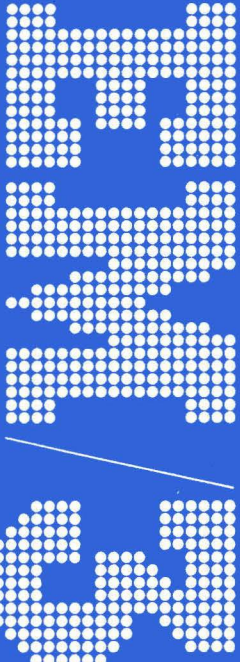




**IBM System/3  
Model 10  
Disk System  
Operator's Guide**



GC21-7508-4  
File No. S3-20

#### **Fifth Edition (March 1974)**

This is a major revision of, and obsoletes, GC21-7508-3 with Technical Newsletters GN21-7675 and GN21-7710. This revision includes information about the Gang-punch program. Changes to text and small changes to illustrations are indicated by a vertical line at the left of the change; new or extensively revised illustrations are denoted by the symbol ● at the left of the caption.

This edition applies to version 10, modification 00 of IBM System/3 Model 10 Disk System (Program Number 5702-SC1), and to all subsequent versions and modifications unless otherwise indicated in new editions or technical newsletters. Changes are continually made to the specifications herein; before using this publication in connection with the operation of IBM Systems, consult the latest IBM System/3 Bibliography, GC20-8080, for the editions that are applicable and current.

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## INTRODUCTION

This manual tells you how to operate the IBM System/3 Model 10 Disk System and provides instructions for running the system programs. Some of the things you must be able to do are:

- Load paper forms in the printer.
- Clear cards from the multi-function card unit (MFCU).
- Clear cards from the 1442 Card Read Punch.
- Mount and remove disk cartridges and tape reels.
- Operate the system.
- Perform error recovery procedures for halts.

Figure 1 summarizes typical responsibilities of a system operator. This figure also shows the source of the items you need to do the job.

## PROGRAM RUN SHEET

Information concerning the nature of each program and what is required of you as the operator to run that program can be supplied on the program run sheet. Figure 2 shows a program run sheet. This sheet is provided to you by the programmer.

The program run sheet indicates:

- The disk cartridge or tape reel to mount.
  - The forms to use in the printer.
  - The input device to use.
  - The Operation Control Language (OCL) statements used (found on back of sheet).
  - Any special procedures that are not normally performed but necessary with this program.
- | ● Programmed halts to be used.

Program Name	Program Number
Programmer	Application
Date	

OCL STATEMENTS

1	3/
4	
8	
12	
16	
20	
24	
28	
32	
36	
40	
44	
48	
52	
56	
60	
64	
68	
72	
76	
80	
84	
88	
92	
96	

Figure 2 (Part 2 of 2). Program Run Sheet (Back)

## SYSTEM CONTROLS AND INDICATORS

Each System/3 processing unit has lights, keys, and switches that are used for communication between you and the system. Lights indicate conditions existing in a device or in the system. Keys and switches are used to control operation of the system. Functions of the lights, keys, and switches on the processing unit are discussed in this chapter.

Controls and indicators for the processing unit are located on a large panel called the console (Figure 3). Although this panel is divided into several smaller panels, you will be concerned primarily with the system control panel, disk panel, and the dual program control panel if you have this feature. The processing unit displays and Customer Engineer controls are used primarily by the Customer Engineer when he services the system.

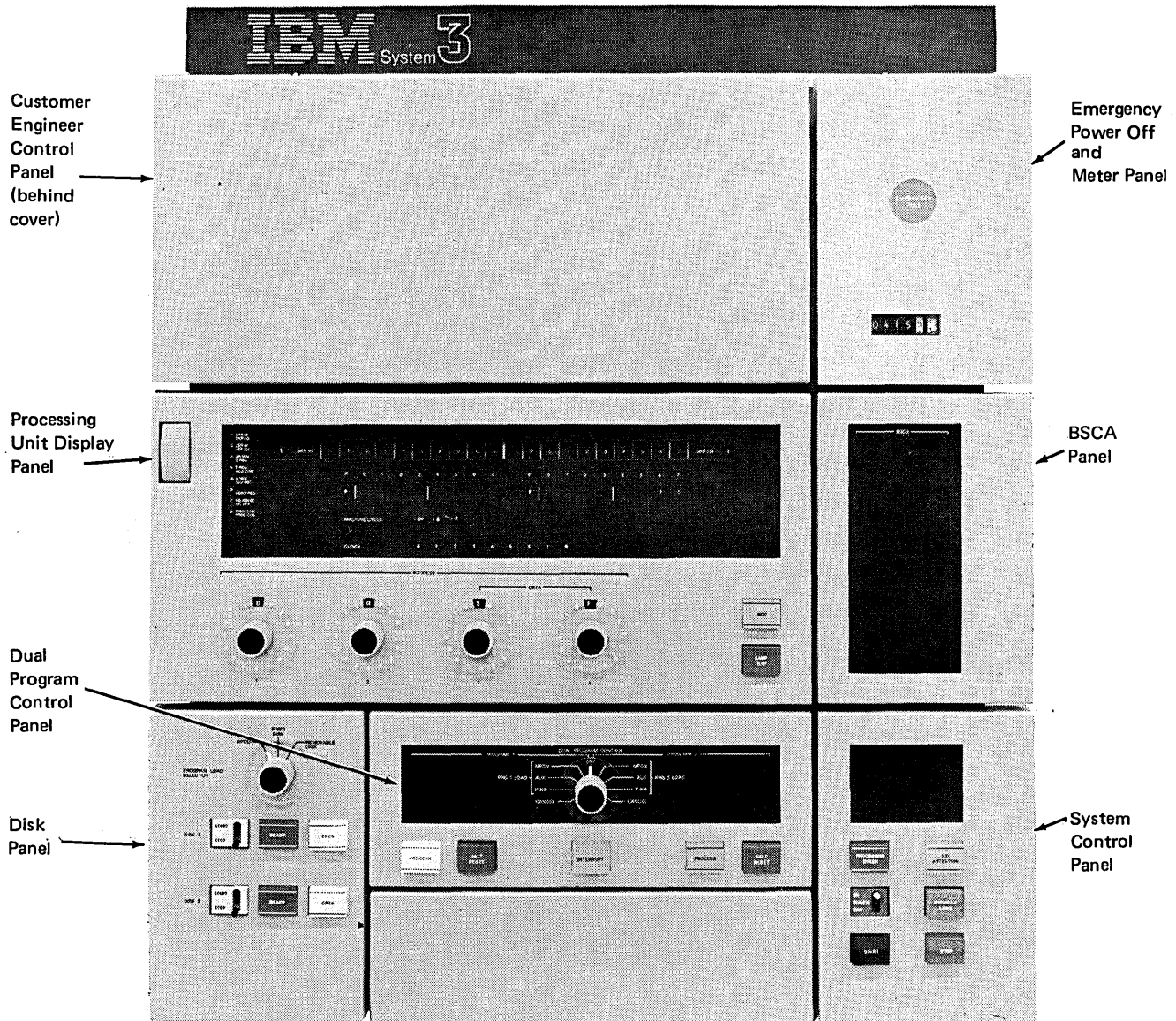


Figure 3. System Console Controls

53298A

## Emergency Power Off and Meter Panel

*EMERGENCY PULL Switch:* This switch, as its name implies, should be used only under unusual circumstances. Once the emergency pull switch is pulled, system power cannot be turned on until the Customer Engineer has reset the switch. Information in storage may be destroyed when the emergency pull is used. Data on disks can also be destroyed by this operation.

*Usage Meter:* This meter records the time used to process programs and data. The meter records all the time that the processing unit is in operation from the time the console START (HALT/RESET if you have DPF) or PROGRAM LOAD is pressed, until the job is complete.

The emergency power off and meter panel is illustrated in Figure 5.

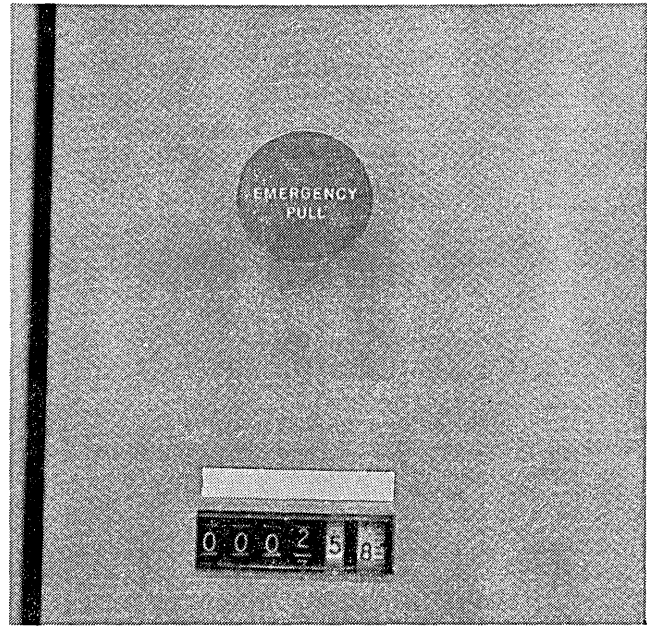


Figure 5. Emergency Power Off and Meter Panel

55024

## Customer Engineer Control Panel

The switches, lights, and dials on this panel (Figure 7) are used primarily by the Customer Engineer to service the system.

*I/O CHECK Switch:* When this switch is set at STOP, the processing unit comes to an immediate stop if an input or output error occurs. The system displays show the status of the system at the time the error occurred. The I/O check, however, is normally set at RUN. This means the system will not stop if an input or output error occurs unless instructed to do so by the program in operation. In this case, the system displays do not reflect conditions at the time the error occurred.

*PARITY CHECK Switch:* This switch is normally set at STOP. It causes the processing unit to stop when a parity error is detected and the error is displayed. When the switch is set at RUN, parity errors are detected and displayed in the register display unit (8 PROC CHK), but the system is not stopped.

*STORAGE TEST Switch:* This switch allows the CE to alter or display storage.

*ADDR INCREM Switch:* This switch is used by the CE to control a counter that increments the storage address register. This switch is effective only when the system is in the CE test modes of alter or display storage.

*ADDR COMPARE Switch:* This switch enables the CE to stop the program when the contents of the storage address register (SAR) matches the setting of the address/data switches. The ADDRESS COMPARE light also turns on when these addresses match. The CE mode selector switch must be set at PROCESS and the register display unit must be set at 1 SAR HI for the ADDR COMPARE switch to be effective.

*P1 and P2 Switches:* These two switches enable the CE to control selection of program 1 or program 2 for use in the dedicated mode (only one program can run in the system). These two switches are on for normal operation of the DPF system. These switches should never be changed unless the system is stopped. A processor check will occur if these switches are changed while the system is running.

*I/O OVERLAP Switch:* This switch enables the CE to control system input/output operations. When in the normal ON position, input and output operations are executed at the same time the processing unit is doing other operations. When this switch is at OFF, each input/output operation must be completed before any other processing occurs.

*ADDRESS COMPARE Light:* This light turns on when an address compare occurs (see *ADDR COMPARE Switch*).

*I/O CHECK Light:* This light turns on when certain errors occur in an input or output device. It is turned off when the SYSTEM RESET key or CHECK RESET key is pressed, or the input/output device error condition is corrected.

*CE KEY Switch:* This switch is operated by the customer engineer to prevent recording time on the customer usage meter. It allows the CE meter to run when the system is being serviced.

*SYSTEM RESET Key:* When the SYSTEM RESET key is pressed, the system enters an idle state. All input/output and machine registers, controls, and indicators are reset. A program must be reloaded after a system reset. The CE mode selector switch must be set at PROCESS for the SYSTEM RESET key to be effective.

*CHECK RESET Key:* When this key is pressed, all current error conditions in the processing unit and input/output devices are cleared. The system resumes normal operation when console START (HALT/RESET if you have DPF) is pressed. The CHECK RESET key is also used to reset a power check.

*BSCA STEP Key:* This key is used for BSCA testing. The key is effective only when BSCA is in the test mode and step mode.

*FILE WRITE Switch:* When this switch is at OFF, write operations cannot be performed on the disk.

*BSCA LOCAL TEST Switch:* This switch is used for testing BSCA on systems that have high speed data sets. For normal operation, the switch is in the OFF position. The switch is present only if you have high speed data sets.

**READY Lights:** These lights (one for each drive) are on when the disk drive is ready for use. If you try to use the drive before this light is on, I/O ATTENTION on the console turns on.

**OPEN Lights:** These lights (one for each disk drive) indicate that the associated disk drive drawer can be opened for changing the removable disk. This light is on when the START/STOP switch is placed at STOP and the disk has come to a stop.

### Dual Program Control Panel

Your system can have the Dual Programming Feature (DPF). This feature enables the system to have two programs in storage at the same time. The dual program control panel (Figure 9) contains switches, lights, and keys used to initiate and control the running of two completely different programs.

**Message Display Unit (Program 1 and 2):** Whenever a programmed halt occurs, a combination of the letters in the appropriate DPF message display unit is displayed: A, C, E, F, H, J, L, P, U, or Y, quote ('), dash (-), blank, and 0 through 9. The displayed characters are used to identify the halt. In the dual programming mode, both display units can be lit at the same time. The PROCESS light determines which program is in control. The HALT/RESET key is used to take a program out of its programmed halt.

**PROCESS Lights (Program 1 and 2):** These lights indicate which program level (program 1 or 2) is currently being used. When the PROCESS light for program 1 is on, program level 1 is being used. When the PROCESS light for program 2 is on, program level 2 is being used.

**HALT/RESET Keys (Program 1 and 2):** HALT/RESET is used to take a program (1 or 2) out of its programmed halt. When the correct HALT/RESET key is pressed, (PROCESS light is lit) the message display unit for that program is cleared and the program continues normal operation.

**DUAL PROGRAM CONTROL Switch:** This switch is only used in conjunction with the INTERRUPT key. When you press the INTERRUPT key, the system expects the input for the job to be supplied from one of three possible devices selected by you: MFCU, auxiliary device (AUX), or printer-keyboard (P-KB). The MFCU position on the panel refers to the primary hopper of the MFCU as the input device. The input device related to the AUX and P-KB positions on the panel are selected when system generation is performed. If you are using the 1442 as the only input device, you must assign the 1442 as an auxiliary device (AUX). For information on which devices can be selected for the AUX and P-KB positions, see the *IBM System/3 Models 6, 8, and 10 System Generation Reference Manual*, GC21-5126. The CANCEL position allows you to cancel the job for the program (1 or 2) selected. See *Chapter 10. System Operation* for information on cancelling jobs.

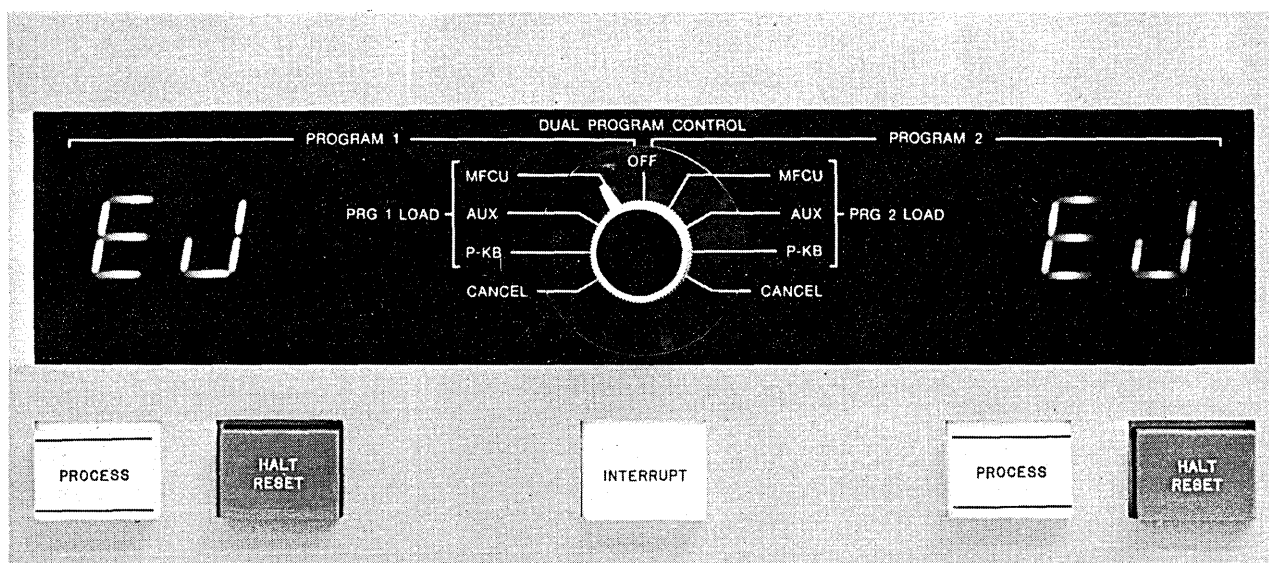


Figure 9. Dual Program Control Panel

55228



**CLEAR TO SEND:** This light turns on to indicate that the BSCA hardware may now transmit.

**TSM TRIGGER:** This light indicates the instantaneous value of the data being transmitted.

**RECEIVE MODE:** This light turns on when a receive operation is taking place.

**CHAR PHASE:** This light turns on when BSCA or LCA has established character synchronism with the transmitting station and is receiving data. The light is turned off when character synchronism is lost or when receive operations have ended.

**RECEIVE TRIGGER:** This light indicates the instantaneous value of the data being received.

**RECEIVE INITIAL:** This light turns on at the initiation of a receive operation and turns off at the end of the initiation operation.

**BUSY:** This light turns on when BSCA or LCA is executing a receive initial, transmit and receive, autocall, or receive only operation.

**UNIT CHECK:** This light turns on when the BSCA or LCA program should enter an error recovery procedure.

**CONTROL MODE:** This light is used only on systems that have multipoint nonswitched network feature installed. The light is turned on when the control station finishes data transfer with a remote terminal. It is turned off when the control station initiates data transfer with a different remote terminal.

**DATA MODE:** This light turns on during a transmit or receive operation when data is being checked for errors. It is turned off at the end of the transmit or receive operation.

**DIGIT PRESENT:** This light is used only on systems that have the autocall feature installed. This light is turned on when a digit is being dialed by the autocall unit.

**ACU PWR OFF:** This light turns on when the power for the autocall unit is off.

**CALL REQUEST:** This light turns on when an autocall operation is being performed.

**DT LINE IN USE:** This light turns on when autocall is being performed, or TALK is pressed on the DATA-PHONE<sup>1</sup> while the phone is off the receiver.

#### Switches

**RATE SELECT:** This switch is present only on systems that have the rate select feature installed. The switch controls the rate at which data is transmitted and received. The switch must be set so the transmission rate of both terminals is identical.

---

<sup>1</sup>Trademark of Western Electric Co., Inc.

## MFCU CONTROLS AND INDICATORS

The lights and keys that you use to communicate with the MFCU are on the front of the MFCU.

### Lights

There are thirty lights on the top part of the MFCU operator's panel. Twenty of these are numbered and identify the position of cards within the MFCU when a feed check occurs (see *Clearing a Card Jam*). A description of the other lights on the MFCU panel are as follows:

**SEC:** The last card was fed from the secondary hopper.

**PRI:** The last card was fed from the primary hopper.

**RD:** There was a read check on the last card read. The SEC or PRI light indicates which hopper the card came from.

**HPR:** A card did not feed from the selected hopper. The SEC or PRI light indicates which hopper failed to feed a card.

**NPRO:** The card paths are not clear. This light also comes on when the system is turned on. To turn the light off, press the NPRO key twice after turning on the system. The hoppers must be empty for the NPRO key to be effective.

**STKR:** One of the four stackers is full. You can turn this light off by removing the cards from the stacker and pressing START or NPRO.

**CHIP:** The chip box is either full or out of the machine. To turn the light off, correct the condition and press START or NPRO.

**CVR:** The top covers are open or not securely latched. To turn the light off, close the covers and press START or NPRO.

**SECONDARY READY:** The secondary feed path is ready for operation.

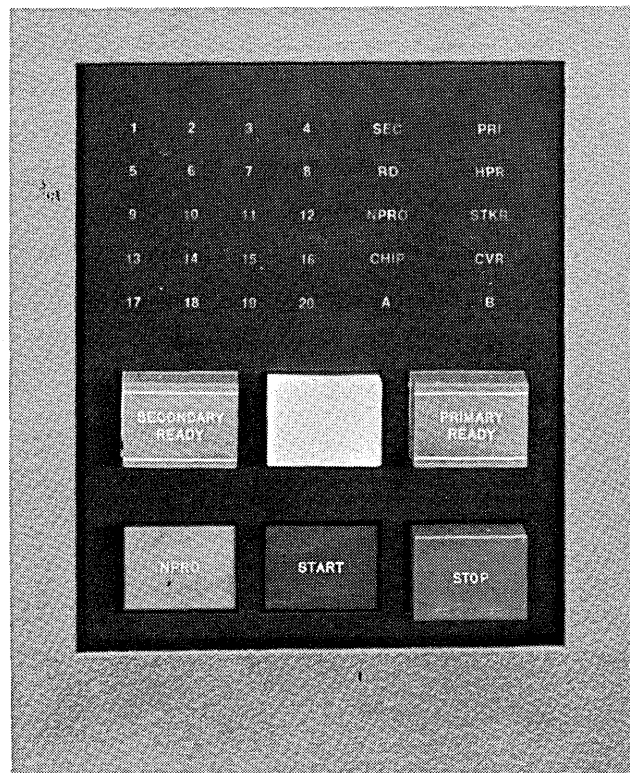
**PRIMARY READY:** The primary feed path is ready for operation.

### Keys

**NPRO (Nonprocess Runout):** Press this key to clear cards from the MFCU. Make sure the card hoppers are empty. Press the key twice to clear both the primary and secondary card paths. The primary feed path is cleared first. Both feed paths empty into stacker 1.

**START:** Press this key to place the MFCU in a ready condition. One or both card feeds are readied, depending on whether cards are in the hoppers and the card paths are clear. Use of the START key does not cause cards to feed from the hoppers.

**STOP:** Press this key to indicate to the system that the MFCU should stop after it completes the current operation. The ready lights turn off.

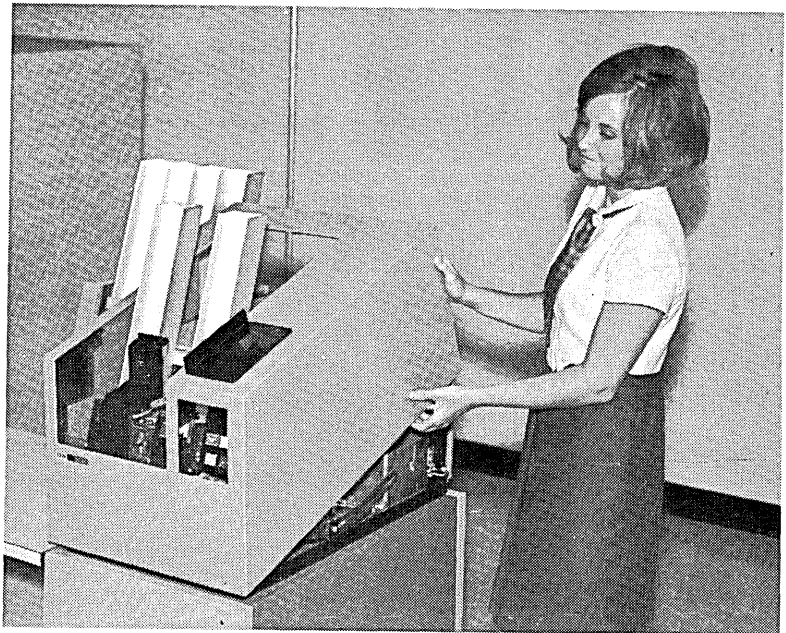


55027

### Customer Engineering Aids

If you press the LAMP TEST key on the processing unit console, you will see two additional indicators on the MFCU panel. They are labeled A and B. These lamps are CE diagnostic aids and are not lit during normal system operations.

