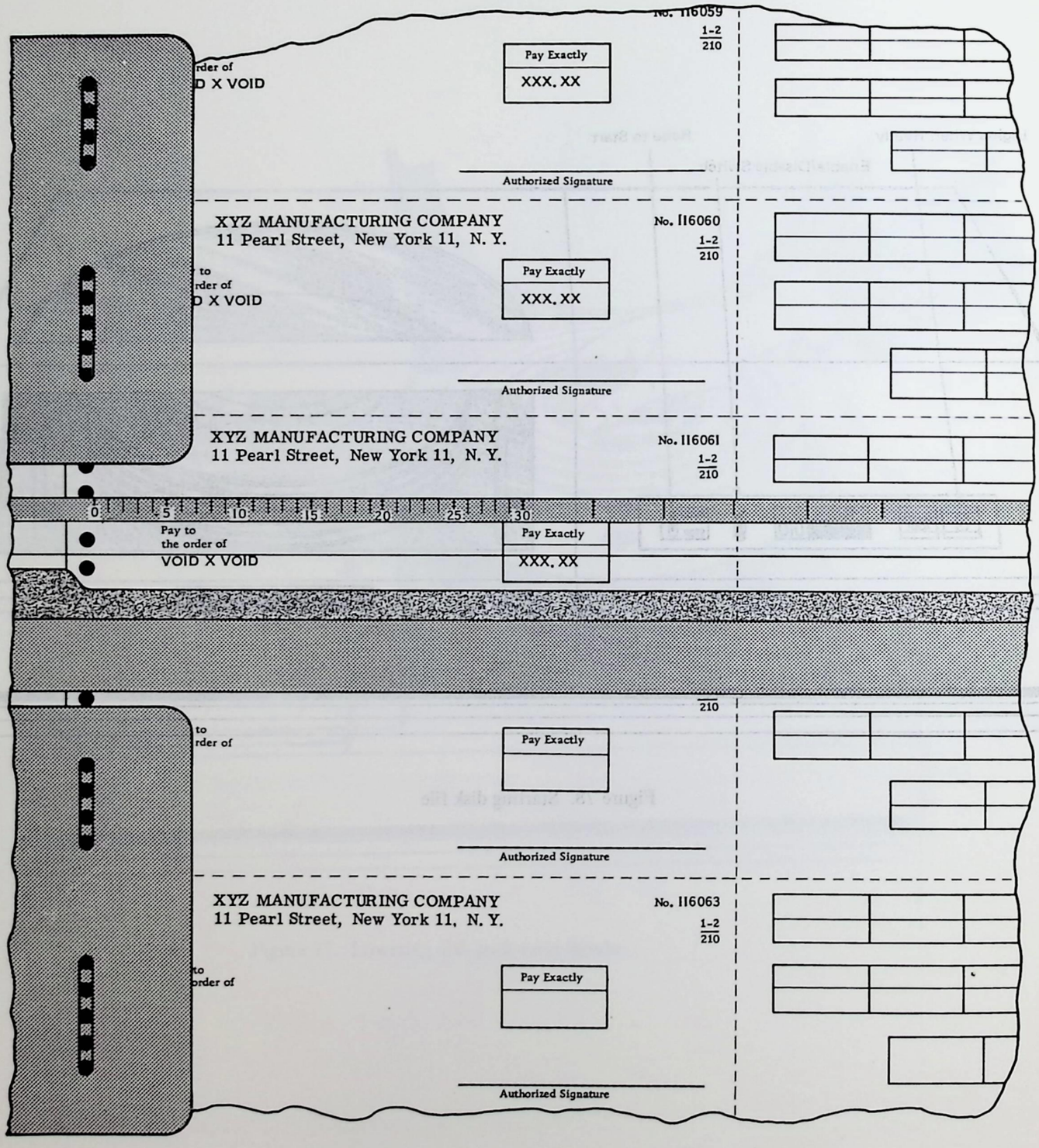


Figure 79. Aligning name at print position 8

JOBNAME	ACCT NO.	PROGRAMMER'S NAME
REGISTER	110466	ROSS KOBETT

TYPE OF RUN	RUN FREQUENCY	USE NUCLEUS
☒ PROD ☐ TEST	WEEKLY	☒ REGULAR ☐ 02 ☐ 03

Device	In	Out	Unit Address	Vol.Ser.No.	COMMENTS
CARD RDR	✓		00C	—	JCL ONLY
PRINTER		✓	00E	—	USE PLAIN PAPER
DISK	✓		190	111 111	SYSRES
DISK	✓		190	111 111	INPUT ON DATA SET CHECKREG (MAKE SURE NOT DELETED UNTIL REGISTER PRINTED)
					SEND REGISTER TO PAYMASTER DEPT: ATTN: AS. Dutra