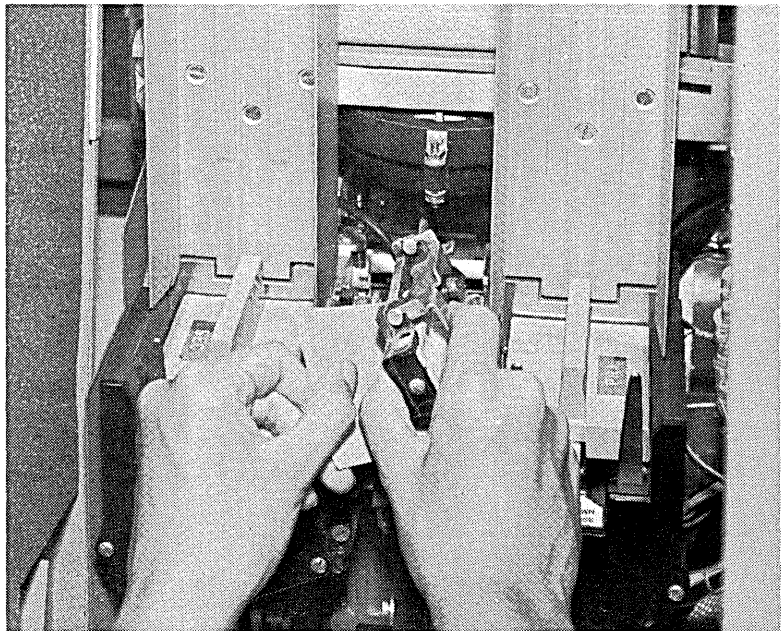
- ① To open the MFCU top covers, lift latch to release cover. Pivot outer and inner top covers towards front of machine.



ART: 55028

- ② To remove a card from the hopper station, press down on latch and raise cover. Close cover when station is cleared.

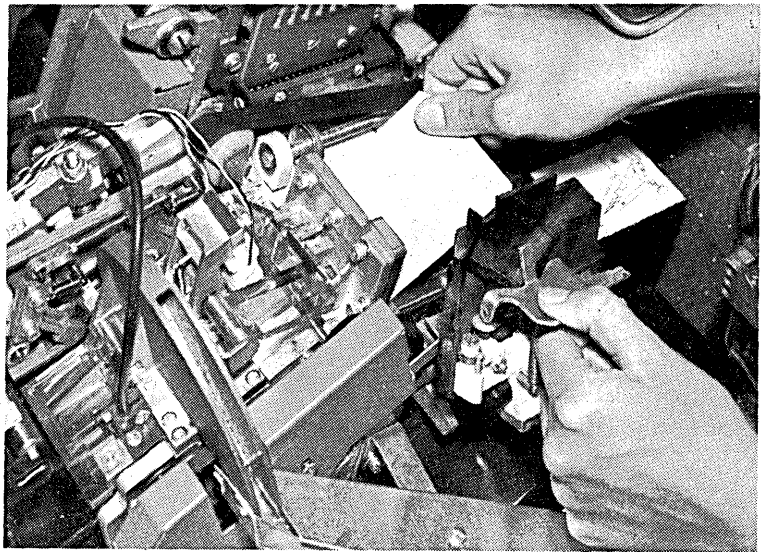
If a card will not come out, free it by turning the feed drive wheel (see item ④).



ART: 55029

5

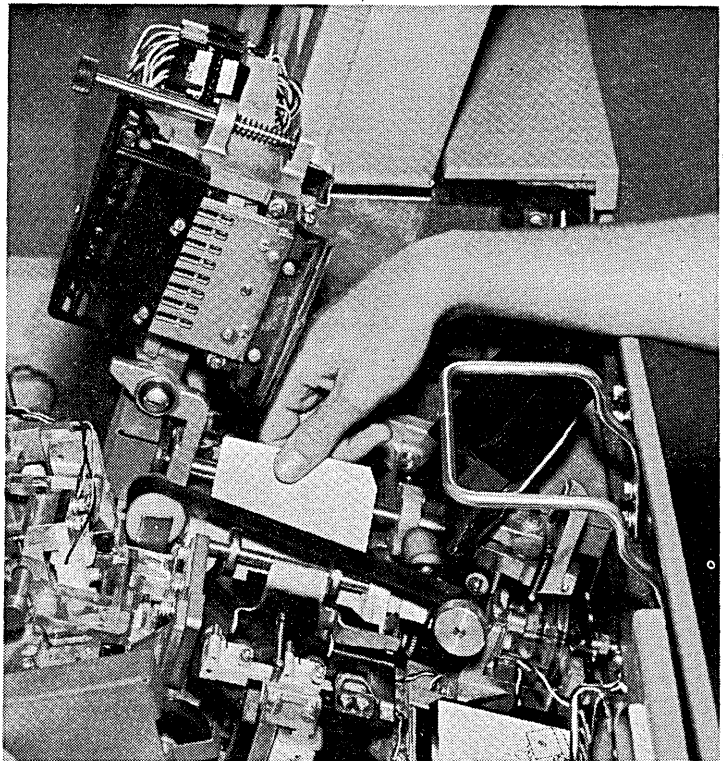
To remove a card from the corner station, pull back on latch to open cover. Close cover when station is cleared.



ART: 55032

6

To remove a card from the print unit, turn shaft counter-clockwise to unlock print unit. Tip unit towards front of MFCU. Lock print unit when station is cleared.

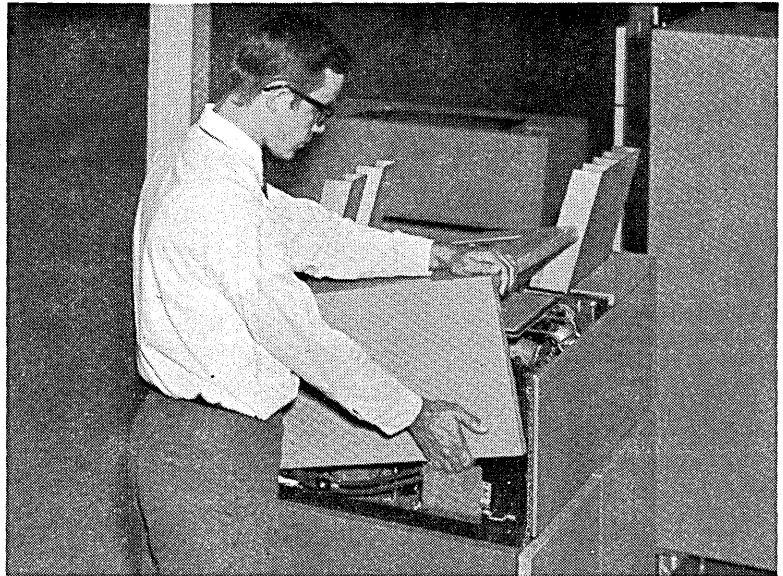


ART: 55033

## CHANGING THE MFCU PRINT RIBBON

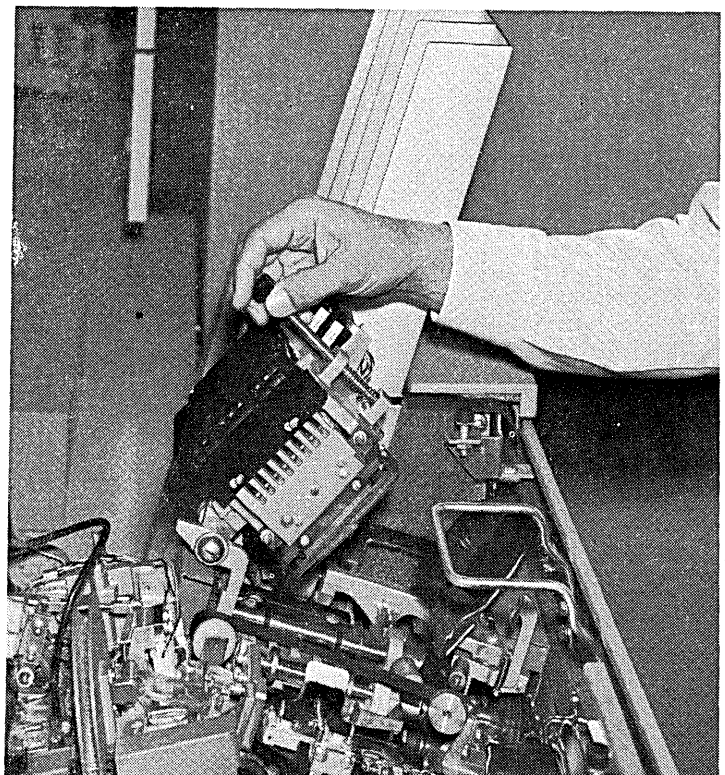
### Removal

- 1 Open MFCU top covers. Lift latch to release cover. Pivot outer and inner top covers towards front of machine.



ART: 55042

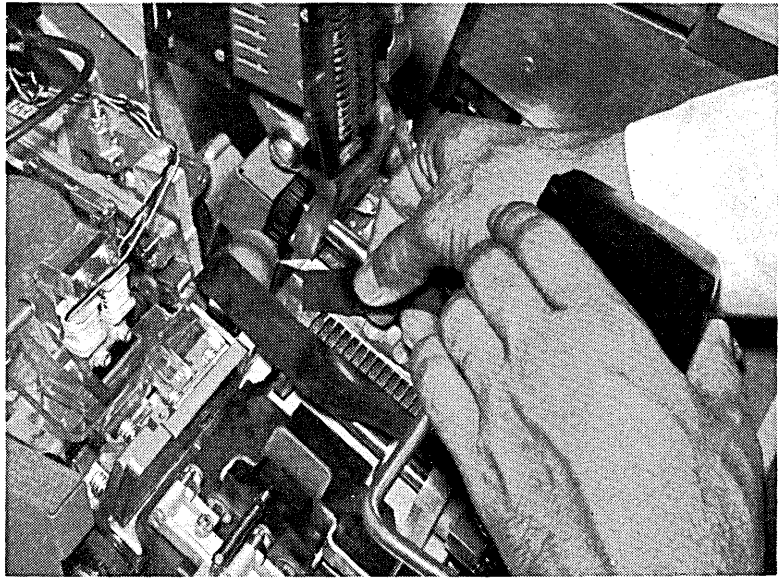
- 2 Raise print unit. Turn shaft counterclockwise to unlock. Tip unit towards front of MFCU.



ART: 55035

**5**

Slip ribbon out from under guide plate and front and rear rollers and remove ribbon cartridge from machine.

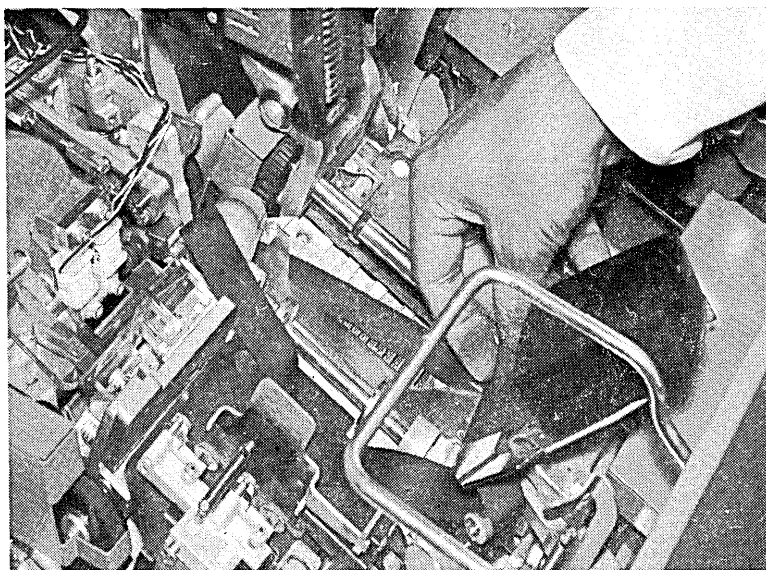


ART: 55038



3

Position ribbon under guide plate and under front and back guide.

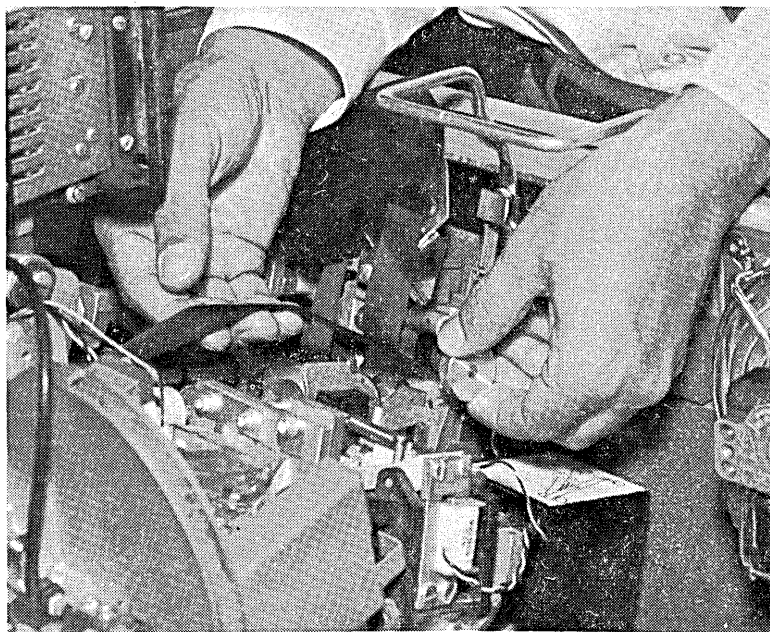


ART: 55039

4

Turn knob on ribbon drive counterclockwise to take up slack in ribbon.

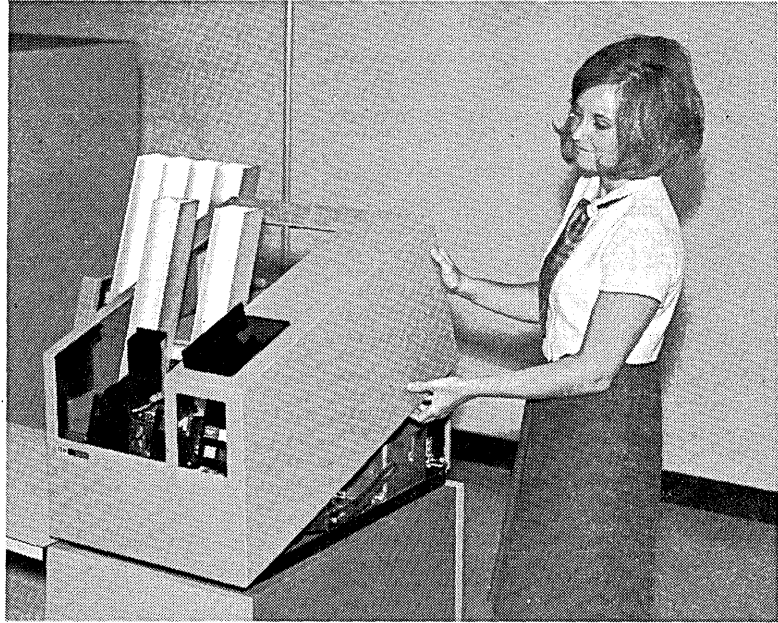
*Note:* Apply light pressure with one finger under the ribbon during the take-up operation. No folds should be allowed to feed into the ribbon cartridge. When the take-up operation is complete, check the ribbon path to ensure there are no folds in the ribbon and the ribbon is not wrapped around any of the guides or rolls.



ART: 55040

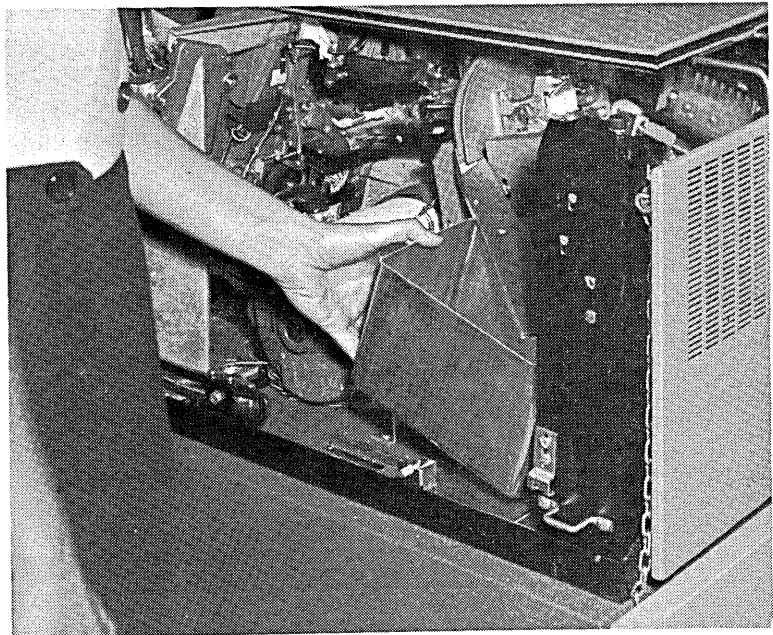
## EMPTYING THE MFCU CHIP BOX

- 1 Open MFCU top cover. Lift latch to release cover. Pivot outer top cover towards front of machine.



ART: 55028

- 2 Lift chip box up and out towards front of machine.



ART: 55041

- 3 Empty chip box.
- 4 Replace chip box.
- 5 Close MFCU top cover.
- 6 Press MFCU START to turn off CVR and CHIP lights on MFCU operator's panel.



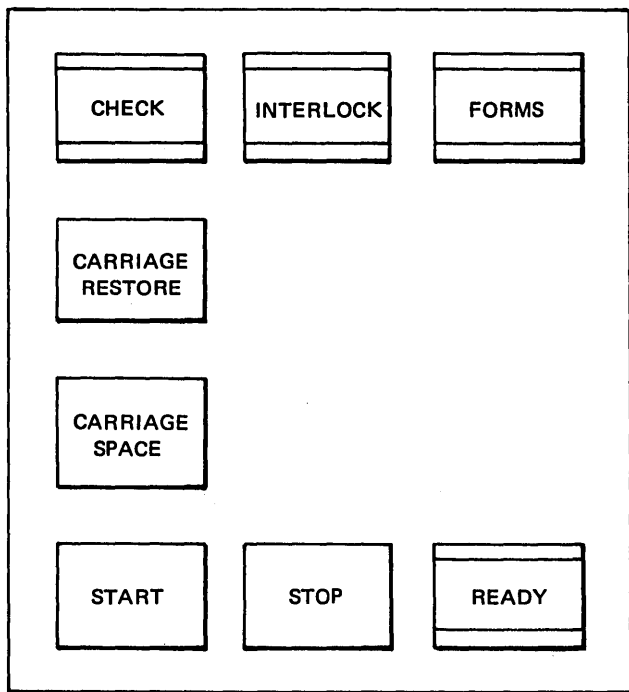
Note: You can use the 1403 Printer in place of the 5203 Printer. For a description and operating procedures of the 1403 Printer see *IBM 1403 Printer Component Description*, GA24-3073.

The standard carriage tape \* provided with the 1403 printer must be installed during operation of the printer with System/3.

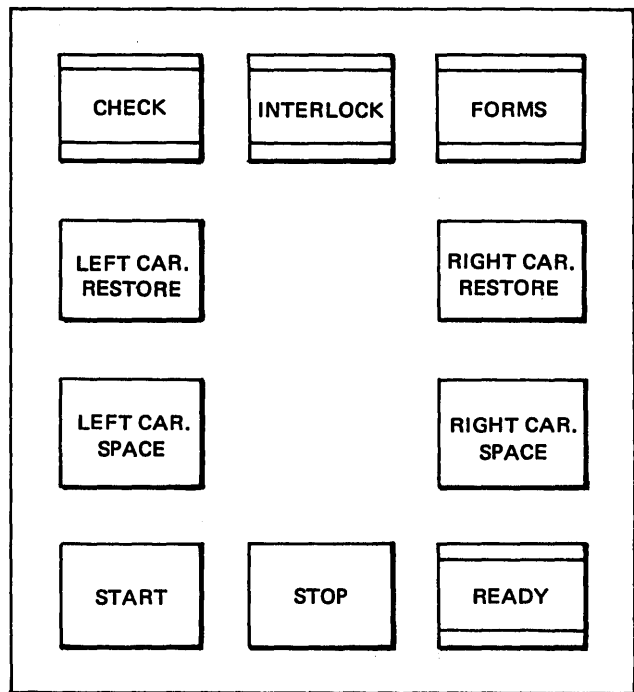
If a print check occurs on the 1403 printer, pressing CHECK RESET and START will usually restart the device. If the print check indicator lights come on a second time, press CHECK RESET and START. If the print check indicator lights come on a third time, a hardware problem is the probable cause. Contact IBM for hardware support ( a repeated pressing of CHECK RESET and START could cause extensive hardware damage).

## PRINTER CONTROLS AND INDICATORS

The lights and keys you use for communication with the printer are located on a panel on the printer. This panel contains four keys and four lights (six keys when the dual-feed carriage is installed).



Printer Operator's Panel (Single-Feed Carriage)



Printer Operator's Panel (Dual-Feed Carriage)

\* Prepunched tapes, part number 428470.

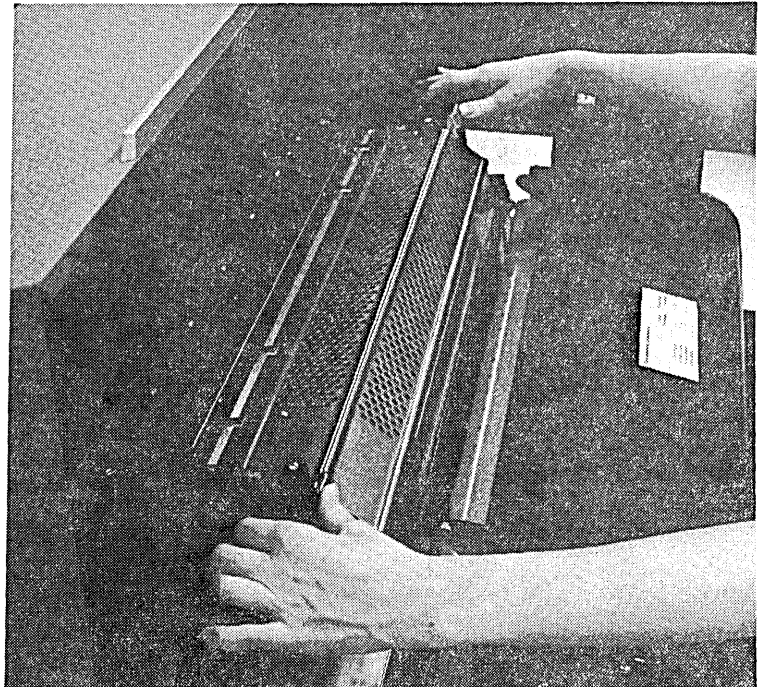
## LOADING FORMS IN THE PRINTER

- 1 Open printer top cover.



ART: 55047

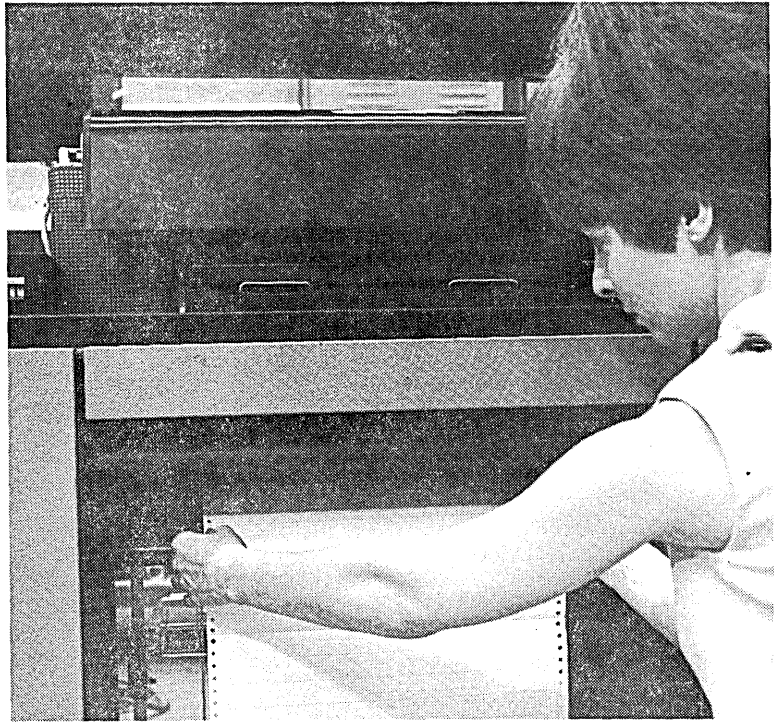
- 2 Tip rear unit back.



ART: 55048

**5**

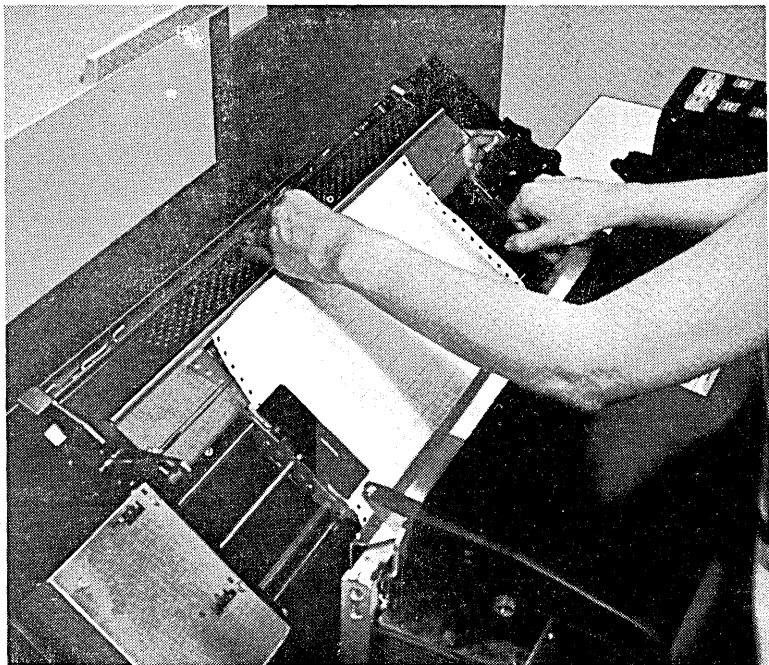
Position forms and feed first form up forms chute. On multiple-copy forms, the dull side of the carbon should be towards you.



ART: 55051

**6**

Pull forms up and lay them back across tractor assembly. Place forms in form tractors, making certain that tractors keep tension across forms.



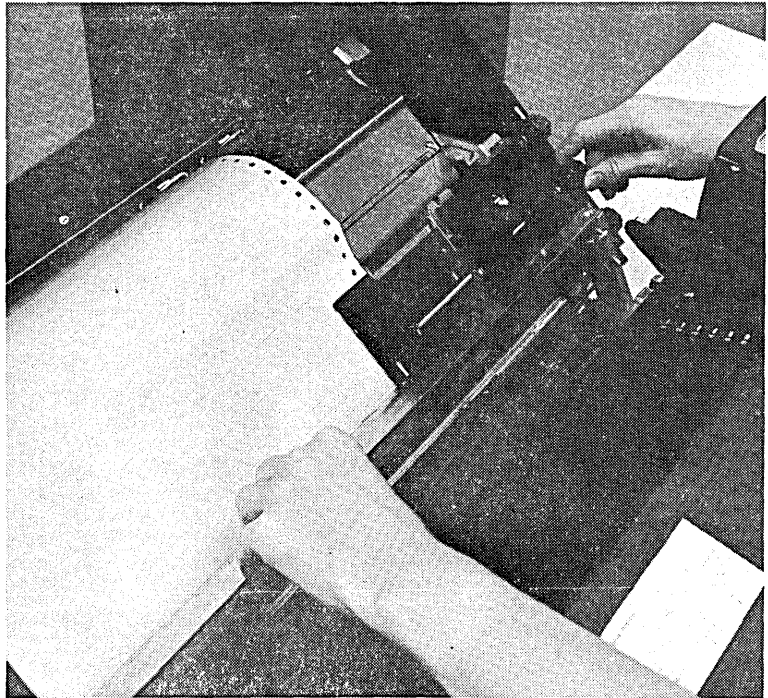
ART: 55052

9

Tip ribbon shield back against forms. Use tractor lateral adjustment knob (←) to align forms with print positions. Close ribbon shield.

*Note:* Printers with dual feed carriage. The tractor lateral adjustment knob moves both sets of tractors at the same time. One form can be adjusted as described above. However, the other form must be laterally adjusted by physically moving the tractors to align the form with the print position.

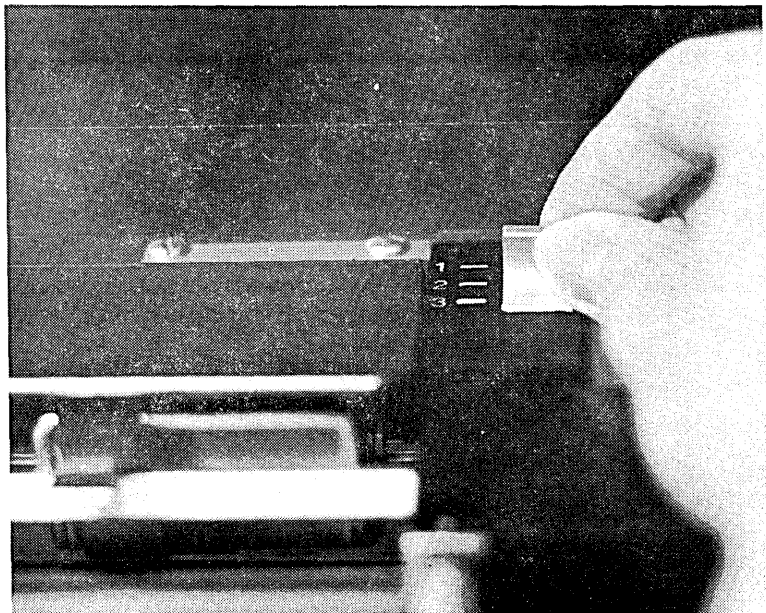
Do not leave unused tractors against edge of carriage. A tractor can be damaged if it is forced against the edge of the carriage by the lateral adjustment knob.



ART: 55059

10

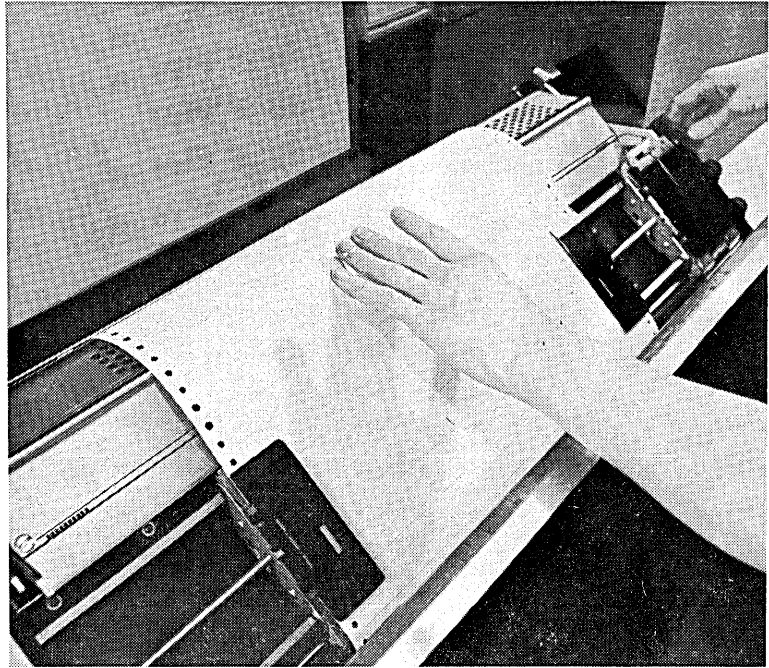
Set pressure roller tension for forms you are using. See recommendation label on ribbon cover.



ART: 55055

- 13 Advance forms using vertical adjustment knob ( $\phi$ ) until crease between forms is aligned with upper scribe line on forms guide.

This procedure aligns forms for printing first line.



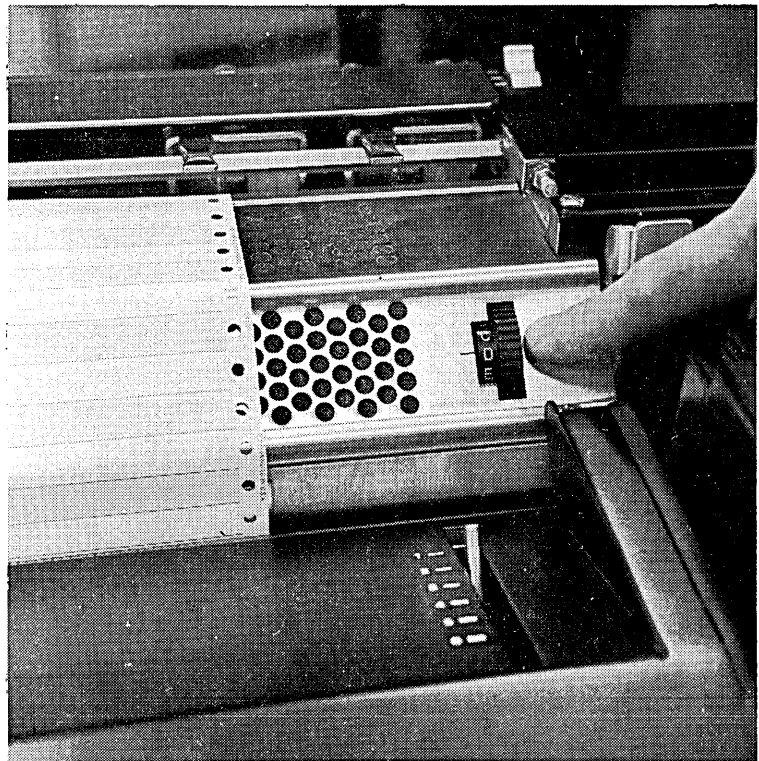
- 14 Press appropriate carriage restore key.

ART: 55058

- 15 Engage carriage clutch. (Set space select lever to six or eight lines per inch.)

- 16 Close rear unit.

- 17 If you have the 300-line-per-minute printer, set impression control dial on the printer to proper setting for forms you are using. See recommendation label on ribbon cover. Change setting as required to obtain best print quality.



ART: 55095



- 20 Position end-of-forms switch so end-of-forms switch feeler drops into cutout over forms.

*Note:* Printers with dual feed carriage have two end-of-forms switches. Only one end-of-forms switch should be used on a form.

When only one carriage is used, position the unused end-of-forms switch as follows:

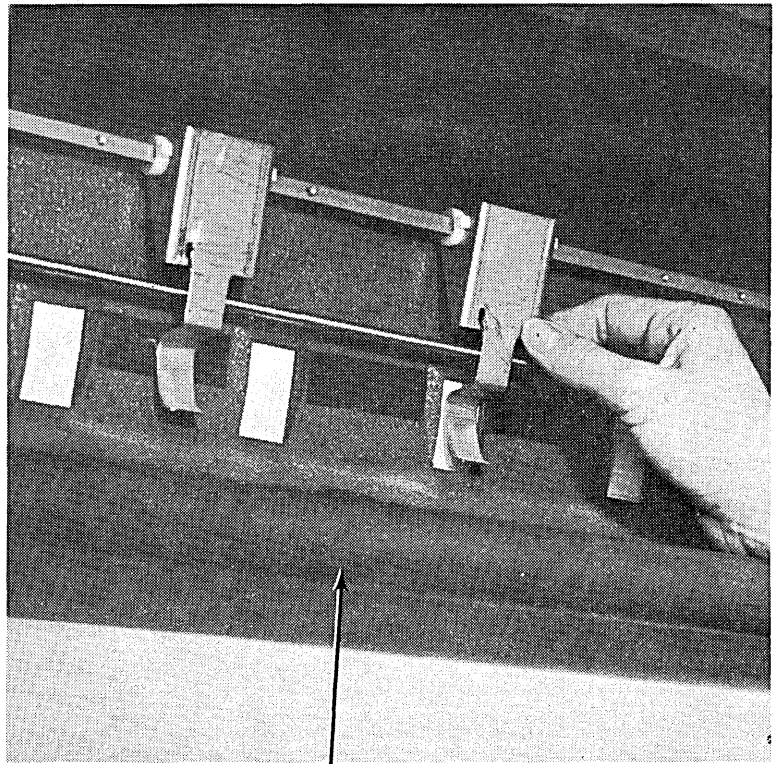
- Raise the end-of-forms switch feeler out of the cutout in the forms chute.
- Move the switch left or right to the next position (indentation) on the bar.

In this position, the end-of-forms switch feeler rides on the forms chute, simulating forms in the printer.

When two forms are used, move an end-of-forms switch into a cutout over each form.

- 21 Close sliding door on forms compartment.

- 22 Close printer top cover.



Forms Loading Chute

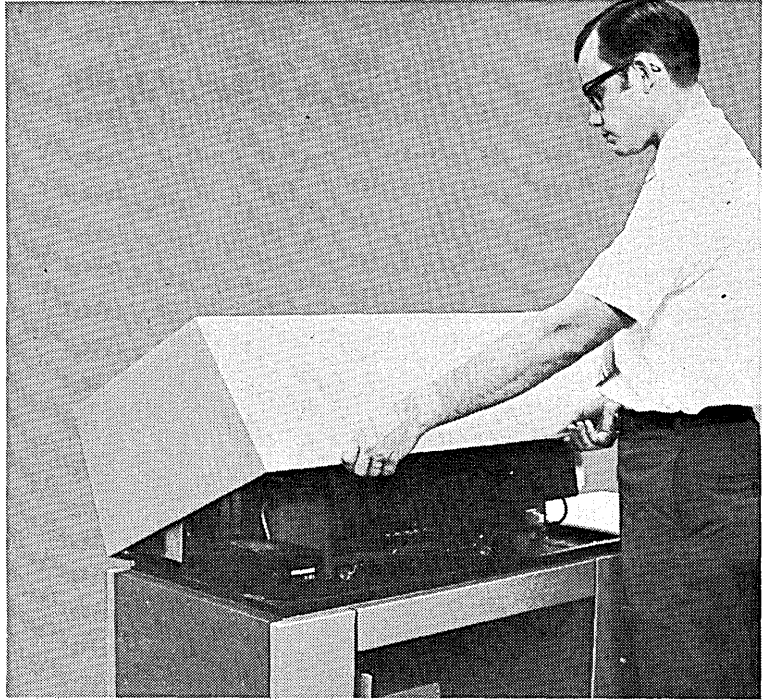
ART: 55062

## CHANGING THE PRINTER RIBBON

### Removal

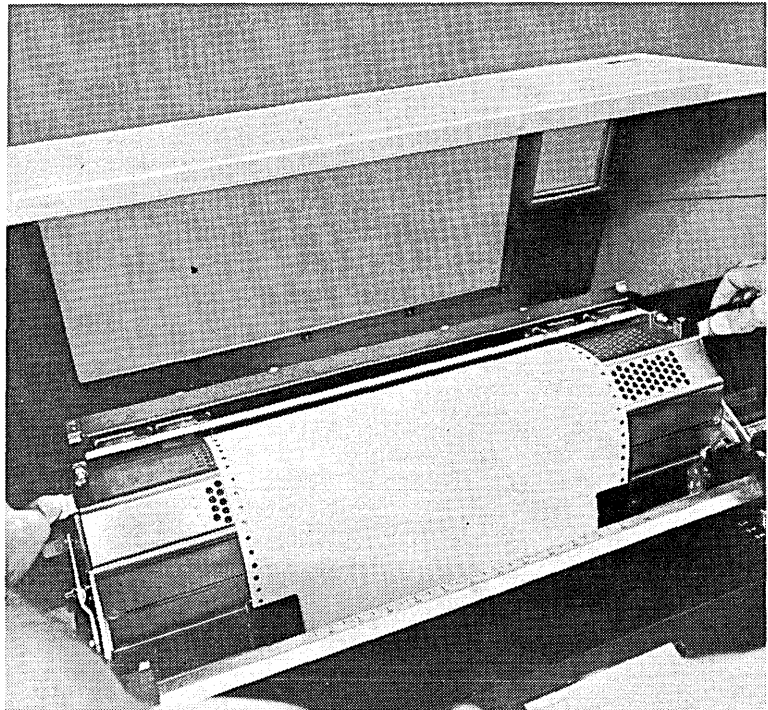
Wear disposable gloves when handling the ribbon.

- 1 Open printer top cover.



ART: 55064

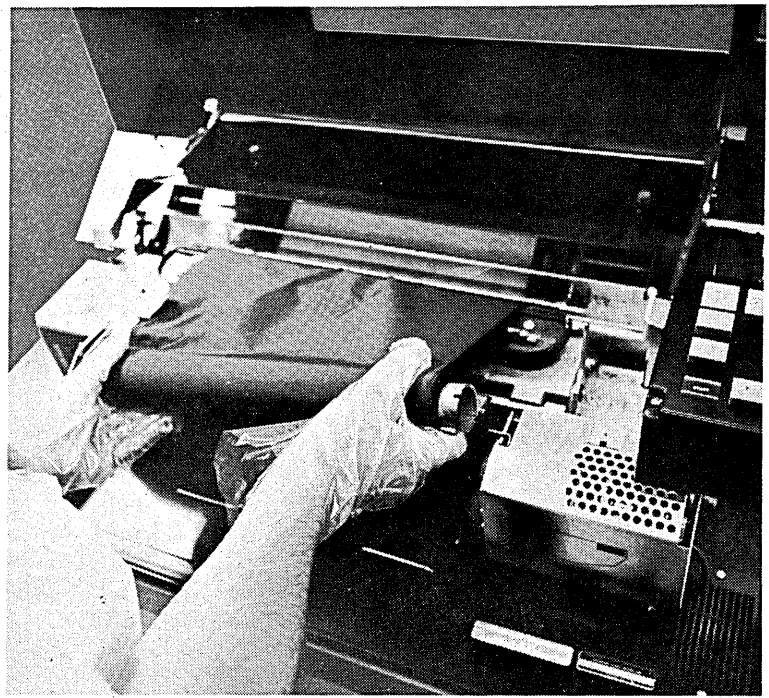
- 2 Tip rear unit back.



ART: 55065

5

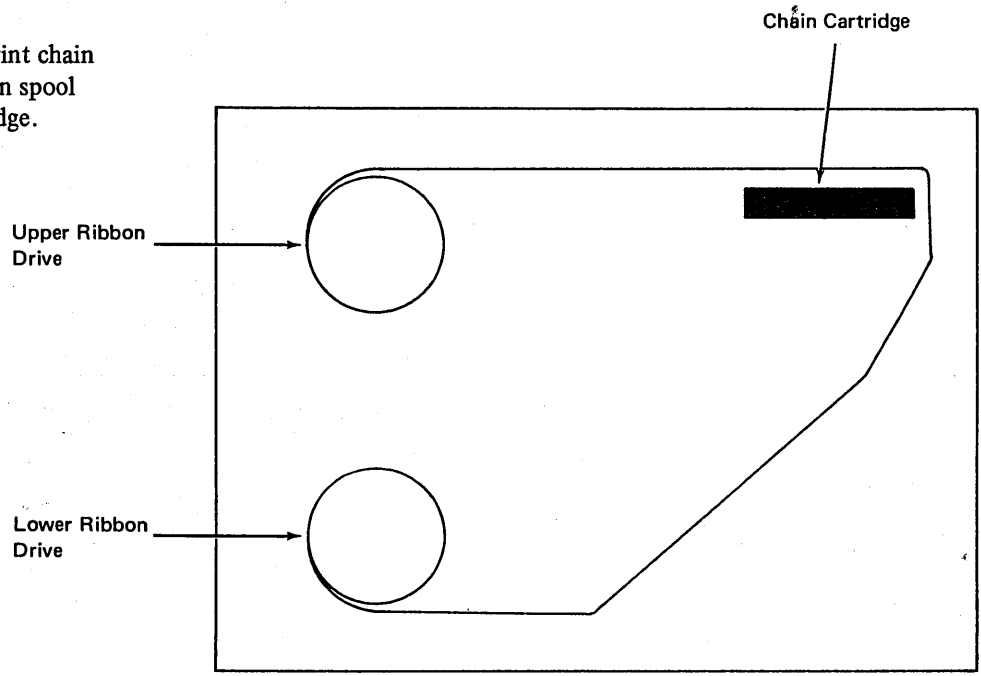
Disengage ribbon spool containing the least ribbon from the ribbon drive.



ART: 55068

6

Drop ribbon behind print chain cartridge or feed ribbon spool up behind chain cartridge.





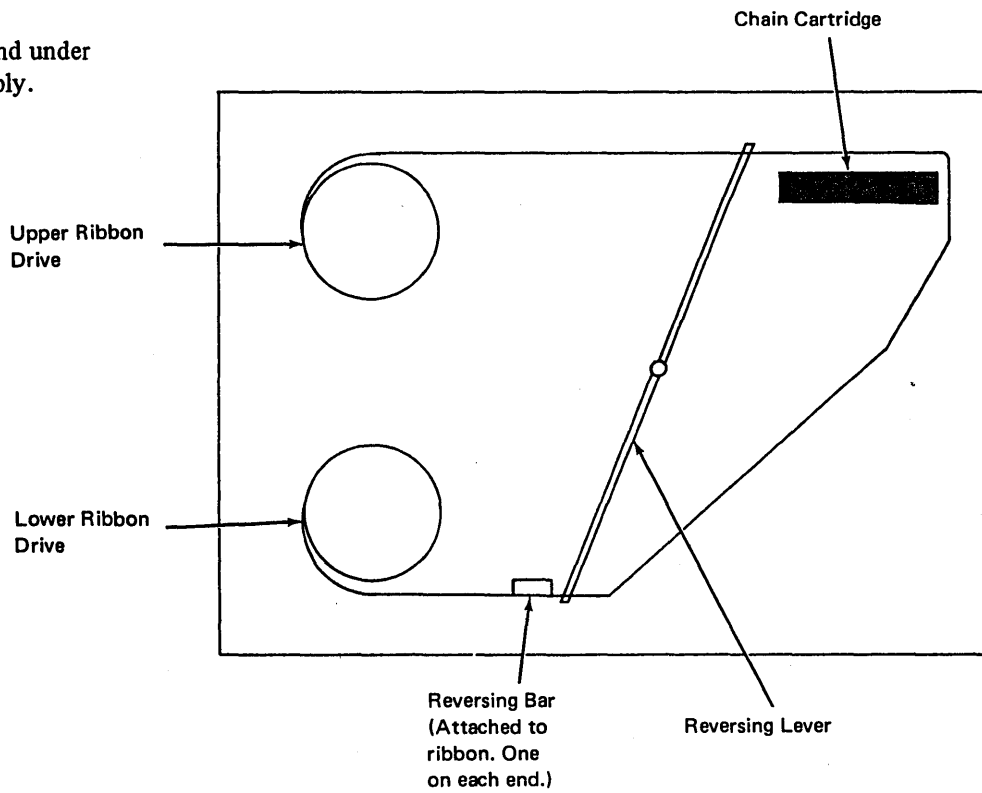
## Installation

- 1 Attach new ribbon spool to upper ribbon drive. The bulk of ribbon is now on this spool.



ART: 55070

- 2 Feed ribbon behind and under chain cartridge assembly.