SPECIAL INSTRUCTIONS: 1. USE CARRIAGE TAPE 3-6 LINES/INCH

Figure 80. Run sheet for register program

JOB SCHEDULE SHEET

SYSTEM NO. _____ DATE _____ SHIFT _____

ITEM NO.	JOB	ID	DEVICES REQUIRED				
			RDR	PCH	PRTR	DASD	TAPE
1	COMPILE-L.E. SIMUL80S	01	✓		✓	2	1
2	EXECUTE SIMUL80S	01	✓		✓	2	1
3	FINALE	02	✓				
4							
5							
6							
7							
8							
9							
10							

SPECIAL INSTRUCTIONS:

1. DEVICES TO BE SCHEDULED FOR MAINTENANCE TODAY SHOULD BE VARIED OFFLINE DURING IPL PROCEDURE. THESE ARE _____.

Figure 81. Job schedule sheet for system exercise

JOB NAME	ACCT NO.	PROGRAMMER'S NAME
SIMUL80S	01	D. B. PEARSON

TYPE OF RUN	RUN FREQUENCY	USE NUCLEUS
☐ PROD ☒ TEST		☒ REGULAR ☐ 02 ☐ 03

Device	In	Out	Unit Address	Vol. Ser. No.	COMMENTS
CARD RDR	✓		00C	—	JOB CONTROL CARDS AND DATA DECKS
PRINTER		✓	00E	—	USE PLAIN PAPER
DISK	✓			111 111	SYSRES-NEED "ASMBLR," "LINKEDIT" AND MACLIB
DISK		✓		ANY AVAIL.	NEED WORK SPACE FOR ASSEMBLER, LINKAGE EDITOR

SPECIAL INSTRUCTIONS: 1. IF WORK SPACE ON DISK IS NOT AVAILABLE, HAVE OPERATIONS MANAGER MAKE NECESSARY CHANGES TO DD CARDS FOR USING TAPE.

2. USE ANY STANDARD CARRIAGE CONTROL TAPE.

3. TAKE ACTION TO MESSAGES AS FOLLOWS.

a. USE VOLUME INVOLVED IN EXPIRATION MESSAGE

b. SKIP THE VOLUME INVOLVED IN MOUNT MESSAGE

c. REPLY TO ALLOCATION RECOVERY MSG. WITH DEVICE ADDR.

4. IF YOU OBSERVE AN ENDLESS LOOP, CANCEL JOB AND REQUEST A DUMP.

Figure 82. Run sheet for system exercise

IPL PROCEDURE SHEET OS-MFT ☐ OS-PCP ☐

SYSTEM NO. _____ DATE _____ SHIFT _____

TIME _____

(Complete This Sheet Before Attempting to IPL)

	SYSTEM MESSAGE	STEPS REQUIRED (Check Required Steps)	OPERATOR ACTION
1.		☐	Dial Address of Sys Res _____
2.		☐	Depress LOAD BUTTON
3.	SPECIFY SYSTEM PARAMETERS		
		☐ Changes	_____ _____ _____ _____
		☐ None	Type: REPLY 00, 'U'
4.	LIST PARTITION SIZES		
		☐ No	Type: REPLY 00, 'NO'
		☐ Yes	Type: REPLY 00, 'YES'
		(If Yes, Partition Sizes will be Listed Plus the Message)	
	INDICATE CHANGE, LIST, OR END		
		☐ Modify Partitions	Type: REPLY 00, 'Pn = X' (for each partition)
		☐ Reduce No. of Partitions	Type: REPLY 00, 'Pn = X' (for each partition except the last)
			Type: REPLY 00, 'Pn = LAST' (for the last one)
		☐ No Change	(No action required)
		☐ LIST Partition	Type: REPLY 00, 'LIST'
		☐ END	Type: REPLY 00, 'END'
5.	READY		
		☐ DISPLAY JOBNAME	Type: DISPLAY JOBNAMES
		☐ VARY Devices	Type: VARY XXX, OFFLINE
		☐ SET	Type: SET DATE = yy.ddd, CLOCK = hh.mm.ss
		☐ Proc Lib on Sep Pack	Add a Comma to the above message plus PROC = XXX
		☐ Other	
6.	START RDR, XXX START WTR, XXX		
		☐ No Change	Type: START
		☐ Changes	Type: START XXX XXX