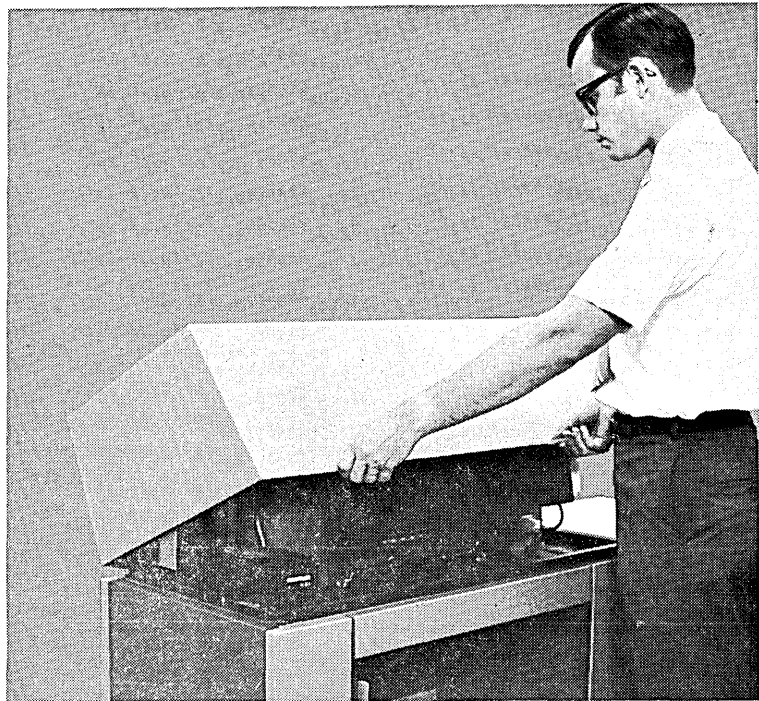


## CHANGING THE PRINT CHAIN CARTRIDGE

### Removal

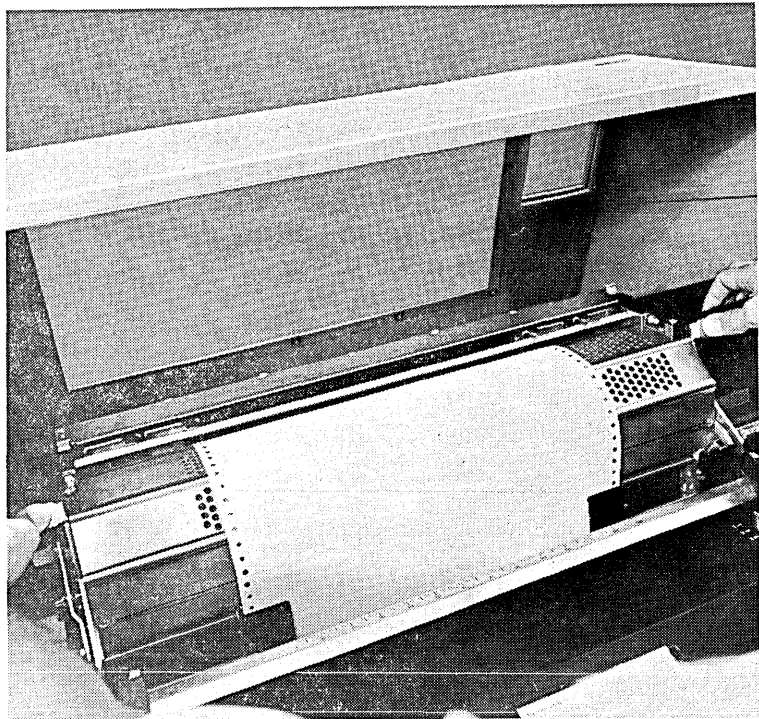
Wear disposable gloves when handling the ribbon or chain cartridge.

- 1 Open printer top cover.



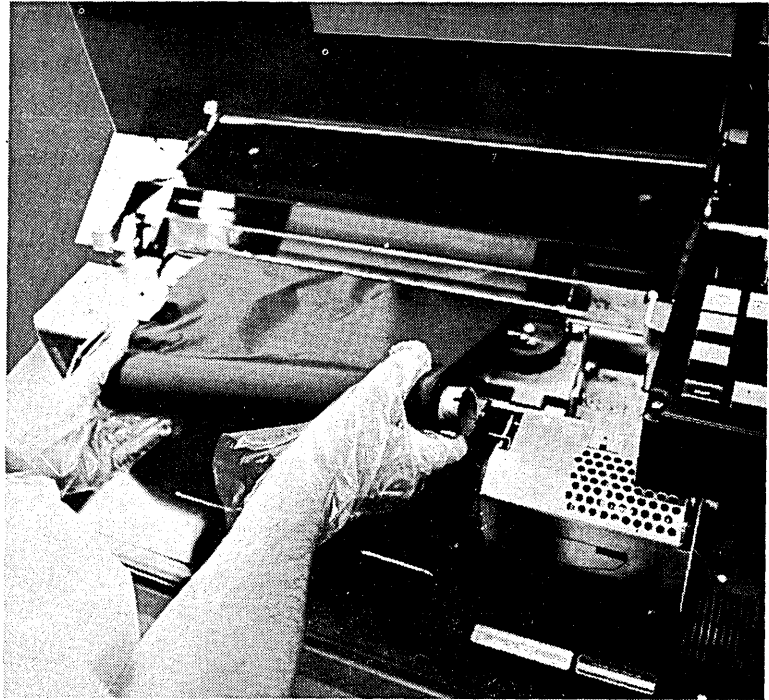
ART: 55064

- 2 Tip rear unit back.



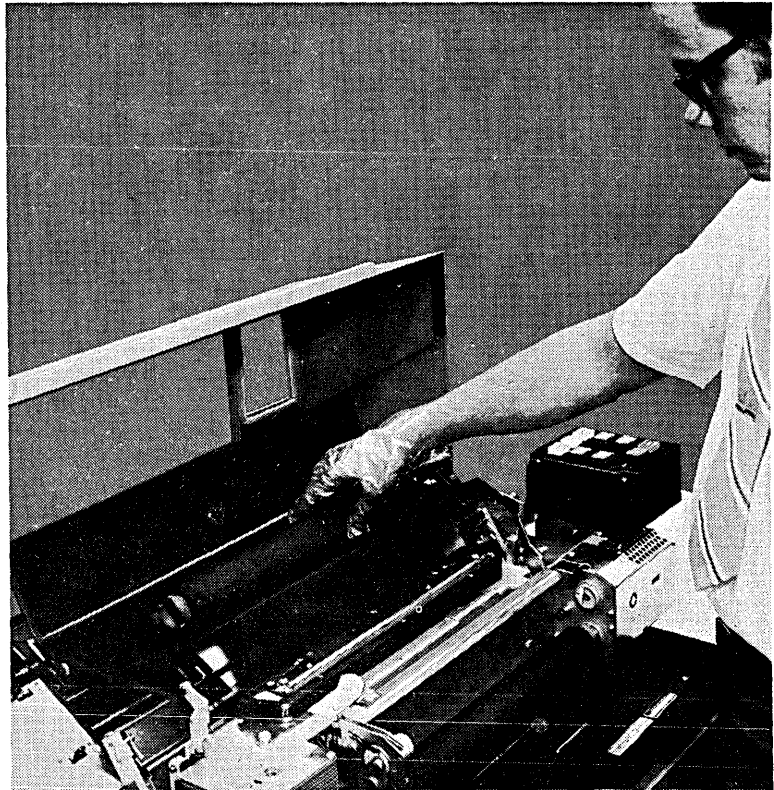
ART: 55065

- 5 Disengage ribbon spool from upper ribbon drive.



ART: 65068

- 6 Lay ribbon on ribbon cover.



ART: 65073

## Installation of 48-Character LC Print Arrangement Chain

- 1 Lower new cartridge onto guide pins.

*Caution:* Do not close cartridge handles. If the cartridge has thumb screws rather than locking handles, do not tighten the thumb screws.



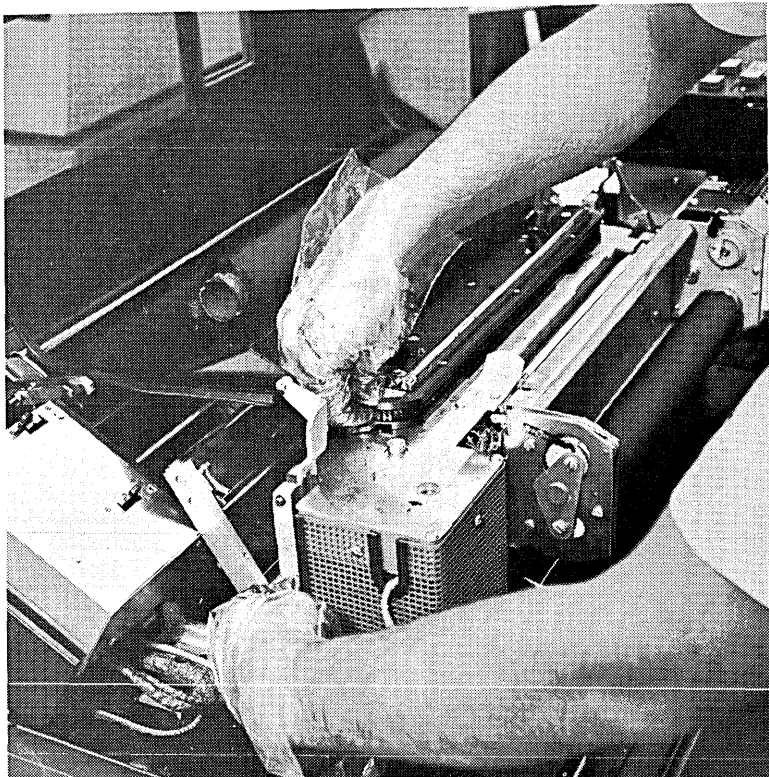
ART: 55089

- 2 To position the left end of the cartridge on the casting: hold print chain and turn chain drive motor, or hold print chain, press brake lever, and turn chain. There is an audible click when the cartridge drops into place.

Access to turn the motor is through the cut-a-way portion of the casting between the ribbon shield and the chain drive motor.

- 3 Close cartridge handles. They lay down flat against cartridge.

If the cartridge has thumb screws, thread the thumb screws into the guide pins until the screws are thumb tight.

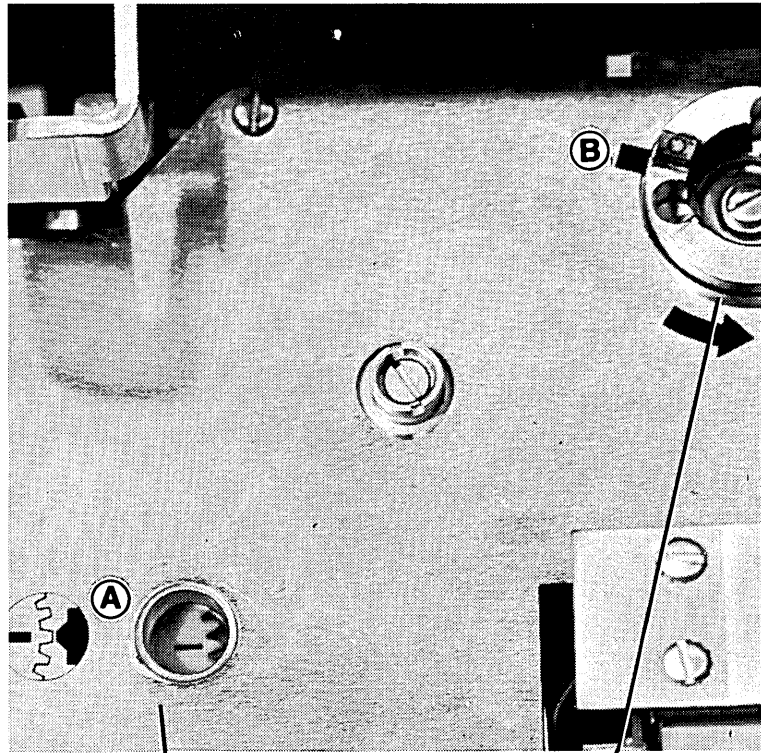


ART: 55090

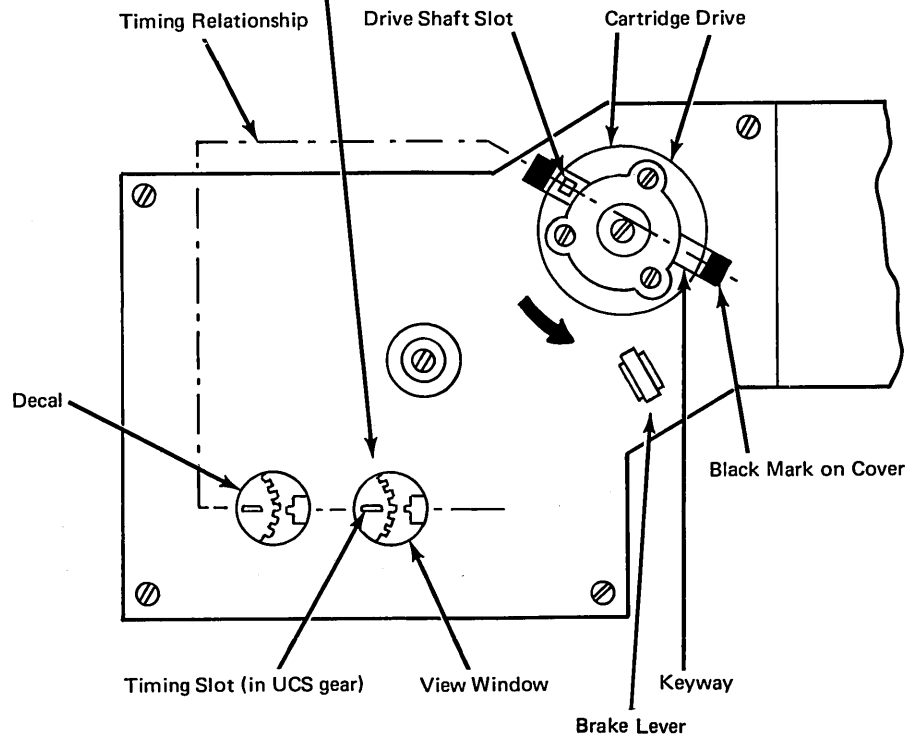
## Installation of UCS Cartridge

- 1 Turn drive motor counterclockwise until mark in view window (A) and slot in drive shaft (B) line up as shown. The mark in the view window can appear up to five times before the proper relationship between A and B is achieved.

Access to turn the motor is through the cutaway portion of the casting between the ribbon shield and the drive motor (or a special tool may be attached to the printer to turn the cartridge drive).



ART: 55091

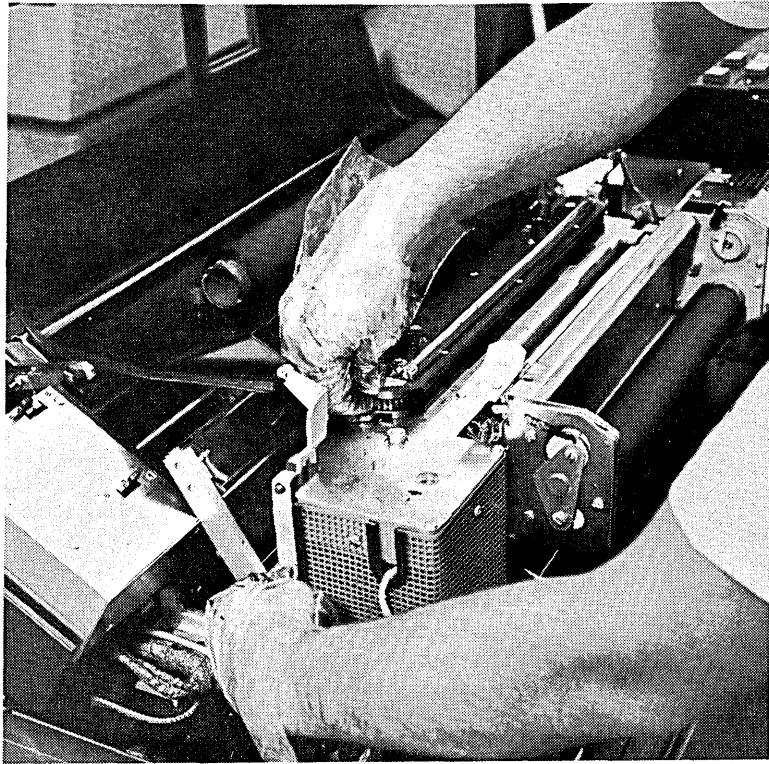




3

Lower cartridge onto guide pins, hold print chain, and rock motor until cartridge seats on casting.

*Caution:* Do not close cartridge handles before cartridge is seated.

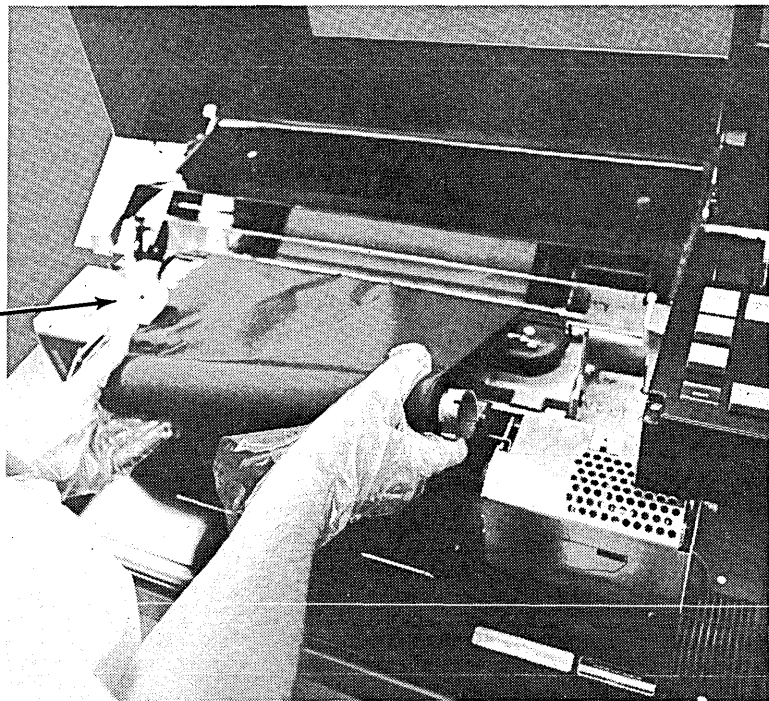


ART: 55090

4

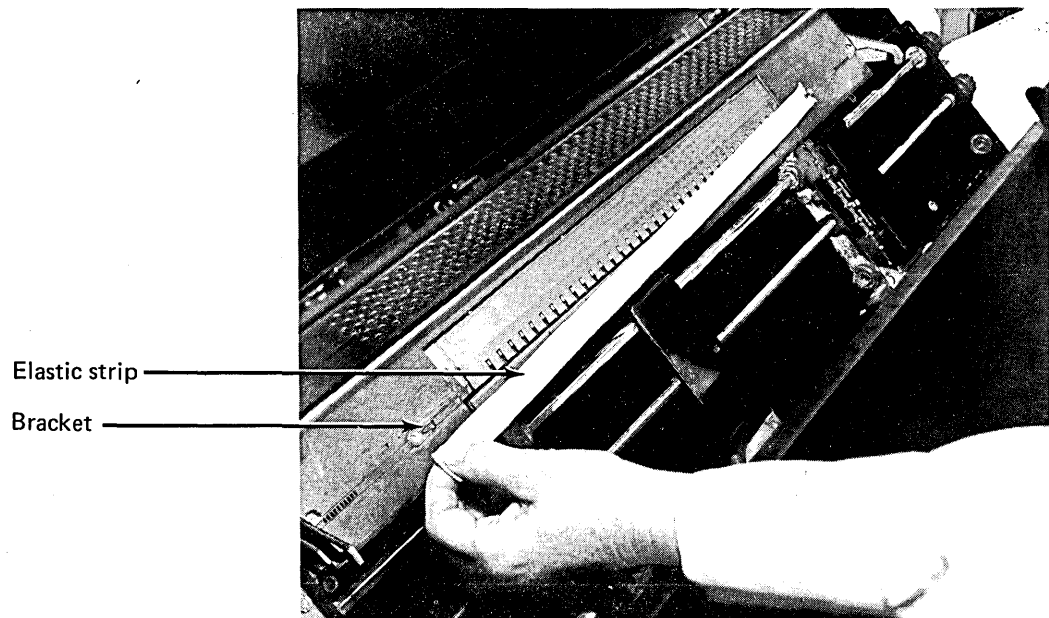
Attach ribbon spool to upper ribbon drive. Make sure ribbon is under ribbon guide.

Ribbon Guide



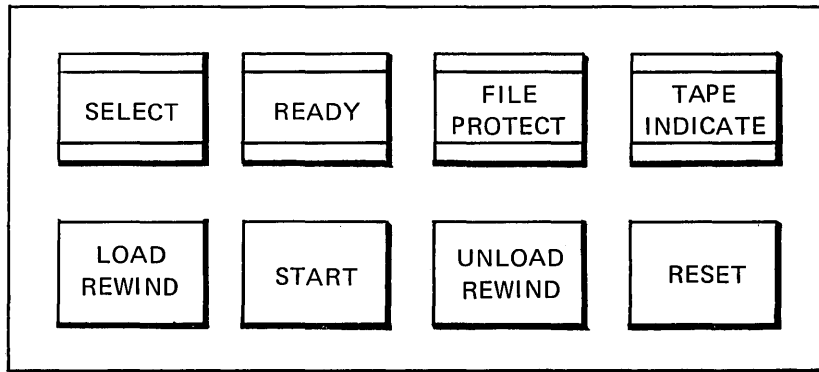
ART: 55068

- 3 Attach an elastic strip over the print hammers. This elastic strip should be about 14 inches (35,6 centimeters) long and 1/2 to 3/4 inch (12,7 to 19,0 millimeters) wide. Ordinary ribbed elastic will produce acceptable Braille. The elastic strip can be attached with masking tape or with special brackets. (To prevent forms jams, be sure the masking tape is totally beyond the edge of the printer page.) The following brackets are available at no charge: for the 5203 – RPQ 810517; for the 1403 N1 – RPQ 818047.



## MAGNETIC TAPE UNIT CONTROLS AND INDICATORS

The operator's panel on the 3410 and 3411 Magnetic Tape Units contains the following keys and lights:



### Keys

**LOAD REWIND:** Press this key to load the tape into the vacuum columns and position the tape at the load point (see *Mounting a Reel*). If the tape has already been loaded, pressing this key rewinds tape to the load point.

**START:** Press this key to indicate that the tape unit is available for system operation. The READY light turns on; all keys except RESET are disabled. START may be pressed while tape reel is in motion.

**UNLOAD REWIND:** If the READY light is not on, press this key to rewind the tape to the load point and unload it (see *Removing a Reel*). If the READY light is on, press RESET before UNLOAD REWIND.

**RESET:** If tape unit is loaded and the READY light is on, press RESET to turn off READY and enable manual operation of the unit; then press LOAD REWIND, START, or UNLOAD REWIND, depending on the action you desire the unit to perform. If tape is rewinding, press RESET to stop rewinding. If tape unit is reading, writing, loading, or unloading, press RESET if you wish to unload the tape (then press UNLOAD REWIND).

### Lights

**SELECT:** The tape unit is under control of the tape control unit.

**READY:** The tape unit is available for operation with the tape control unit (columns are loaded, tape is not rewinding, and START key has been pressed). This does not necessarily mean the tape is positioned at load point.

**FILE PROTECT:** Indicates one of three conditions:

1. Loaded file reel does not have a write-enable ring; you cannot write on the tape or erase it.
2. No tape reel is mounted.
3. A load, rewind, or unload/rewind operation is in progress.

This light is turned off by mounting a reel which contains a write-enable ring.

**TAPE INDICATE:** The end-of-tape marker has been sensed during a forward operation. This light is turned off when the tape moves backward over the end-of-tape marker.

### MOUNTING A REEL

If system power is on and no tape reel is mounted on the unit, the FILE PROTECT light is on. Use the following procedure to mount a reel.

1. Raise the cover on the tape unit.



- 6 Wrap two or three turns of tape around the right-hand spindle; take up the slack. The load point marker should remain to the left of the read/write head.

*Note:* Ensure that you do not load tape beyond the load point marker (see *Replacing Tape Markers*). If you load the tape beyond the load point marker and then press LOAD REWIND, the tape unit may continue to search forward until it reaches the end of the tape. If this happens, push RESET to stop tape motion, then push LOAD REWIND; the tape will move backward until the load point is reached.

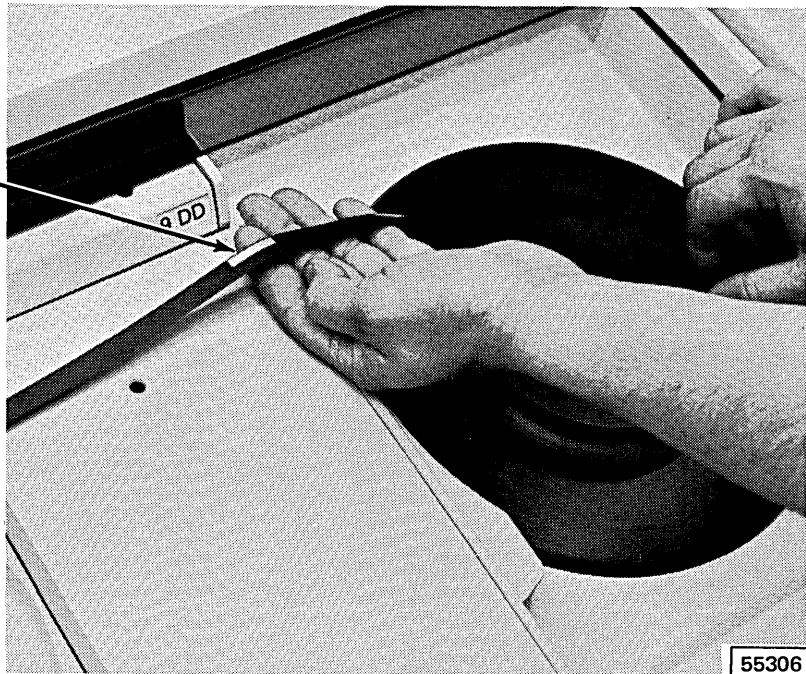


55303

- 7 Close the cover on the tape unit.
- 8 Press RESET.
- 9 Press LOAD REWIND. Tape is automatically fed to the tape heads and into the vacuum columns. The load point marker advances to the read/write head.
- 10 Press START. The READY LIGHT turns on.

*Note:* RESET, LOAD REWIND, and START may be pressed in succession without hesitating.

EOT Marker



A load point marker is about 10 feet (3,1 meters) from the beginning of the tape, on the edge of the tape which is nearest you when the reel is mounted. An end-of-tape (EOT) marker is about 25 feet (7,62 meters) from the end of the tape, on the edge of the tape which is nearest the tape unit when the reel is mounted.

Photosensors on the tape unit detect the load point and EOT markers to determine the beginning and the end of the data on the tape. New reels of IBM magnetic tape are supplied with load point and EOT markers.

Occasionally, tape markers must be replaced. Most often, it is the load point marker which must be replaced, since the beginning of the tape is most susceptible to wear and damage. If the EOT marker is missing, the tape will probably be wound completely off of the reel (the unit stops in this case). It is best to replace markers while the tape is mounted on the tape unit to keep dust from collecting on the unrolled tape. Be sure to replace markers carefully, aligning them as described in the procedure that follows. Press new markers down firmly. If you wish to order tape markers, order Part Number 352407, Magnetic Tape Markers.

Replace the tape marker as follows:

① If the tape is damaged, cut off the end of the tape, including the old tape marker, if present.

② *Load Point Marker:* Unwind about 10 feet (3,1 meters) of tape (6 or 7 turns on the right spindle).

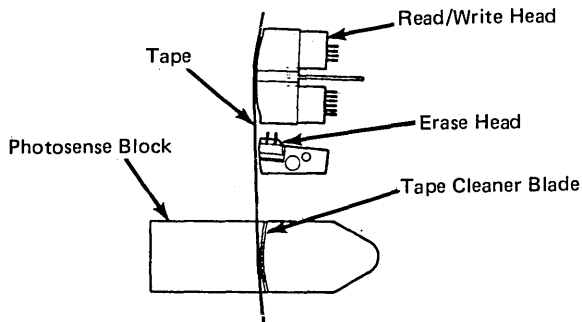
*EOT Marker:* Rewind about 25 feet (7,62 meters) of tape (about 15 turns on the left spindle).

③ *Load Point Marker:* Place a tape marker on the side of the tape nearest you, parallel to and not more than 1/32 of an inch (0,79 millimeters) from the edge, but not overlapping the edge.

*EOT Marker:* Place a tape marker on the side of the tape nearest the tape unit, parallel to and not more than 1/32 of an inch (0,79 millimeters) from the edge, but not overlapping the edge.

## Capstan Cleaning

- 1 Rotate the capstan with a finger covered with a lint-free cloth. With the other hand, wipe the capstan surface with a lint-free cloth moistened with tape cleaner. Use no water in this area, and **AVOID EXCESSIVE** cleaning pressure.
- 2 Dry the capstan surface with a lint-free cloth before loading tape. **AVOID EXCESSIVE PRESSURE.**



## MAGNETIC TAPE HANDLING

The following suggestions are offered to help you ensure maximum performance of your magnetic tape and tape units:

- Clean tape units frequently, particularly the read/write head and vacuum columns. This prevents accumulation of dust and dirt which can interfere with contact between the tape and the read/write head.
- Floors, ceilings, walls, draperies, and furnishings in the machine room should be composed of materials which are easy to clean, do not flake, and are free of lint and static.
- Store reel containers where they will not be exposed to dust.
- When a reel of tape is removed from the unit, always place it immediately in a container.
- Do not smoke near tape or tape units, since ashes can contaminate or burn tape.
- Use care in handling tape reels, since dropping or mishandling can damage the tape or the reel.
- To clean the magnetic tape, wipe it gently with a lint-free cloth which has been dampened with tape transport cleaner (see *Cleaning Procedures* for available products).
- Inspect reel containers periodically for dust or dirt.
- Do not expose magnetic tape to magnetism.
- If a roll of tape is dropped, inspect it immediately. If the reel is undamaged, thoroughly clean the exposed tape and rewind it on a good reel. If you feel the tape may be damaged, you should thoroughly clean it and attempt to check the data through a tape-to-printer job or other operation.
- Do not grasp the tape reel at the outer edges, as the tape itself may be pinched and thereby damaged.
- Do not turn system power off until all tapes have been rewound and unloaded.

## **MOUNTING A 5440 DISK CARTRIDGE**

The following procedures are for mounting a 5440 disk cartridge. If a cartridge is on the disk drive, remove it before placing a new cartridge on the disk drive. Follow the procedures later in this chapter for removing a cartridge.

The cartridge to be used by the system should be in the environment in which it is to be used for at least three hours. This ensures the disk cartridge can be used properly by System/3. A cartridge should always be on the disk drive when the system is not in use. This keeps dust from entering the drive.

5 With the IBM label pointed toward the front of the disk storage drawer, mount the cartridge by lowering it on the disk drive.

6 Release the carrying handle. It should be flush with the cartridge.



55233

7 Invert the bottom cover and place it on top of the cartridge.



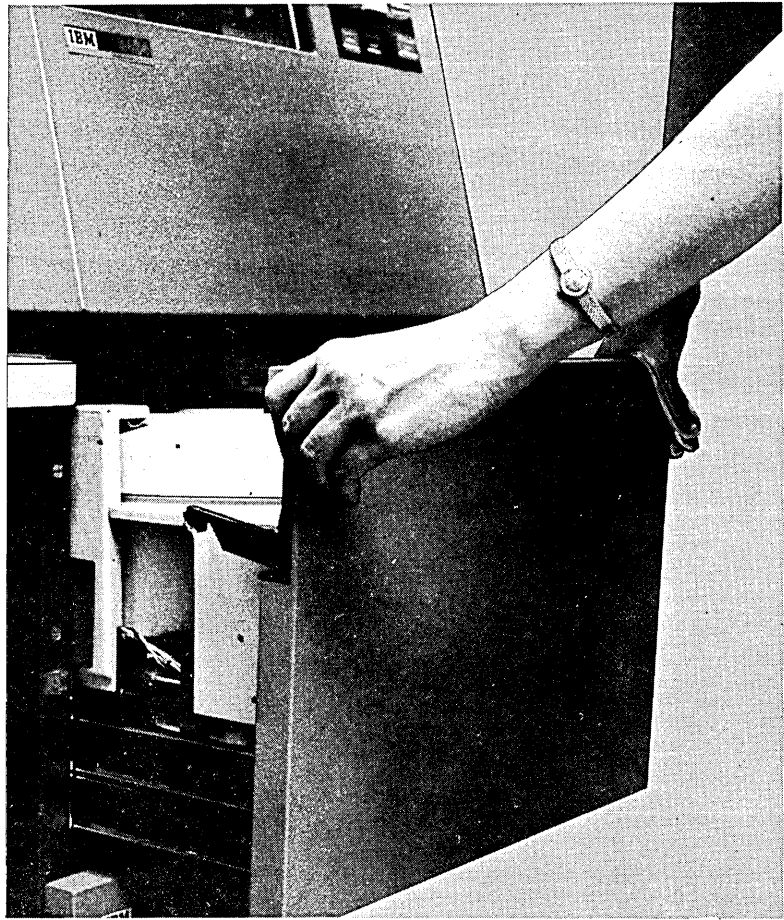
55234

## REMOVING A 5440 DISK CARTRIDGE

- 1 Set disk panel START/STOP switch at STOP for the cartridge to be dismounted (R1 or R2).

*Note:* The disk storage drawer cannot be opened until the OPEN light for the selected disk (1 or 2) is lit.

- 2 When disk panel OPEN light is lit (READY light is off), squeeze drawer release lever and slide disk storage drawer out until it stops.



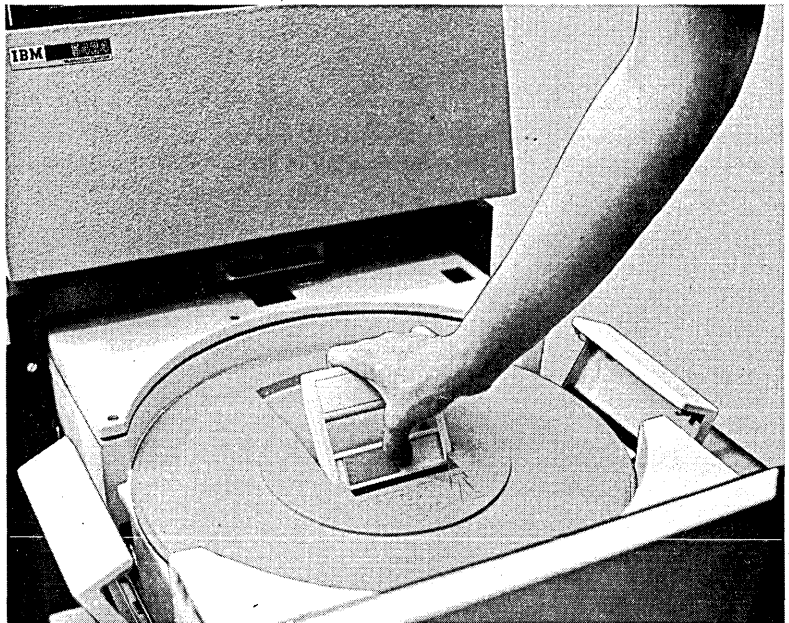
55236

- 4 Lift bottom cover off of cartridge.



55234

- 5 Slide release button to left and raise carrying handle to release cartridge from disk drive.

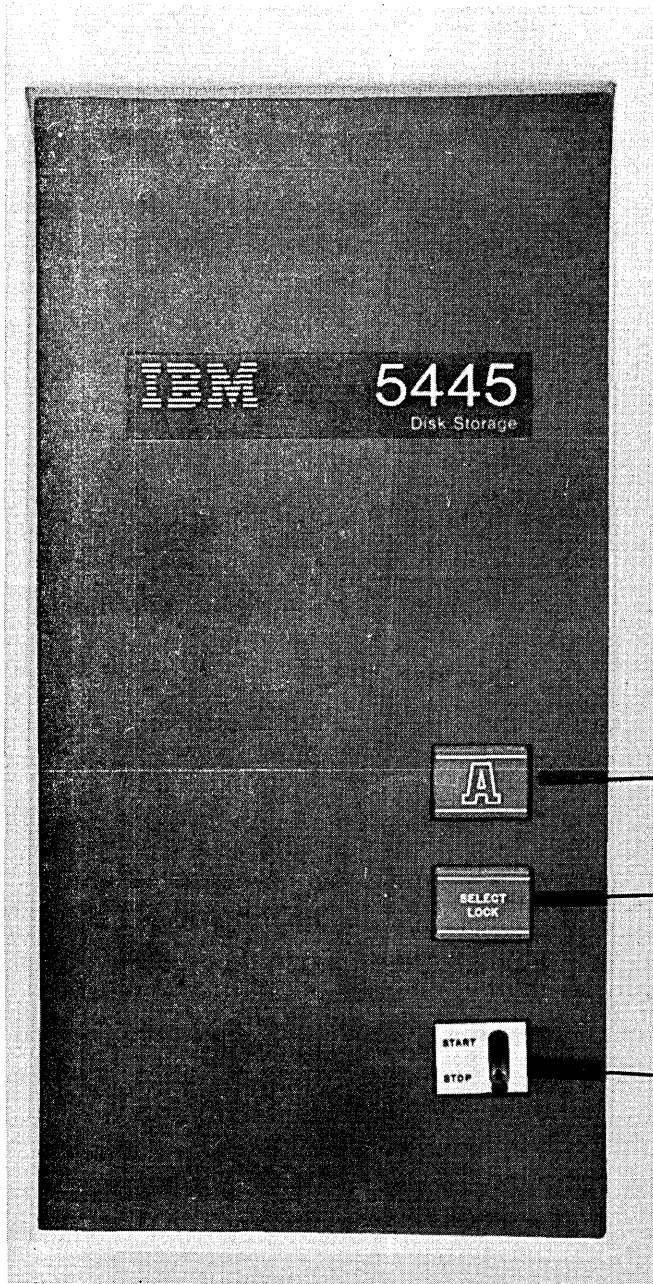


55238





## DISK CONTROLS AND INDICATORS



*READY Light:* This light comes on when the 5445 disk drive is ready for use.

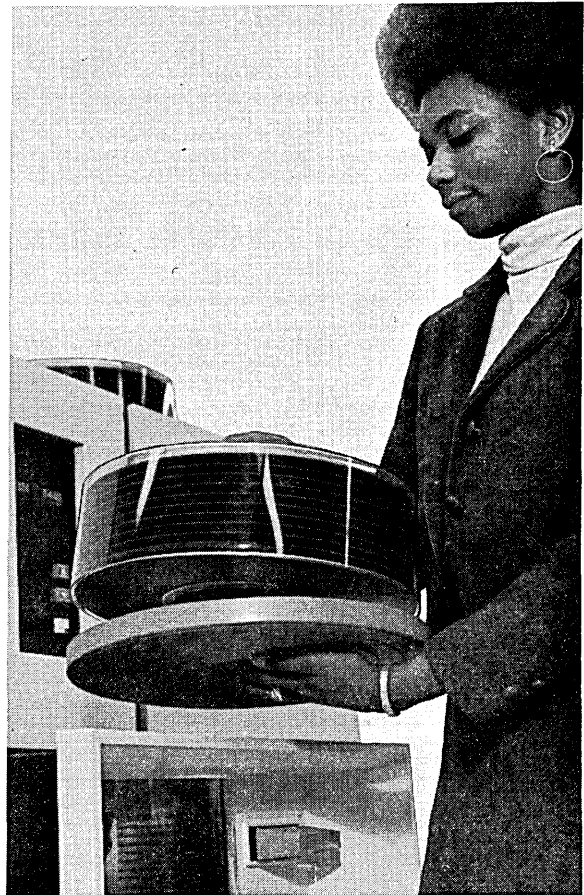
*SELECT/LOCK Light:* This light comes on when a halt has occurred in the program being processed or when the 5445 disk storage drive is malfunctioning.

*START/STOP switch:* This switch turns the disk drive power on or off when the system power is on. With the switch at STOP, the drawer can be opened and the disk can be replaced.

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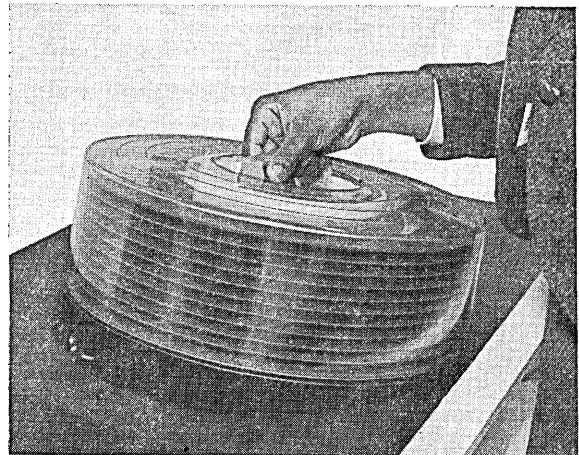
Remove the bottom cover of the disk cartridge by holding the top cover handle with one hand and turning the bottom cover handle counterclockwise with the other.



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5

Lower the cartridge on the disk drive.



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6

Turn the top cover handle clockwise until the handle is tight.

3

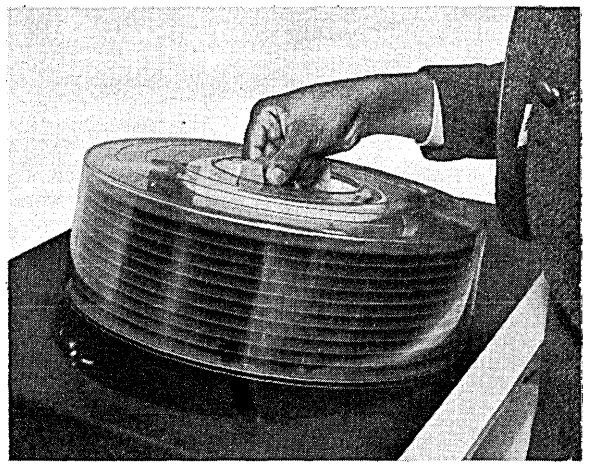
Place the top cover on the cartridge.



55295

4

Turn top cover handle counter-clockwise until a clicking sound is heard.



55294

5

Lift cartridge from disk drive.



## USE OF THE PRINTER-KEYBOARD

The printer-keyboard (Figure 12) is an optional device for System/3 and consists of the printer and keyboard connected to the system processing unit. With the printer-keyboard, you can:

1. Request information from a disk file.
2. Print out requested information.
3. Enter data directly into the system.
4. Print out OCL statements and error codes for a program by using the printer-keyboard as a logging device.
5. Interrupt a program (if inquiry has been specified) by pressing the REQ key. You will be told when to do this on the program run sheet.

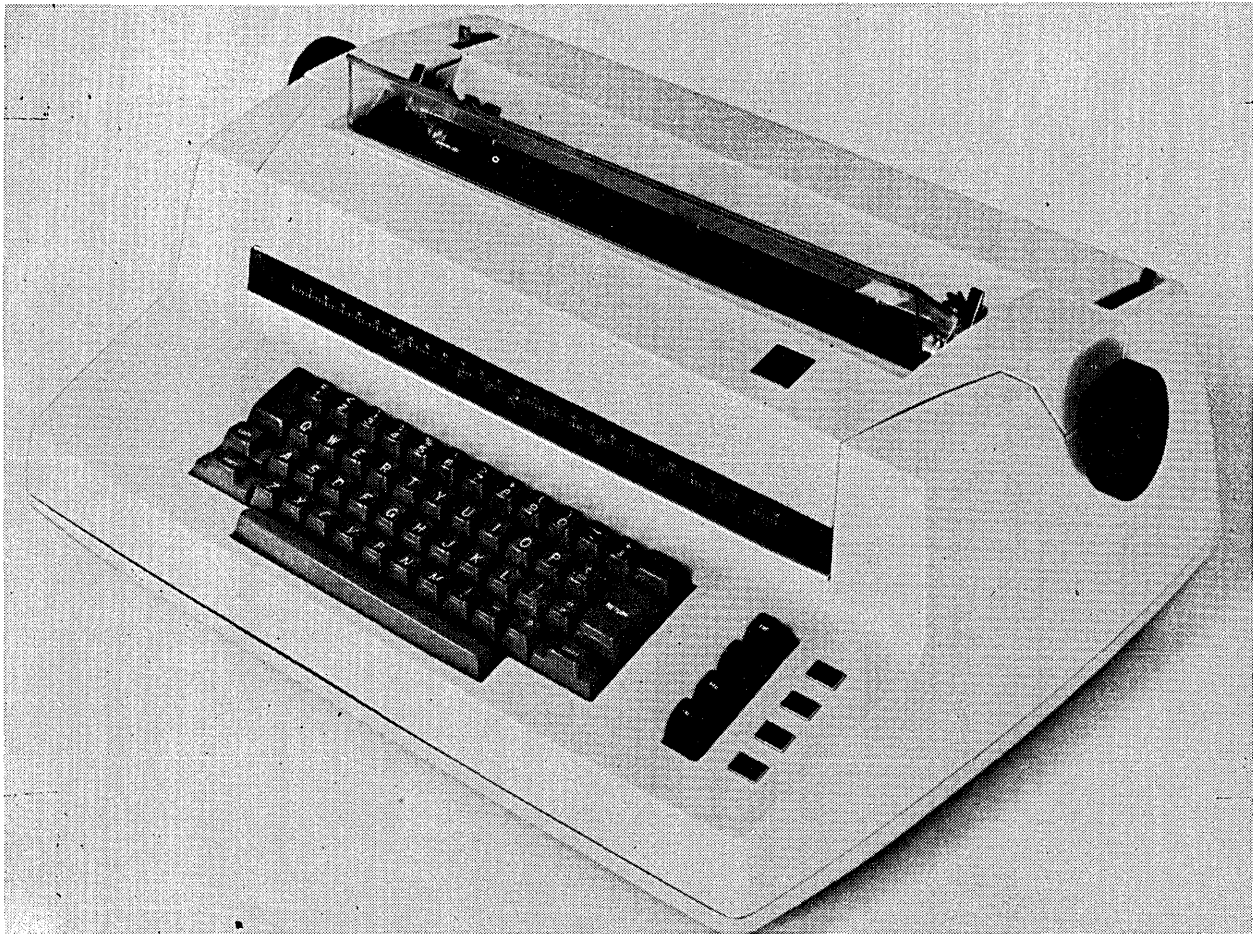
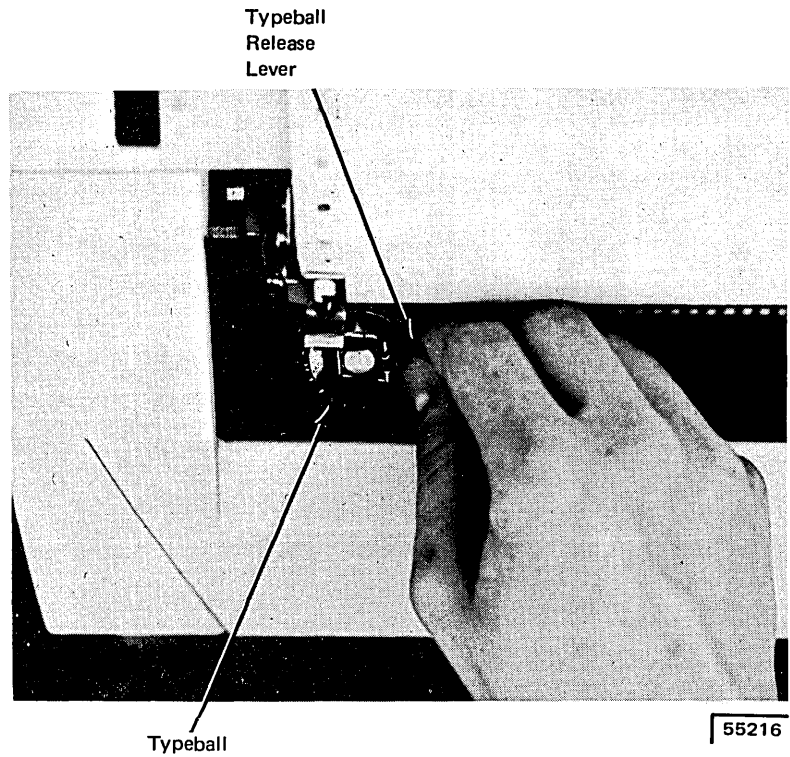


Figure 12. Printer - Keyboard

53297

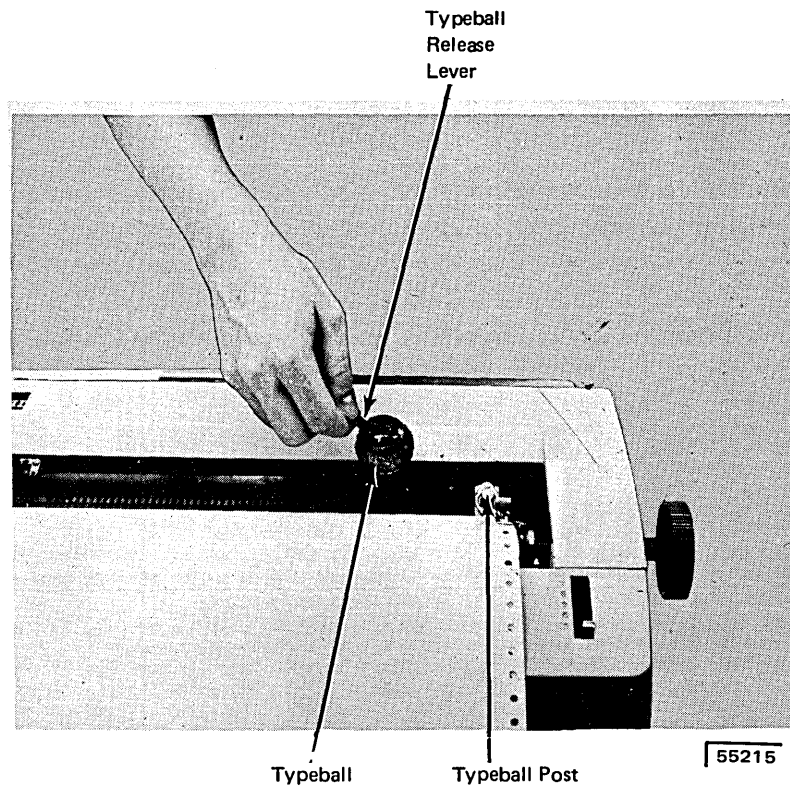
## REMOVING THE TYPEBALL

- 1 Lift the typeball release lever until the lever clicks into position.
- 2 Remove the typeball by lifting it off of the typeball post.