Figure 83. IPL procedure sheet

```
Column                                                                  Column
1                                                                         80
//SIMUL80S JOB 01,DBP,MSGLEVEL=1                                          001
//ASM EXEC PGM=ASMBLR                                                     002
//SYSUT2 DD UNIT=2311,SPACE=(CYL,(1,1))                                   003
//SYSUT3  DD  UNIT=2311,SPACE=(CYL,(1,1))                                 004
//SYSPRINT DD SYSOUT=A                                                    005
//SYSLIB DD DSNAME=SYS1.MACLIB,DISP=OLD                                   006
//SYSUT1 DD UNIT=2311,SPACE=(CYL,(1,1))                                   007
//SYSPUNCH DD DSNAME=&LOADSET,UNIT=2311,SPACE=(CYL,(1,1)),            M   008
//            DISP=(,PASS)                                                009
//SYSIN DD *                                                              010
START    START 0                                                          011
         STM   14,12,12(13)                                               012
         BALR  2,0                                                        013
         USING *,2                                                        014
         LA    3,SAVEAREA                                                 015
         ST    3,8(13)                                                    016
         ST    13,SAVEAREA+4                                              017
         LR    13,3                                                       018
     WTO  ' '                                                             019
     WTO ' * * * * * * * * * * * * * * * * * * * * * * * * * * * * * -    020
                * * * * * * * * * * * * '                                 021
 WTO 'YOU ARE ABOUT TO RECEIVE A SERIES OF SIMULATED SYSTEM MESSAGES'      022
 WTO 'REPLY TO THEM AS FOLLOWS'                                           023
    WTO  '          USE THE UNEXPIRED TAPE'                              024
     WTO '          SKIP THE VOLUME ASKED FOR'                           025
    WTO  '          USE THE 3 CHARACTER DEVICE NAME AFTER ALLOCATION REC-026
              OVERY MESSAGE'                                              027
     WTO ' * * * * * * * * * * * * * * * * * * * * * * * * * * * * * -   028
                * * * * * * * * * '                                       029
     WTO  ' '                                                             030
D02 WTOR '1EC007D E 180,123456,A',REPLY,1,ECB                             031
         WAIT  ECB=ECB                                                    032
C01 OC REPLY,=CL8' '                                                      033
 CLI REPLY,C'U'                                                           034
         BE    A01                                                        035
    NOPR  0                                                               036
 CLI REPLY,C'M'                                                           037
 BE B01                                                                   038
 NOPR 0                                                                   039
         BAL   3,A02                                                      040
A01      MVI   ECB,0                                                      041
 OPEN (SYSIN,(INPUT),SYSOUT,(OUTPUT))                                     042
E02 GET SYSIN,WORKAREA                                                    043
 PUT SYSOUT,WORKAREA                                                      044
 B E02                                                                    045
F02 EQU *                                                                 046
         WTOR  'IEC601D M 190,123457 REPLY=SKIP VOL OR MOUNTING',REPLY,C  047
               8,ECB                                                      048
         WAIT  ECB=ECB                                                    049
G02 OC REPLY,=CL8' '                                                      050
         CLC   REPLY,=C'SKIP VOL'                                         051
         BE    B02                                                        052
 CLC REPLY,=C'MOUNTING'                                                   053
 BE H02                                                                   054
         BAL   3,A02                                                      055
B02      WTO   'IEF244I UNABLE TO ALLOCATE FROM AVAILABLE DEVICES'        056
 WTO 'IEF247I SIMUL80S ALLOCATION RECOVERY'                               057
 WTO 'IEF247I SIMUL80S 180 OFFLINE'                                       058
         MVI   ECB,0                                                      059
 WTOR 'IEF247I REPLY 3 CHAR DEVICE NAME OR CANCEL',REPLY,6,ECB            060
         WAIT  ECB=ECB                                                    061
J02 OC REPLY,=CL8' '                                                      062
         CLC   REPLY(3),=C'180'                                           063
         BE    C02                                                        064
 CLC REPLY(6),=C'CANCEL'                                                  065
 BE K02                                                                   066