## REPLACING THE TYPEBALL

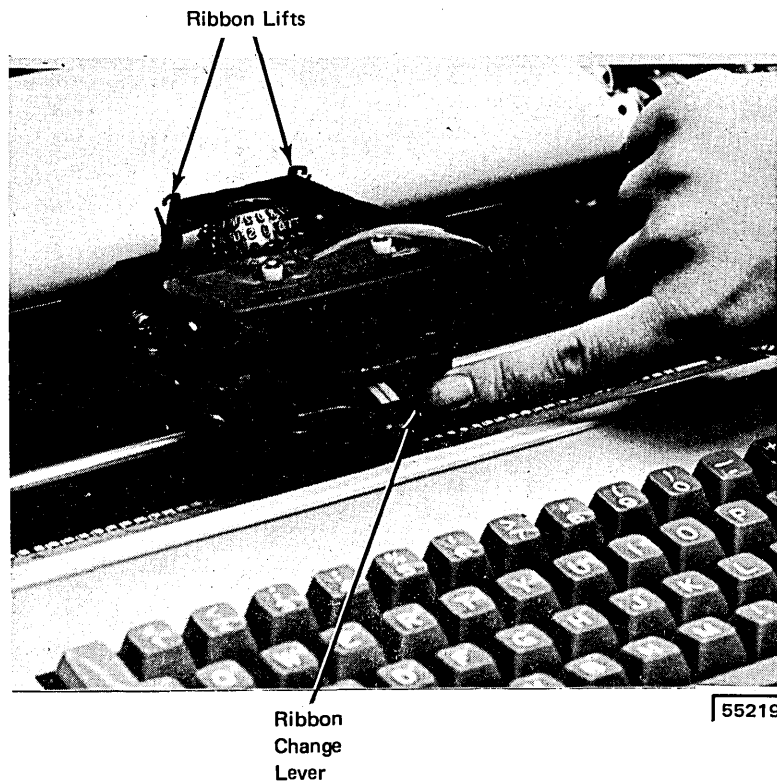
- 1 Lift the typeball release lever until it clicks into position.
- 2 Place the typeball on the typeball post with the triangle facing directly away from you.
- 3 Close the lever. Avoid using force.



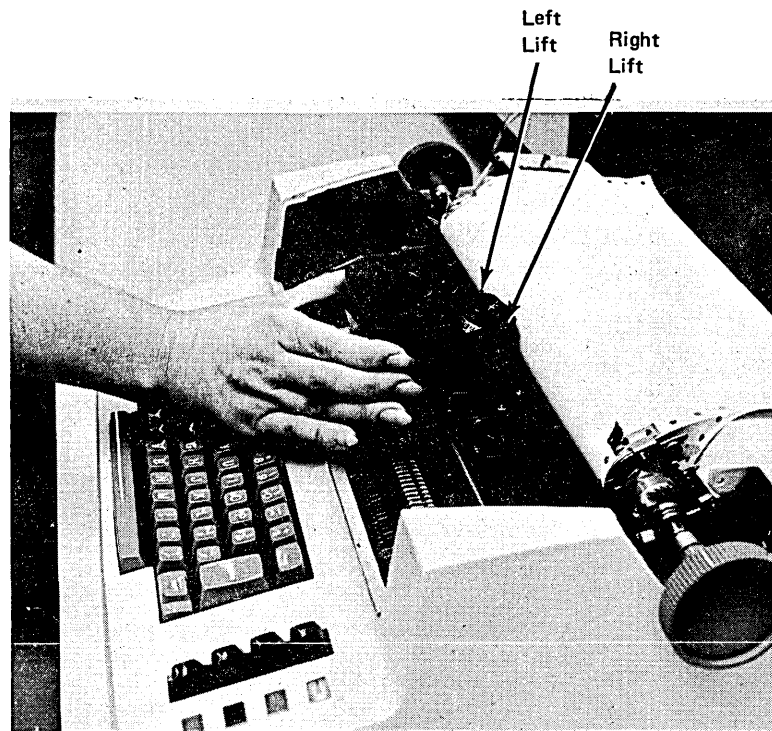


## REMOVING THE FABRIC RIBBON CARTRIDGE

- 1 Lift the front cover.
- 2 Move the ribbon change lever to the right. This will raise the ribbon lifts for easier removal of the ribbon.



- 3 Lift the cartridge upward and off the ribbon cartridge spindles.
- 4 Ease the ribbon out of the slots in the ribbon lifts.
- 5 To rewind excess ribbon, insert a pencil in either of the holes in the cartridge and turn in the direction of the arrow.



8

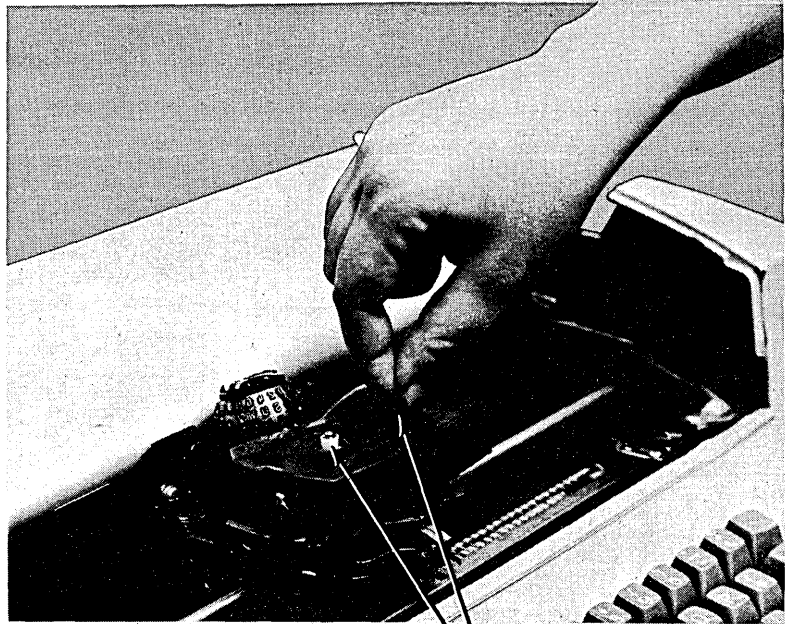
Move the ribbon change lever back to the left. This will lower the ribbon into typing position.

9

To rewind excess ribbon, turn either spindle in the direction of the arrow.

10

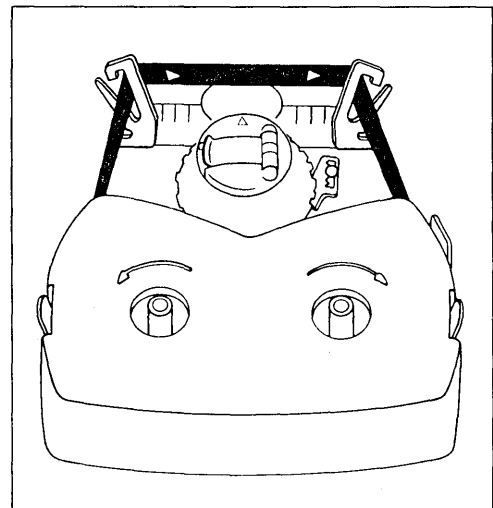
Close the cover.



55222

Spindles

This is the way the fabric ribbon cartridge will look when it is correctly inserted and ready for use. The arrows indicate the direction in which the ribbon can move.



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## 1442 CONTROLS AND INDICATORS

All of the 1442 controls and indicators are on a single panel to the right of the card hopper. Eight of the indicators are on a backlit panel.

### Keys

The operator's panel (Figure 14) contains three keys:

**START Key:** Pressing the START key places the 1442 in a ready status if the following conditions are met:

1. System power on.
2. Cards in the hopper. One card is fed and registered at the pre-read station when the START key is pressed.
3. 1442 CHECK light off.
4. Stacker not full.
5. Chip box properly positioned and not full.
6. 1442 covers closed (after card jam removed).

The START key is also used to return the 1442 to a ready status after 1442 STOP has been pressed and to indicate the last card sequence.

**STOP Key:** Pressing the STOP key takes the 1442 out of ready status. The READY light turns off. Do not use the 1442 STOP key to stop a job, use console STOP.

**NPRO Key:** Pressing the Nonprocess Runout (NPRO) key clears all cards from the card feed path. The hopper must be empty before the NPRO key will operate.

NPRO is also used to turn off the CHECK light and HOPR sense light when the system is turned on. This procedure ensures that the card feed path is clear.

### Status Lights

Four lights, above the keys on the operator's panel, show 1442 status.

**POWER ON Light:** This light turns on when the system power is turned on.

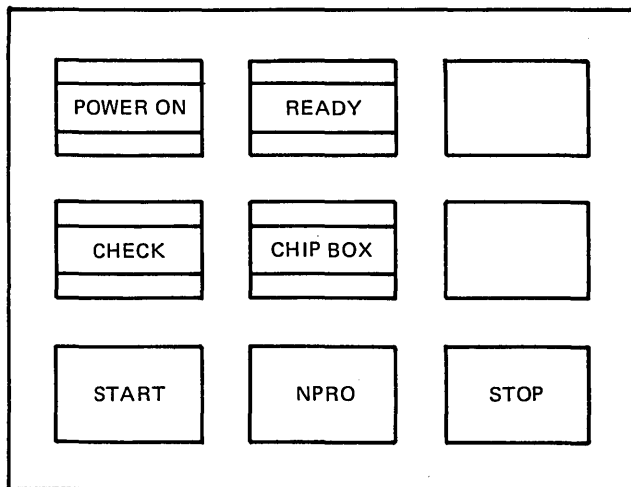


Figure 14. Operator's Panel

## CLEARING A CARD JAM

The following procedure tells you how to physically remove cards from the 1442 card path. The program recovery procedures with corresponding halts — what to do with the cards to continue program operations — are listed in the program halts in the *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540.

### Indications

All of the following indicate a hopper misfeed or card jam in the 1442:

- C5, C6, C7, C8, or C9 halt in the console Message Display Unit.
- 1442 READY light not on.
- 1442 CHECK light on.
- A sense light on.

A sense light indicates the area in the card feed path where the trouble occurred. When a hopper misfeed or card jam occurs, record the error in your console log book. If the same error occurs repeatedly, it is an indication that the 1442 should be serviced.

### Removing Cards From the Card Feed Path

The 1442 card path is shown in Figure 16. The sense lights, whose names are shown in Figure 17, are lit to indicate where in the card path a card is jammed.

#### Hopper Misfeed :

1. Remove the cards from the hopper.
2. Check the bottom card for damage. All edges must be smooth. If the card is damaged, punch a new card to replace it.
3. Refer to the C5 halt in the *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, for program recovery procedures.

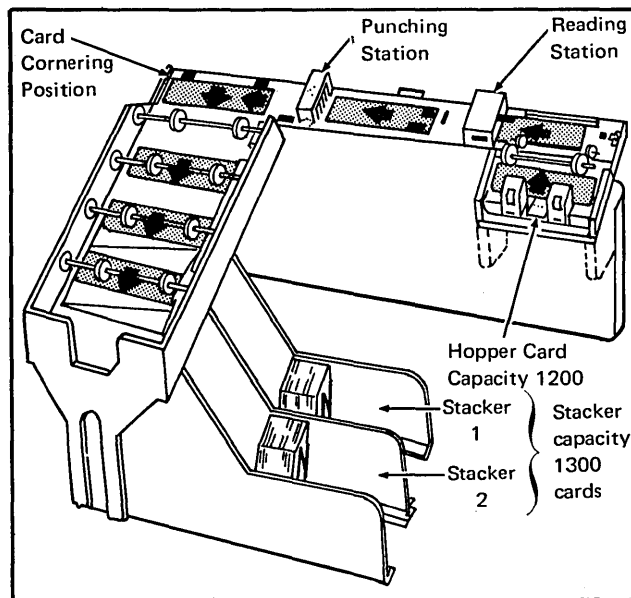
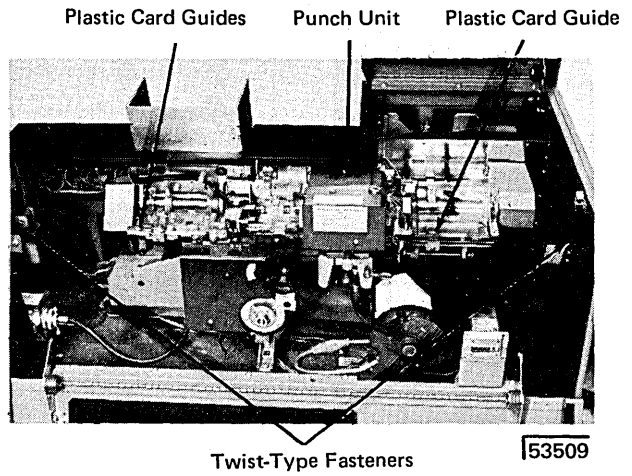


Figure 16. 1442 Card Path Schematic

2

Raise the plastic card guides and remove all cards from the card path. If a card remains jammed under the punch unit, proceed with steps 3-7; otherwise go to step 8.

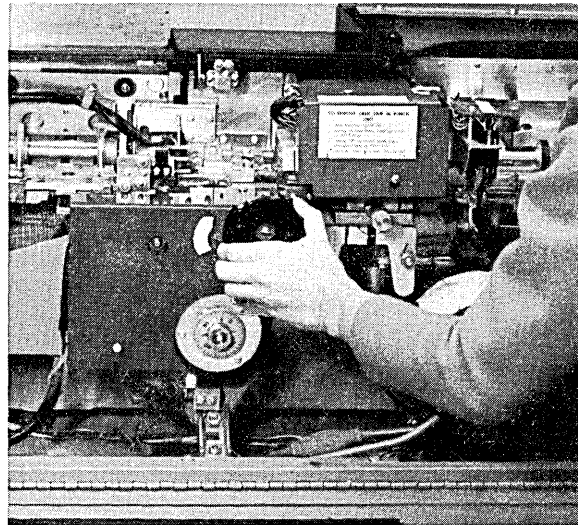


3

Open the two twist-type fasteners on the inside of the rear cover and lower the cover.

4

Turn the punch unit handwheel clockwise at least one-half revolution. System power must be on.



## 1442 POWER ON AND READY PROCEDURES

1. Turn on the system POWER switch on the processing unit console. The 1442 CHECK and HOPR lights turn on.
2. Remove any cards from the 1442 card hopper.
3. Press the 1442 NPRO key. The CHECK and HOPR lights turn off.
4. Remove any cards from the stackers.
5. Place the cards to be processed, 9-edge first, face down in the card hopper.
6. Place the card weight behind these cards.
7. Press 1442 START. The first card in the hopper feeds to the pre-read station and the 1442 READY light turns on. The 1442 Card Read Punch is now ready for program operation.

## 1442 LAST CARD PROCEDURES

When the last card is fed from the card hopper, the 1442 READY light turns off and the I/O ATTENTION light on the processing unit console turns on.

Operator action is determined by the program in operation:

1. More cards are required. Place the cards in the 1442 card hopper and press 1442 START. The program resumes operation.
2. Last card sequence. Before pressing 1442 START, be sure that a /\* card follows the last data card of a 1442 input or combined file. The last card is processed and the program resumes operation. Before proceeding to the next job(s), ready the 1442 (see *Using the 1442 as the Only Card Input Device, Chapter 10*).

*Note:* If a single card is being processed, it is necessary to press 1442 START twice. The first time START is pressed the card is registered at the pre-read station. The READY light turns on and off. The second time START is pressed the READY light turns on, and the card is ready to be processed as part of the last card sequence.



### USING THE 3741 AS THE ONLY INPUT DEVICE

You may have a System/3 Model 10 Disk System that has the 3741 as the only input device. In this case, you cannot run the following types of jobs:

- 96-List program.
- 96-96 Reproduce and Interpret program.
- MFCU Sort/Collate program.
- Data Recording program.
- Gangpunch program.

For a complete description of the procedures for operating the 3741 online, see the *IBM System/3 3741 Reference Manual*, GC21-5113.

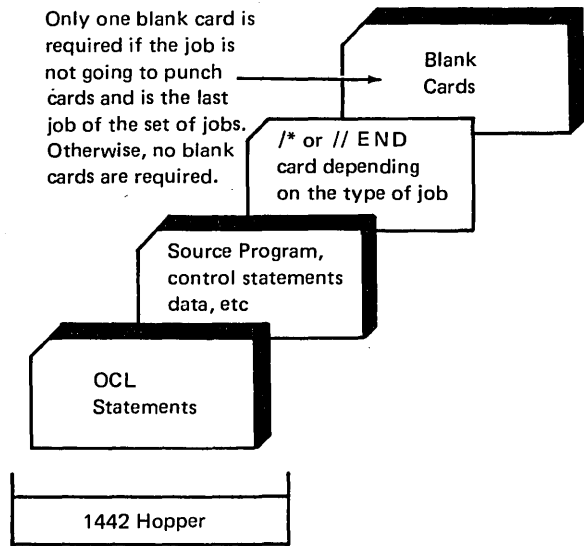


Figure 18. General 1442 Input for a Job

### USING THE 1442 AS THE ONLY CARD INPUT DEVICE

You may have a System/3 Model 10 Disk System that has the 1442 as the only card input device. In this case, you cannot run the following types of jobs:

- 96-List program.
- 96-96 Reproduce and Interpret program.
- MFCU Sort/Collate program.
- Data Recording program.
- Data Verifying program.
- Gangpunch program.

The following procedures describe the necessary steps that must be taken to run all jobs that can be run using the 1442 as the only card input device. Figure 18 shows the general input for the 1442.

1. Mount disk cartridges as specified on the program run sheet and ready disks.
2. Clear all cards from 1442. Remove any cards in stackers.
3. Place OCL and source statements in 1442 hopper. Place a blank card after the last card for the job in the 1442 hopper.

*Note:* If the job is going to punch cards, place blank cards after the last card for the job.

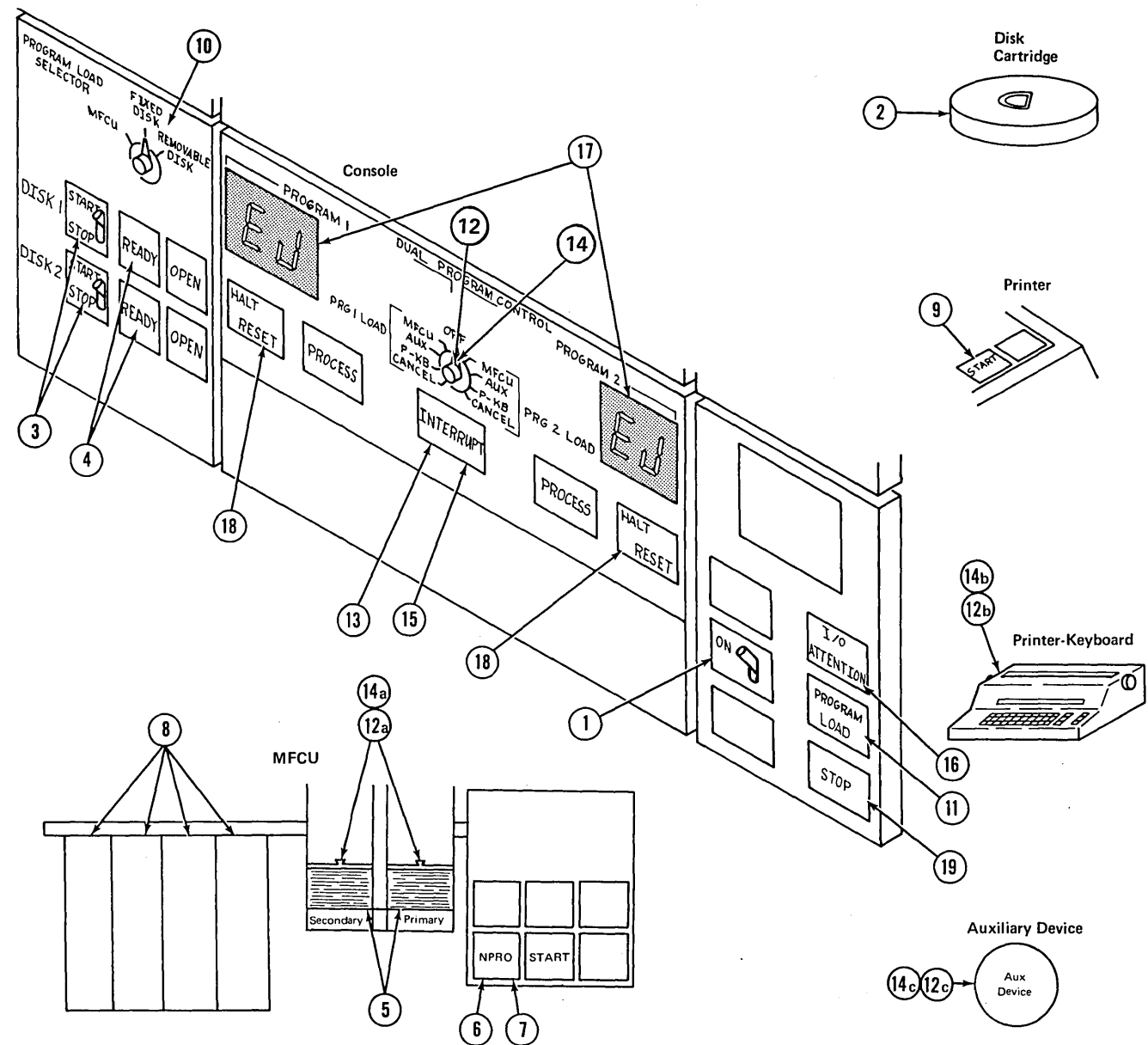
4. Press 1442 START. The READY light turns on.
5. Ready printer.
6. Press console START or appropriate HALT/RESET key if you have DPF. The job is complete when EJ is displayed in the message display unit.

*Note:* If the job is running with the // $\emptyset$  NOHALT statement in effect, a ' $\emptyset$ 9' halt may occur. If so, follow instructions in the *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540. To avoid this halt, a // $\emptyset$  HALT statement should be included in the last job's OCL to allow the EJ halt to occur so the operator can proceed to step 7.

7. After the job is complete, repeat steps 1-6 to start the next job.

If halts occur during the execution of the job, see *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, for recovery procedures.





1. System power on.
2. Mount indicated disk cartridge as specified on program run sheet. Be sure the START/STOP switch is set at STOP and the OPEN light is on before mounting cartridge.
3. Set appropriate START/STOP switch to START.
4. READY light turns on when disk is up to speed.
5. Remove cards from reader hoppers or remove diskette from 3741.
6. Press NPRO to clear primary feed path.
7. Press NPRO to clear secondary feed path.
8. Clear all cards from stacker.
9. Ready printer if it is used by the program.
10. Set PROGRAM LOAD SELECTOR at position from which you will perform the IPL process.
11. Press PROGRAM LOAD.
12. Set DUAL PROGRAM CONTROL switch to input device for program 1.
  - 12a. If MFCU, place OCL statements, data cards, and blank cards in hoppers as required by program. Load cards face down, top edge to the left. Check program run sheet and operating procedures in this manual. Press MFCU START.
  - 12b. If printer-keyboard, be ready to key information.
  - 12c. If auxiliary device, ready it.
13. Press INTERRUPT key.
14. Set DUAL PROGRAM CONTROL switch to input device for program 2.
  - 14a. If MFCU, place OCL statements, data cards, and blank cards in hoppers as required by the program. Load cards face down, top edge to the left. Press MFCU START.
  - 14b. If printer-keyboard, be ready to key information.
  - 14c. If auxiliary device, ready it.
15. Press INTERRUPT key.
16. I/O devices not ready will be indicated by the I/O ATTENTION light or OY halt for 3741. Ready the devices to continue.
17. Programmed halts are displayed on the DPF message display units. See *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, for an explanation of halts.
18. Press HALT/RESET to continue.
19. Press console STOP when the system is not being used. Press console STOP before turning system power off.

Figure 20. Summary of Program Operating Procedures for a DPF System

The following procedures must be performed each time you initiate the IPL process from the fixed or removable disk:

1. Perform step 1a if the resident system disk cartridge has to be mounted. Perform step 1b if the disk cartridge is mounted or the resident system is on F1.
  - a. If your resident system is on a removable disk cartridge and it is not mounted, mount the cartridge on R1. (See the procedures in *Chapter 6. IBM 5440 Disk Cartridge and IBM 5444 Disk Storage Drive*, if you do not know how to mount or remove cartridges.)
  - b. If the proper cartridge is already mounted or if the resident system is on the fixed disk (F1), set the disk 1 START/STOP switch on the disk panel at START.

*Note:* For you to initiate the IPL process, a cartridge must be on R1. When your resident system is on F1, mount the cartridge for the first job on R1 if one is used by the first job. Otherwise, mount any cartridge so you can initiate the IPL process.
2. Set program load selector at FIXED DISK (F1) or REMOVABLE DISK (R1).
3. When the READY light for disk 1 is on, press PROGRAM LOAD. Initial program loading is performed.

#### *Initiating the IPL Process from the MFCU*

Some programs require that you initiate the IPL process from the MFCU. These are known as stand-alone programs because they do not require system control programs to execute. The program run sheet supplied to you by the programmer will indicate when to initiate the IPL process from the MFCU. Perform the following procedures to initiate the IPL process from the MFCU:

1. Place cards for stand-alone job in primary hopper of MFCU.
2. Press MFCU START.
3. Set program load selector at MFCU.
4. Press PROGRAM LOAD.

Cards in the primary hopper of the MFCU are read into storage and the program is executed.

Initiate the IPL process from the fixed or removable disk after completion of the programs that required you to initiate the IPL process from the MFCU.

Figures 19 and 20 show the steps required to load and run a program on System/3. The necessary information you require to run the program can come from two sources, System/3 or the programmer:

1. Information from System/3. The system informs you of error conditions or special operating instructions by a displayed or printed message or both:
  - I/O ATTENTION means an I/O (input/output) device is not ready. See *Clearing I/O ATTENTION* in this chapter.
  - Programmed halts are displayed in the Message Display Unit and described in the *IBM System/3 Model 10 Disk System Halt Guide, GC21-7540*.
  - Unidentifiable halts should be recorded on the error log sheet described in this chapter.
2. Information from the programmer. The programmer can give you special instructions on the program run sheet.

#### **CLEARING I/O ATTENTION**

The I/O ATTENTION light on the processing unit console turns on when any input/output device is selected by a program and the device is not ready. The device itself has additional indicators to guide you to the cause of the not-ready condition. I/O ATTENTION turns off when the device that required service is ready for operation. Conditions that cause I/O ATTENTION, along with recovery procedures, are listed in Figure 21.



Device	Device Indicator On	Cause	How to Clear
1442	None	<p>1442 not ready. Can be caused by:</p> <ol style="list-style-type: none"> <li>1. No cards in hopper.</li> <li>2. Last card sequence.</li> <li>3. You pressed 1442 STOP.</li> <li>4. Stacker full.</li> <li>5. Top cover open or not securely latched.</li> </ol>	<ol style="list-style-type: none"> <li>1. On initial run in, load cards in hopper and press 1442 START.</li> <li>2. For last card, press 1442 START, or place cards in hopper and press 1442 START.</li> <li>3. Press 1442 START.</li> <li>4. Empty stacker and press 1442 START.</li> <li>5. Close covers and press 1442 START.</li> </ol>
1442	CHIP BOX	<p>Chip box is full or not in machine.</p>	<ol style="list-style-type: none"> <li>1. Empty the chip box or place it back in the machine. The chip box is located inside the left front cover.</li> <li>2. Press 1442 START.</li> </ol>
Tape	None	<p>Tape unit not ready Can be caused by:</p> <ol style="list-style-type: none"> <li>1. Cover not closed.</li> <li>2. Tape not mounted properly.</li> <li>3. Tape multivolume processing.</li> </ol>	<ol style="list-style-type: none"> <li>1. Close cover and press RESET, LOAD REWIND, and START.</li> <li>2. See procedures for tape mounting.</li> <li>3. When an end of volume is reached on a multivolume file, a message 'EOV Tx' (where x=1; 2, 3, or 4) is printed on the log device if available and the completed reel is rewound and unloaded. If the OCL specified multiple drives for this file and if the next volume is mounted on the next drive, processing continues without interruption. If the OCL specified a single drive for this file, the system comes to I/O ATTENTION. When the current volume is unloaded, the operator should mount the next volume on this drive and ready it. As soon as it becomes ready, processing continues. If the OCL specified multiple drives for this file and the next volume is not ready, the system comes to I/O ATTENTION. The operator should mount the next volume on the next drive and ready it. Processing continues as soon as the next drive is ready.</li> </ol>

Figure 21 (Part 2 of 2). Clearing I/O ATTENTION

It is necessary to perform the IPL process on the system to start a new job after using the console STOP key to stop a job. If you have DPF, you can cancel the job. (See *Dual Programming Operation, Procedures for Canceling Jobs.*)

#### USING THE MACHINE COVERS FOR SAFETY

Besides improving appearance, covers of IBM machines have been designed to protect you against possible injury during operation. While some hazards, such as moving mechanical parts, are obvious, others are not. Electrical potential and acoustical noise are in the latter category.

IBM maintains vigorous attention to safety on all its machines. However, the effectiveness of this effort is lessened when you fail to keep the covers closed while the system is running.

Covers have been designed to reduce noise levels to a more comfortable range. Operation with the covers open causes needless exposure to unseen hazards. Because of this, IBM strongly recommends that all people working with the equipment follow the simple safety-first procedure of keeping all covers closed while the system is operating.

The frames of all IBM equipment have been made electrically safe by recommended grounding practices.

In addition to the safety aspects of this procedure, the system runs quieter and looks better.

#### TURNING SYSTEM POWER OFF

When turning system power off, an EJ halt should be displayed in the message display unit. Perform the following procedures to turn system power off:

1. Press console STOP.
2. Set START/STOP switches on the disk panel at STOP.
3. Clear cards from MFCU.
4. Press RESET and UNLOAD REWIND on all tape units.
5. When the OPEN lights on the disk panel are lit and tapes have been rewound, set the console power switch at OFF.

If system power is turned off before the disk panel START/STOP switches are set STOP, perform the following procedures:

1. Set the power switch at ON and wait for the READY lights to turn on.
2. Set START/STOP switches at STOP and wait for the OPEN lights to turn on.
3. Clear cards from MFCU.
4. Set power switch at OFF.



## DUAL PROGRAMMING OPERATION

The Dual Programming Feature (DPF) allows two jobs to execute at the same time within the system. These two jobs are referred to as program 1 and program 2 levels. Jobs can be initiated in either level first. In other words, a job can be loaded into the program 2 level before a job is loaded into the program 1 level. Running jobs under DPF is basically the same as running jobs on System/3 without DPF. The following differences should be noted:

- You select the system input device to be used for each level by using the dual program control switch.
- Press INTERRUPT to initiate the first job for the level, after selecting the input device.
- Press HALT/RESET to recover from programmed halts or to initiate the next job if the same input device for the level is being used.
- If you select a different input device for the level, you must again press INTERRUPT to initiate the job.
- You can use the same input device for both levels only when the first level loaded no longer requires the input device. Halt JP displayed in the DPF message display unit means you are trying to use an input device that is required by the other level.
- Halt JL displayed in the DPF message display unit means that there is not enough room in storage for the job you are trying to load. The PARTITION statement controls the amount of storage available for program 2.
- Contention for the system work area occurs when jobs running in program 1 and program 2 both require the use of the system work area. One program will appear to stop until the other program either finishes or frees up the system work area.

The *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, lists the halts and the procedures you must take to recover from the halts.

### Procedures

The following general procedures tell you how to run programs if you have DPF:

1. Follow the steps under *Preparing the System for Program Operation* in this chapter to perform IPL. After performing IPL, the EJ halt appears on both DPF message display units.

2. Set dual program control switch on DPF panel to appropriate input device for level you are going to load first (program 1 or program 2). Be sure you supply a DATE statement in front of the first job to be loaded after performing IPL. The system expects the input from the device you selected. If the MFCU is the device, have the cards in the specified hoppers. If the printer-keyboard is the device, be ready to key-in the information. If the 3741 is the device, put it online.
3. Press INTERRUPT on DPF panel. The job is loaded and execution begins. If the printer-keyboard is the input device, you must key the job.
4. Set dual program control switch on DPF panel to the input device to be used for other program level. Remember, if one level is using an input device, the other level cannot use that device until the first level no longer requires it.
5. Press INTERRUPT on the DPF panel. The job is loaded and execution begins.
6. When a job in one of the levels (program 1 or program 2) is complete, an EJ halt is displayed on the DPF message display unit for that level if in halt mode. If the next job for that level uses the same input device as the preceding job, press HALT/RESET on the DPF panel to load the next job. If you are going to use a different device, repeat steps 2 and 3.
7. Repeat step 6 for the other level when EJ halt occurs.
8. Repeat steps 6 and 7 until there are no more jobs to be run.

While jobs are running, program halts can occur for both levels. See *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, for recovery procedures when program halts occur. If program halts occur for both levels at the same time, handle them one at a time according to the procedures in *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540. See *Chapter 11. Program Operation* for information on running individual programs.

*Note:* I/O ATTENTION for one level can cause the other level to stop if the other level requires the transient area of the supervisor.



## OPERATION CONTROL LANGUAGE (OCL) CONSIDERATIONS

Every program that you run has certain statements in front of the deck called OCL (operation control language) statements. OCL provides the system the information about the job to be run (what program to use, what files to use, what input/output devices to use, etc). It is a good idea to examine these statements because some of them require action from you. OCL statements used by a program should be listed on the program run sheet. Never change the order of the OCL statements. For more information on OCL, see *IBM System/3 Model 10 Disk System Control Programming Reference Manual*, GC21-7512.

### // DATE Statement

This card must always be the first statement supplied to the system after IPL. Each time the IPL process is performed, the system expects a DATE statement. The date supplied is used as the system date. Place it in the system input device (normally the primary hopper of the MFCU) ahead of the set of statements of the first job. If you have DPF, the DATE statement must be supplied with the program you load first. Do not provide a DATE statement for the other program.

### // READER Statement

The READER statement identifies the system input device. Any statements that follow the READER statement must be supplied to the system via the new system input device. The READER statement should be preceded by a /& statement.

If the system input device is the 5471 Printer-Keyboard, the keyed input will be preceded by a blank, 1, or 2. These characters provide the following information:

Blank	Dedicated system.
1	DPF. Program level 1 has initiated the input request.
2	DPF. Program level 2 has initiated the input request.

### // LOG Statement

If your system has a printer-keyboard, OCL statements and error codes are printed by the printer-keyboard; otherwise, the statements and error codes are printed on the printer. The LOG statement can tell the system to do one of the following:

- Use the printer as the logging device.
- Use the printer-keyboard as the logging device.
- Stop printing OCL statements and error codes.
- Start printing OCL statements and error codes.
- Stop or resume page ejects at end of job.

The logging device is turned on when you perform IPL. If your system has DPF, the following should be noted:

- The logging device will be off if LOG statements for *either* level (program 1 or program 2) specify that it be off.
- LOG statements for both program 1 and program 2 must state that the logging device be on before it can be used for logging.
- Only LOG statements for program 1 can tell the system to use a different logging device.
- When the printer is the logging device, OCL statements and error codes are not printed if *either* program 1 or program 2 are using the printer for other output.

If the logging device is the 5471 Printer-Keyboard, the logged output is preceded by a blank, 1, or 2. These characters provide the following information:

Blank	Dedicated system.
1	DPF. Program level 1 has initiated the log request.
2	DPF. Program level 2 has initiated the log request.

At end-of-job, the characters EJ preceded by a blank, 1, or 2 are logged if the 5471 Printer-Keyboard is the logging device.

### // LOAD Statement

This statement identifies the program to be run and indicates whether the program will be loaded from the system input device or disk.

## RPG II PROGRAM

*Note:* If you are using the 1442 instead of the MFCU see *Using the 1442 as the Only Card Input Device* in Chapter 10. *System Operation.*

This section lists the steps required to compile and execute an RPG II program. *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, lists compilation halts and object program execution halts.

### Compilation

The procedures for compiling an RPG II source program are:

1. Mount any disk cartridges specified on program run sheet, and ready disks.
2. Clear all cards from the MFCU by pressing NPRO twice.
3. Place OCL statements source program deck in the primary hopper (see Figures 23 and 24). Load cards facedown, top edge to the left. A source program deck may not be given to you if a // COMPILER statement is supplied in the OCL for the program. The COMPILER statement tells the system where the

source program is located (on disk or cards) and where to place the object program. When the source program is on disk, you will not be given a source program deck. This is all that is needed for diagnostics-only run.

4. If an object deck is to be punched, place blank cards in the secondary hopper. Load cards facedown top edge to the left.
5. Press MFCU START. PRIMARY READY and SECONDARY READY lights turn on.
6. Ready printer.
7. Press console START (or appropriate HALT/RESET key if you have DPF).

During compilation, a number of halts can occur. Check the list of program halts in *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, for recovery procedures.

EJ in the Message Display Unit indicates the end of compilation, or the end of a diagnostics-only run. Clear the MFCU according to the type of run just completed (see following methods). Always clear the primary hopper first.

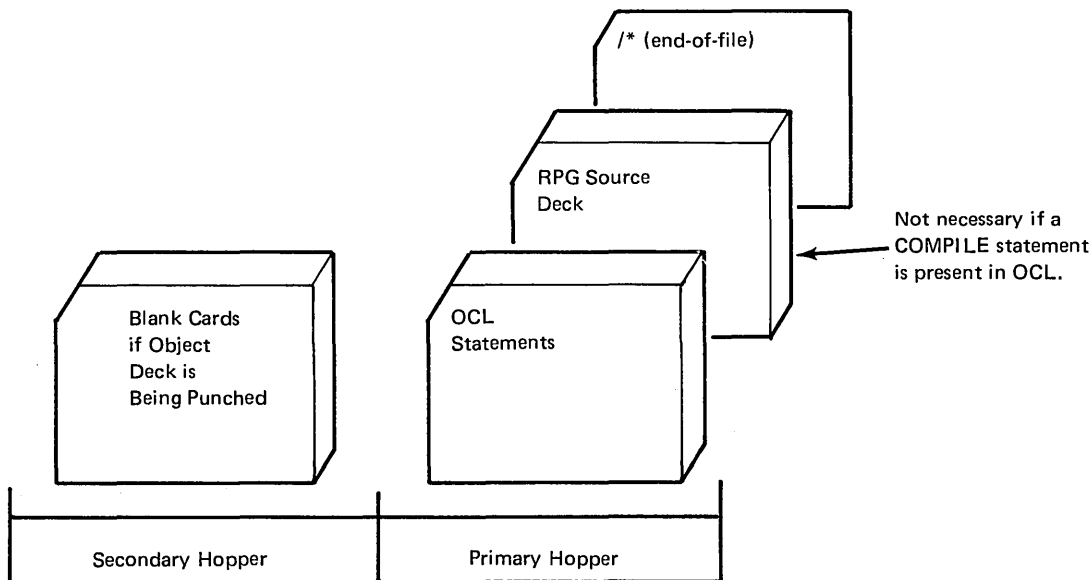


Figure 23. RPG II Input

### *Clearing the MFCU After a Successful Compilation*

1. Press MFCU STOP.
2. Press NPRO to feed source deck end-of-file card into stacker 1.
3. Remove source deck from stacker 1.
4. If an object deck was punched, it will be in stacker 3. Use these cards for the execution portion of the RPG II program.
5. Remove blank cards from secondary hopper.
6. Press NPRO.
7. Remove blank card from stacker 1.

### *Clearing the MFCU After a Diagnostic-Only Run*

1. Press MFCU STOP.
2. Press NPRO to feed source deck end-of-file card into stacker 1.
3. Remove source deck from stacker 1.

### **Object Program Execution**

1. Mount disk cartridge specified on program run sheet, and ready disks.
2. Clear cards from MFCU.
3. Place OCL statement in primary hopper. Load cards face down, top edge to the left. If an object deck was punched, place it in the primary hopper of the MFCU.
4. If required, place object tables and data cards (Figure 25) in the hopper designated on program run sheet.
5. Press MFCU START. The PRIMARY READY light will come on. If any cards are in the secondary hopper, SECONDARY READY will come on.
6. Ready printer. If special forms are required, load them in the printer.
7. Ready tape units if required by the program.
8. Press console START (or appropriate HALT/RESET key if you have DPF).

During object program execution, a number of halts can occur. H1-H9 halts indicate that instructions for running this program are provided on the program run sheet or printer listing. A 1P halt means the forms in the printer need positioning. H1-H9 and 1P halts can occur only if the programmer specified them in the source program. All object program halts are included in the list of program halts in *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540.

EJ in the message display unit indicates a successful program execution.

### Executing an RPG II I-Type Program

RPG II I-Type programs are loaded into storage and remain there to be used as needed. I-Type programs can only be executed by an inquiry request (pressing REQ on the printer-keyboard). An I-Type program cannot be interrupted and placed on disk. I-Type programs can be used most efficiently with a DPF system, however, they can also be used on a dedicated (non-DPF) system. I-Type programs can also be loaded into storage after interrupting an RPG II object program. For information on executing I-Type programs after interrupting RPG II object programs, see *Interrupting an RPG II Object Program*.

The execution of an I-Type program depends on the input device being used.

#### *Execution of an I-Type Program Using the MFCU, 1442, or 3741*

1. Mount disk cartridge specified on program run sheet and ready disks.
2. Clear cards from reader or remove diskette.
3. Place OCL statements and data cards in hopper or insert diskette and place 3741 online.

*Note:* The OCL statements may be keyed using the printer-keyboard. This will be indicated on the program run sheet when you have to do this. The data cards will still be placed in the hopper or data records may reside on diskette.

4. Press START on the reader if using cards, or place the 3741 in read mode.
5. Press console START, or appropriate HALT/RESET key if you have DPF. The OCL statements are read and the I-Type program is loaded into storage.
6. Press REQ on printer-keyboard. The data records are read and the I-Type program is executed. EJ is displayed in the message display unit when the job is complete. If any other halts occur, see *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540 for recovery procedures.

*Note:* Additional 3741 information is in *IBM System/3 3741 Reference Manual*, GC21-5113.

#### *Execution of an I-Type Program Using the Printer-Keybord*

1. Mount disk cartridge specified on the program run sheet and ready disks.
2. Key OCL statements using the printer-keyboard.

*Note:* The OCL statements can be on cards or on a diskette. The program run sheet will indicate where the OCL statements are. If they are on cards, place the OCL statements into the required hopper and press the START key on the reader. If you have DPF, press console START or the appropriate HALT/RESET key. If the OCL statements are on a diskette, insert the diskette, select the correct data set, and place the 3741 online.

3. Press REQ on printer-keyboard. PROCEED light turns on.
4. Key data record using printer-keyboard. The data record is processed and then the I-Type program goes into a wait state. It is waiting for the next data record to be processed.
5. Press REQ on printer-keyboard. PROCEED light turns on.
6. Key next data record when desired. The data record is processed and, again, the I-Type program goes into a wait state.
7. Repeat steps 5 and 6 for each data record to be processed.
8. When no more data records are to be processed, press REQ on printer-keyboard and key /\*. EJ is then displayed in the message display unit. If other halts occur, see *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540

#### **Interrupting an RPG II Object Program**

RPG II object programs can be interrupted provided the job being executed allows interrupts and you have a printer-keyboard to initiate the interrupt. When the interrupt is initiated, the job in storage is placed on disk. A new job can then be loaded into storage and executed. The program run sheet will indicate when you have to interrupt an RPG II object program.

19. When the PROCEED light comes on, key OCL for new job via the printer-keyboard. You may only have to key a READER statement for the MFCU, 3741, or 1442 if the OCL for the new job is on cards or a diskette. In this case, key-in the READER statement and make sure the OCL for the job is in front of any data records. If an I-Type program is being loaded (determine this by checking the program run sheet) and the printer-keyboard is being used as the input device, the following must be done after keying the OCL statements and the first data record:
- Press REQ on the printer-keyboard. The PROCEED light turns on.
  - Key next data record.
  - Repeat steps a and b for each data record, including the end-of-file (/\*) statement.

The new job is loaded and halt '5 occurs. This halt allows you to continue with or cancel the job.

20. Set rightmost ADDRESS/DATA switch at 0 to allow the job to execute or set rightmost ADDRESS/DATA switch at 3 to cancel the job.
21. Press console START (or appropriate HALT/RESET key if you have DPF). If you cancelled the job, go to step 24.

The job begins execution. When the job is complete, halt J' is displayed in the message display unit. You must now restore the conditions that existed before the RPG II job was interrupted.

If either the 1442 or the MFCU was used by the interrupting job, you must prepare both devices for card repositioning. If neither device was used and the cards were left in the machines, proceed to step 25.

If the 3741 was used by the interrupting job, refer to the *IBM System/3 3741 Reference Manual*, GC21-5113.

22. Clear cards from MFCU and/or the 1442.
23. Remove cards from stacker.
24. If any cards for the interrupted program were removed from the machines, replace them in the - appropriate hoppers of the MFCU and/or the 1442.
25. Press MFCU START or 1442 START, or ready the 3741 by placing it online.
26. Remount disk cartridge used by the interrupted job and ready disks.
27. Ready printer.
28. Set rightmost ADDRESS/DATA switch at 0 if card repositioning is needed; set at 1 if card repositioning is not needed.
29. Press console START (or appropriate HALT/RESET key if you have DPF) to continue operation of the interrupted job. If the J' halt occurs again, you may have mounted the wrong cartridge. After you have checked that the correct cartridge is mounted, set the rightmost address/data switch at 0 and press console START (or appropriate HALT/RESET key if you have DPF).

If any other halts occur during this operation, refer to the *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, for recovery procedures.

A schedule must be established to ensure that each BSCA station loads its program at the correct time. On a leased network, the receiving station must start first. On a multi-point network, the System/3 terminal must start first. These programs will wait; a transmit program will not wait for the receiving program to be started. On a switched network, the answering terminal must be ready first.

#### *Nonswitched Networks*

1. Mount disk cartridges and tape reels specified on program run sheet and ready disk and tape units.
2. Clear cards from MFCU.
3. Remove cards from stackers.
4. Place OCL statements, object deck (if any), and data cards (if any) in hoppers as specified on program run sheet.
5. Press MFCU START. PRIMARY READY LIGHT turns on. If there are any cards in the secondary hopper, the SECONDARY READY light turns on.
6. Ready printer.
7. Press console START, or appropriate HALT/RESET key if you have DPF. The programs are loaded and transfer of data occurs. Transmission is complete when EJ is displayed in the message display unit.

#### *Switched Networks*

The procedures you perform when your system is on a switched network depends on whether you are initiating the call and whether the initiation of the call is being made manually or automatically.

#### *Initiating a Call Manually*

1. Mount disk cartridges and tape reels specified on program run sheet and ready disk and tape units.
2. Clear cards from MFCU.
3. Remove cards from stacker.