         BAL   3,A02                                                      067
C02  WTO  '  '                                                           068
   WTO  '* * * * * * * * * * * * * * * *'                                 069
    WTO 'YOU ARE ABOUT TO ENTER A LOOP'                                   070
     WTO 'CANCEL THE JOB AND REQUEST A DUMP'                              071
   WTO  '* * * * * * * * * * * * * * * *'                                 072
     WTO       ' '                                                        073
 B *                                                                      074
A02      MVI   ECB,0                                                      075
         WTOR  'IEE008A ERROR-REPEAT REPLY',REPLY,8,ECB                   076
H02 EQU *                                                                 077
         WAIT  ECB=ECB                                                    078
 SH 3,=H'30'                                                              079
         BR    3                                                          080
SAVEAREA DS    18F                                                        081
REPLY    DC    CL8' '                                                     082
ECB      DC    F'0'                                                       083
B01 LA 3,C01+30                                                           084
 B L02                                                                    085
SYSIN DCB DDNAME=SYSIN,DSORG=PS,MACRF=GM,EODAD=F02,BFTEK=S                086
SYSOUT DCB DDNAME=SYSOUT,DSORG=PS,MACRF=PM,BFTEK=S,BLKSIZE=120,RECFM=F    087
WORKAREA DC CL144' '                                                      088
H02 LA 3,G02+30                                                           089
 B L02                                                                    090
K02 LA 3,J02+30                                                           091
L02 WTO 'YOU HAVE MADE A VALID RESPONSE'                                  092
 WTO 'IT IS NOT,HOWEVER,THE ONE REQUESTED IN YOUR INSTRUCTIONS'           093
 MVI ECB,0                                                                094
 WTOR 'GIVE THE REQUESTED REPLY',REPLY,8,ECB                              095
 B H02                                                                    096
 END                                                                      097
 /*                                                                       098
//LKED EXEC PGM=IEWL                                                      099
//SYSLIN DD DSNAME=&LOADSET,DISP=(OLD,DELETE)                             100
//SYSLMOD DD DSNAME=&GOSET(GO),UNIT=2311,SPACE=(1024,(50,20,1)),      M   101
//            DISP=(,PASS)                                                102
//SYSUT1  DD  UNIT=2311,SPACE=(1024,(50,20))                              103
//SYSPRINT DD SYSOUT=A                                                    104
//GO EXEC PGM=*.LKED.SYSLMOD                                              105
//SYSOUT DD SYSOUT=A                                                      106
//SYSIN DD *                                                              107
THESE MESSAGES ARE BEING PRINTED BY SIMUL80S                              108
PREVIOUS PRINTER OUTPUT IS FROM JOB SCHEDULER,ASSEMBLER,AND LINKAGE EDITOR 109
FOLLOWING SHOULD BE AN INDICATIVE CORE DUMP WITH COMPLETION CODE OF 122   110
THIS WILL BE FOLLOWED BY FURTHER JOB SCHEDULER OUTPUT                     111

                          ((((((((((((((((((((((((((((((((((((((((((((((( 112
                          ((((((((((((((((((((((((((((((((((((((((((((((( 113
                          (((((((                             ))))))) 114
                          (((((((                             ))))))) 115
                          (((((((((((  FOR  ))))))))))))) 116
                          (((((((((    AN    ))))))))))) 117
                          (((((((  EXPLANATION  ))))))))) 118
                          (((((((      OF       ))))))))) 119
                          (((((((  COMPLETION  ))))))))) 120
                          (((((((((   CODES    ))))))))) 121
                          (((((((((    SEE     ))))))))) 122
                          (((((((((  PART III  ))))))))) 123
                          (((((((((     OF     ))))))))) 124
                          ((((((     MESSAGES,   )))))) 125
                          ((((  COMPLETION CODES,  )))) 126
                          ((((((       AND       )))))) 127
                          ((((((  STORAGE DUMPS   )))))) 128
                          (((((((                     ))))))) 129
                          (((((((                     ))))))) 130
                          ((((((((((((((((((((((((((((((((((((((((((((((( 131
                          ((((((((((((((((((((((((((((((((((((((((((((((( 132
 /*                                                                       133
 //FINALE JOB 01,DBP,MSGLEVEL=1                                          134
 // EXEC PGM=IEHPROGM                                                     135
 //SYSIN DD DUMMY                                                        136
 //SYSPRINT DD SYSOUT=A                                                  137
```

Figure 84. Listing of System Exercise card deck

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