4. Place OCL statements, object deck (if any), and data cards (if any) in hoppers as specified on program run sheet.
5. Press MFCU START. PRIMARY READY light turns on. If there are any cards in the secondary hopper, the SECONDARY READY light turns on.
6. Ready printer.
7. Press console START, or appropriate HALT/RESET key if you have DPF. The program is loaded and execution begins.
8. When halt Y7 occurs, do the following:
  - a. Press TALK on DATA-PHONE.
  - b. Set rightmost ADDRESS/DATA switch at 0.
  - c. Press console START, or appropriate HALT/RESET key if you have DPF.
  - d. Wait for I/O ATTENTION and BSCA ATTN lights to turn on.
  - e. Pick up receiver and dial digits in proper sequence.
  - f. Verbally communicate with the operator on the other system, or if AUTO is pressed on the DATA-PHONE of the other system, wait for a high-pitch tone.
  - g. Press DATA on your DATA-PHONE.
  - h. Place receiver back on DATA-PHONE.

#### *Initiating a Call Automatically*

1. Mount disk cartridges and tape reels specified on program run sheet and ready disks and tape units.
2. Press AUTO on DATA-PHONE.
3. Clear cards from MFCU.
4. Remove cards from stackers.
5. Place OCL statements, object deck (if any), and data cards (if any) in hoppers as specified on program run sheet.
6. Press MFCU START. PRIMARY READY light turns on. If there are any cards in the secondary hopper, the SECONDARY READY light turns on.



The system LOG must be ON when the Device Counter Logout program is run or the program will go to end of job. The contents of the counters will be displayed on the device assigned as the system LOG.

2. Press MFCU START.
3. Ready the system LOG device.
4. Press console START (or appropriate HALT/RESET key if you have DPF). The device counters will be printed in the following format:

*Operating Procedure*

1. Place the following OCL cards in the MFCU primary hopper.

```
// LOG ON
// LOAD $$BSDL,F1 (Use R1 if your system pack
is mounted there.)
// RUN
```

BSCA LOG mm/dd/yy

ADAPTER 1

```
*****
COUNTER DESCRIPTION          TOTAL      LAST JOB
*****

TEXT BLOCKS SENT             nnnn      nnnn
TEXT BLOCKS RECEIVED         nnnn      nnnn
NAKS RECEIVED                 nnnn      nnnn
DATA CHECKS                   nnnn      nnnn
FORWARD ABORTS                nnnn      nnnn
ABORTS                         nnnn      nnnn
ADAPTER CHECKS ON TRANSMIT    nnnn      nnnn
ADAPTER CHECKS ON RECEIVE     nnnn      nnnn
INVALID REPLIES               nnnn      nnnn
ENQS RECEIVED                 nnnn      nnnn
LOST DATA COUNT              nnnn      nnnn
DISCONNECT TIMEOUTS          nnnn      nnnn
TIMEOUTS DURING RECEIVE DATA nnnn      nnnn
```

```
*****
TERMINAL      UNSUCCESSFUL      SUCCESSFUL
ADDRESS      I/O OPERATIONS    I/O OPERATIONS
*****
```

```
Address 1          nnnn      nnnn
Address 2          nnnn      nnnn
Address 3          nnnn      nnnn
Address 4          nnnn      nnnn
Address 5          nnnn      nnnn
Address 6          nnnn      nnnn
Address 7          nnnn      nnnn
Address 8          nnnn      nnnn
Address 9          nnnn      nnnn
Address 10         nnnn      nnnn
```

- ABORTS** – Number of times a remote terminal has terminated transmission abnormally while receiving data.
- ADAPTER CHECKS ON TRANSMIT** – Number of times the following errors occurred while the terminal was transmitting data:
  1. Parity check within the adapter.
  2. Cycle steal overrun.
  3. Local store register or control register check.
- ADAPTER CHECKS ON RECEIVE** – Number of times the following errors occurred while the terminal was receiving data:
  1. Parity check within the adapter.
  2. Cycle steal overrun.
  3. Local store register or control register check.
- INVALID REPLIES** – Number of abnormal responses (including no responses) from the remote terminal.
- ENQ'S RECEIVED** – Number of requests for retransmission of this terminal's last acknowledgement after the acknowledgement has already been sent.
- LOST DATA COUNT** – Number of text blocks received which do not fit into the receive area.
- DISCONNECT TIMEOUTS** – Number of times the data set has dropped ready status after that status was set on.
- TIMEOUTS DURING RECEIVE DATA** – Number of times this terminal expected to receive text but did not receive anything for 3.25 seconds.

#### **CARD UTILITIES**

The procedures in this section are for the following card utilities:

1. 96-List
2. 96-96 Reproduce and Interpret
3. MFCU Sort/Collate
4. Data Recording
5. Data Verifying
6. Gangpunch

10. Press console START (or appropriate HALT/RESET key if you have DPF).
11. System halts with EJ in the message display unit. Clear cards from MFCU.

#### Restart Procedure

1. Set rightmost ADDRESS/DATA switch at 1.
2. Press console START (or appropriate HALT/RESET key if you have DPF). The message display unit changes to CU.
3. Place cards needed for this run in primary hopper of MFCU—if they are not already there—and ready MFCU.
4. Repeat operating procedure starting at step 7.

#### 96-96 REPRODUCE AND INTERPRET PROGRAM

1. Mount proper disk cartridge if specified on program run sheet and ready disks.
2. Clear cards from MFCU.
3. Place OCL statements, followed by cards required for the job, in primary hopper of MFCU. Load cards face down, top edge to the left. Be sure two end-of-file (/\*) cards are at the end of the deck. Several reproduce and interpret jobs can be placed in the MFCU at the same time. Place the cards in the order shown in Figures 27 and 28. Each deck, however, must be followed by two end-of-file cards.
4. Place blank cards in secondary hopper.
5. Press MFCU START. The PRIMARY READY light and the SECONDARY READY light will turn on.
6. Press console START (or appropriate HALT/RESET key if you have DPF). After the program is loaded, the system halts with CU displayed in the message display unit. If CU is not displayed, check the list of program halts in the *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540.

7. Set rightmost ADDRESS/DATA switch on console to select program option you want to run, as indicated on the program run sheet:

- Read and interpret (print as punched) 0
- Reproduce (punch a new card deck) 1
- Reproduce and interpret (punch and print on cards) 2
- Reproduce with reformatting 3
- Reproduce and interpret with reformatting 4

Any switch setting other than 0 through 4 selects the reproduce and interpret option (same as 2).

8. Press console START (or appropriate HALT/RESET key if you have DPF). The selected program option is performed. Cards from the primary hopper go to stacker 1 (nearest the hoppers). Cards from the secondary hopper go to stacker 4. If any reformat data cards are present, they go to stacker 2. When two consecutive end-of-file (/\*) cards are read, the system halts with 52 in the message display unit.
9. If there are no more reproduce and interpret jobs to run, set the rightmost ADDRESS/DATA switch at 2. If more reproduce and interpret jobs are to be run, follow the steps under *Restart Procedure*.
10. Press console START (or appropriate HALT/RESET key if you have DPF).
11. When system halts with EJ in the message display unit, clear cards from MFCU.

#### Restart Procedure

1. Set rightmost ADDRESS/DATA switch at 1.
2. Press console START (or appropriate HALT/RESET key if you have DPF). The message display unit changes to CU.
3. Place cards needed for this run in proper hoppers of MFCU—if they are not already there—and ready MFCU.
4. Repeat operating procedure starting at step 7.

**Reformat Data Card**

If reformatting is needed, reformat data cards must be punched to indicate the format of the new deck.

A reformat unit of six card columns is required to reformat a field. Up to 100 reformat units can be used. (A field is one or more columns on a card that contains the same or related information.) Several reformat units may be placed on one card or each unit can be placed on a separate card.

Figure 29 shows the format of a reformat data card. When reformatting is specified, all cards are reformatted except those with a /\* in columns 1 and 2; these cards are reproduced in their original format.

1	2	3	4	5	6	7	8	9	10
0	1	0	4	0	8				
a	a	b	b	c	c				
These six columns make one reformat unit									
A field beginning in column 01 (aa)		and ending in column 04 (bb) is being reproduced.				It will be reformatted so that in the new deck it will end in column 08 (cc). Therefore, the reformatted field will begin in column 05 in the new deck.			

Figure 29. Reformat Data Card Format

*Examples*

**Moving Fields:** In this example, we want to switch fields 1 and 2. The deck to be reformatted is:

Card Column 1 2 3 4 5 6 7 8 9 10 11 12  
F I E L D 2 F I E L D 1

The reformat data card that will cause Fields 1 and 2 to be switched in the new deck is shown in Figure 30. The format of the new deck is:

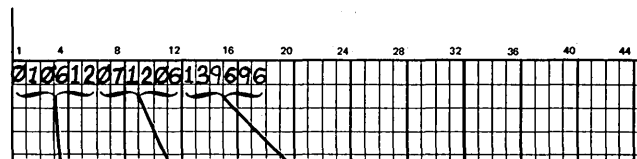
Card Column 1 2 3 4 5 6 7 8 9 10 11 12  
F I E L D 1 F I E L D 2

**Deleting a Field:** In this example, we want to delete Field 6. The deck to be reformatted is:

Card  
Column 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68  
F I E L D 5 F I E L D 6 F I E L D 7

The reformat data card needed to punch a deck that does not contain Field 6 is shown in Figure 31. Columns 57-62 (Field 6) are not punched on the new cards because these columns are not included in the reformat data card. The format of the new deck is:

Card  
Column 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68  
F I E L D 5 F I E L D 7



The field from columns 1-6 is punched in columns 7-12 in the new cards.  
The field from columns 7-12 is punched in columns 1-6 in the new cards.  
The remainder of the data fields are punched in their original position in the new cards.

Figure 30. Reformat Data Card: Moving Fields

## MFCU SORT/COLLATE PROGRAM

The following steps are required for all sort/collate jobs.

1. Mount disk cartridge if specified on program run sheet, and ready disks.
2. Clear cards from MFCU.
3. Place OCL cards in primary hopper of MFCU. Load cards face down, top edge to the left.
4. Place sort specification cards in secondary hopper of MFCU. Figure 32 shows the input for sort/collate without alternate collating. Figure 33 shows the input for sort/collate with alternate collating.
5. Press MFCU START. PRIMARY READY and SECONDARY READY lights will turn on.
6. Ready printer.
7. Press console START (or appropriate HALT/RESET key if you have DPF) to load the program. When the program is loaded, it reads specifications cards and lists them on the logging device.

The system halts with one of the following values displayed in the message display unit:

- EE (ready to go halt). This halt signifies that the program is successfully loaded. Read the operating procedure for the job you are doing for further instructions.
- EL (conditional halt). Check message on logging device to determine cause (all sort/collate messages are described in *Appendix B*). Set rightmost ADDRESS/DATA switch to 0 and press console START (or appropriate HALT/RESET key if you have DPF) to continue. The message display unit changes to EE. Read the operating procedure for the job you are doing for further instructions.
- EA (terminal halt). This halt indicates that something is wrong with the specification deck. Check printout to determine the cause of the error. Set rightmost ADDRESS/DATA switch at 3 and press console START (or appropriate HALT/RESET key if you have DPF) to cancel the job. The sort/collate program must be reloaded after the error is corrected. If the message display unit contains a display other than EE, EL, or EA, check the list of program halts in the *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540.

## Sort Operating Procedure

A complete file can be sorted or a file can be sorted after selected card types are removed. The first method is a simple sort; the second is a sort with omits.

### Sort (No Omits):

1. Clear cards from MFCU.
2. Divide card deck to be sorted. Place approximately one half of the card deck in the primary hopper of the MFCU and place the remaining cards in the secondary hopper.
3. Ensure that an end-of-file (/\*) card (if one is not there) is placed behind cards in each hopper. (Have two extra end-of-file cards available. These cards will save you time in the next pass of the program.)
4. Press MFCU START. The PRIMARY READY and SECONDARY READY lights turn on.
5. Set rightmost ADDRESS/DATA switch at 0.
6. Press console START (or appropriate HALT/RESET key if you have DPF).
7. Cards are read in from both hoppers and selected into all four stackers. If a stacker fills before the hoppers empty, take cards from stacker and place them in bin above stacker. Press MFCU START to continue.
8. When the pass is completed, the system halts with EP in the message display unit. A message indicating the number of passes remaining to complete the sort is printed on the logging device.
9. Place cards from stacker 1 and stacker 2 (in that order) in the primary hopper (Figure 34). Place cards (if any) from the stacker-1 bin in the primary hopper before the cards in stacker 1. The same procedure applies for stacker 2.
10. Place cards from stacker 3 and stacker 4 (in that order) in the secondary hopper (Figure 34). Before you place cards from stacker 3 in the secondary hopper, place the cards in the stacker-3 bin, if any, in the secondary hopper. The same procedure applies for stacker 4.
11. Place end-of-file cards behind decks in both hoppers.
12. Press MFCU START.
13. Set rightmost ADDRESS/DATA switch at 0.
14. Press console START (or appropriate HALT/RESET key if you have DPF).
15. The second pass of the sort is run and the system again halts with EP in the message display unit. Remove end-of-file cards from under the cards in stackers 1 and 3. You will use these cards in the next pass.
16. Repeat steps 9-15 until all cards are routed into stacker 1 (the end-of-file card from the secondary hopper will be in stacker 3). At this time, the system halts with EJ in the message display unit. Press MFCU NPRO key twice to run end-of-file cards out of unit. The sort is completed.

*Note:* If a halt other than EP or EJ occurs during the sort run, check list of program halts in the *IBM System/3 Model 10 Disk System Halt Guide, GC21-7540*.

*Note:* If you forget to remove one of the end-of-file cards (/\*) from under the cards in one of the stackers (step 15), you can save yourself an extra pass by performing the following:

1. Remove end-of-file cards from behind cards in both hoppers and let the pass continue.
2. Wait for I/O ATTENTION. One hopper is empty and the other hopper has cards in it. The cards remaining in the hopper are there because the system has read the misplaced end-of-file card and does not expect any more cards from that hopper, but is looking for more cards from the empty hopper.
3. Remove remaining cards from hopper and place them in empty hopper.
4. Place end-of-file card after cards in hopper.
5. Press MFCU START. The pass continues.

*Sort (With Omits):*

1. Clear cards from MFCU.
2. Divide card deck to be sorted. Place approximately one half of the card deck in the primary hopper of the MFCU and place the remaining cards in the secondary hopper.
3. Place an end-of-file (/\*) card (if one is not there) behind cards in each hopper. (Have two extra end-of-file cards available. These cards will save you time in the next pass of the program.)
4. Press MFCU START. PRIMARY READY and SECONDARY READY lights turn on.
5. Set rightmost ADDRESS/DATA switch at 0.
6. Press console START (or appropriate HALT/RESET key if you have DPF).
7. Cards are read from both hoppers and selected into all four stackers.  
  
If a stacker fills before hoppers empty, take cards from the stacker and place them in bin above stacker. Press MFCU START to continue.
8. When the pass is completed, the system halts with E0 in the message display unit. A message indicating the number of passes remaining to complete the sort is printed on the logging device.
9. Take cards from stackers 2 and 4 and set them aside. These are the omitted cards.
10. Place any cards in bin above stacker 1 in primary hopper, then place cards from stacker 1 in primary hopper.
11. Place cards from stacker 3 in secondary hopper.
12. Place end-of-file cards behind decks in both hoppers.
13. Press MFCU START.
14. Set rightmost ADDRESS/DATA switch at 0.
15. Press console START (or appropriate HALT/RESET key if you have DPF).
16. The second pass of the sort is run and the system halts with EP in the message display unit. Remove end-of-file cards from under the cards in stackers 1 and 3. You will use these cards in the next pass.
17. Do steps 8-16 of the Sort (No Omits) procedure.

*Note:* If you forget to remove one of the end-of-file (/\*) cards from under the cards in one of the stackers (step 16), you can save yourself an extra pass by doing the following:

1. Remove end-of-file cards from behind cards in both hoppers and let the pass continue.
2. Wait for I/O ATTENTION. One hopper is empty and the other hopper has cards in it. The cards remaining in the hopper are there because the system has read the misplaced end-of-file card and does not expect any more cards from that hopper, but is looking for more cards from the empty hopper.
3. Remove remaining cards from hopper and place them in empty hopper.
4. Place end-of-file card after cards in hopper.
5. Press MFCU START. The pass continues.

## DATA RECORDING PROGRAM

The data recording program enables you to use System/3 for recording data in punched cards, using the IBM 5475 Data Entry Keyboard. The following procedure is used for loading the data recording program into storage, allowing the data entry keyboard to be used for data recording. For more information on the data recording program and the data entry keyboard, see the *IBM System/3 Sort/Collate and Card Utilities Reference Manual, SC21-7529*.

### Program Load Procedure

1. Mount disk cartridge as specified on Program Run Sheet, if any, and ready disks.
2. Remove cards from both hoppers of MFCU.
3. Clear cards from MFCU.
4. Remove any cards from stackers.
5. Place OCL statements in primary hopper of MFCU. Load cards face down, top edge to the left.
6. Place cards to be punched in secondary hopper of MFCU. Load cards face down, top edge to the left.
7. Press MFCU START. PRIMARY READY and SECONDARY READY lights turn on.
8. Press console START (or appropriate HALT/RESET key if you have DPF).
9. When the column indicator on the keyboard panel comes on, showing 01, the program has been loaded. (If 01 does not light, check to make sure there are cards in the secondary hopper.)
10. When the column indicator shows 01, press MFCU STOP.
11. Press NPRO on the MFCU control panel once. (This removes the last card fed and stacks it in stacker 1.)
12. Press MFCU START. Data recording can now begin, unless program control cards are to be used.

A program control card causes specified functions to be performed automatically and must be loaded into storage before data recording can begin. For more information on the program control card and how to load it, see the *IBM System/3 Sort/Collate and Card Utilities Reference Manual, SC21-7529*.



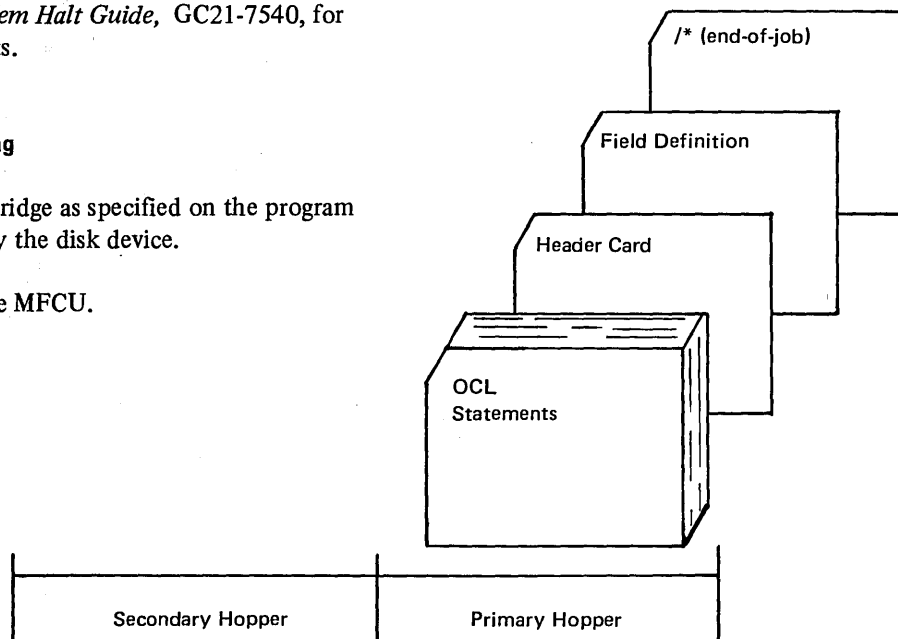
### Count-Controlled Gangpunching

1. Mount the disk cartridge specified on the program run sheet and ready the disk device.
2. Clear cards from the MFCU.
3. Place the OCL statements and the gangpunch control statements in the MFCU primary hopper in the following order (see Figure 35):
  - OCL statements
  - Header control statement
  - Field definition control statement
  - /\* card
4. Place the master cards, followed by two /\* cards, in the MFCU secondary hopper.
5. Place the detail cards, followed by two /\* cards, in the MFCU primary hopper. (This may be the same as the system input device.)
6. Start the card MFCU.
7. Ready the printer.
8. Press console START (or appropriate HALT/RESET key if you have DPF) to load program. When the program is loaded, it reads specifications cards and lists them on the logging device. See *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, for explanations of halts.

### Match Field Gangpunching

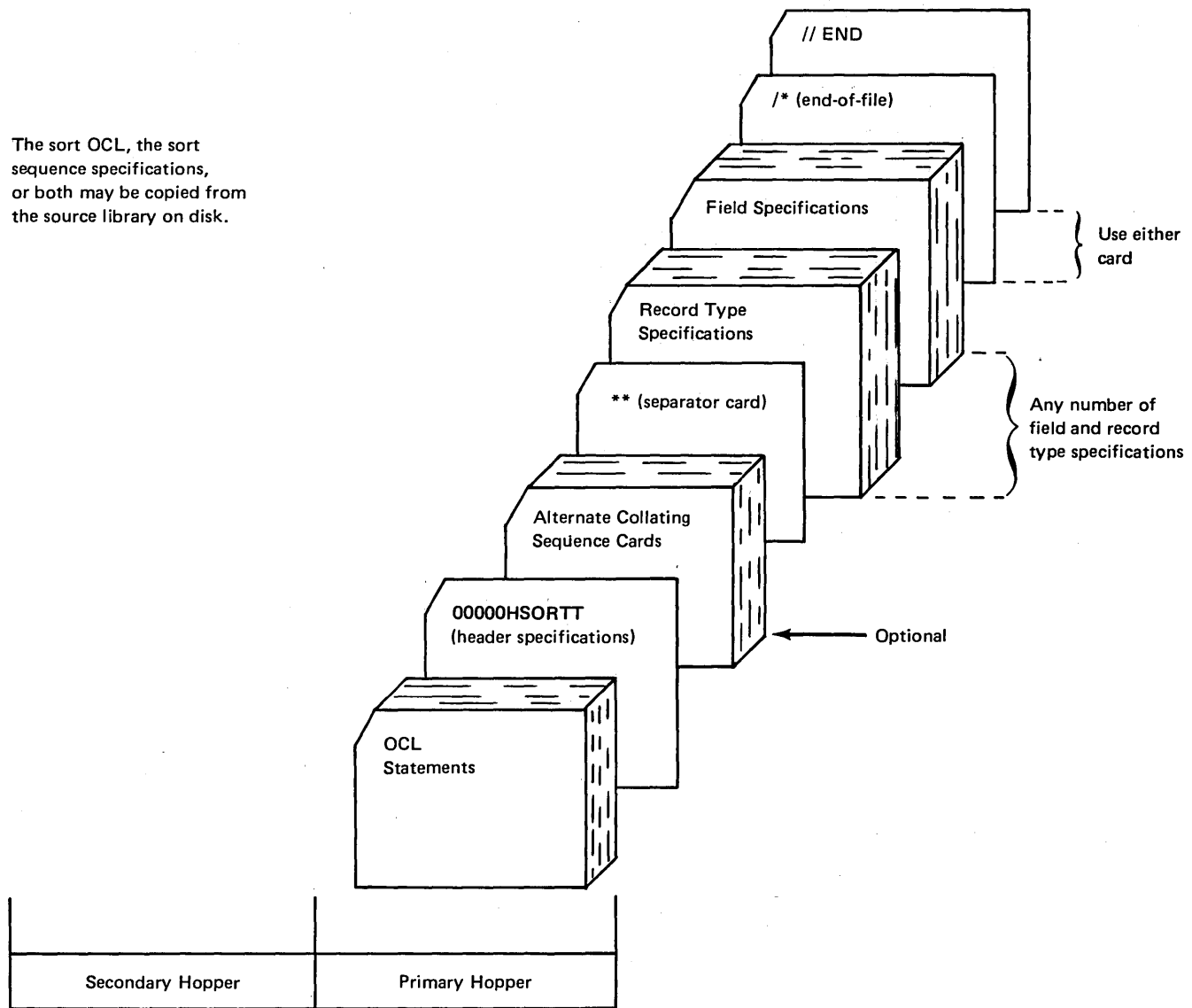
1. Mount the disk cartridge as specified on the program run sheet, and ready the disk device.
2. Clear cards from the MFCU.

3. Place OCL statements and gangpunch control statements in the MFCU primary hopper in the following order (see Figure 35):
  - OCL statements
  - Header control statement
  - Field definition control statement
  - /\* card
4. Place the master cards, followed by two /\* cards in the MFCU secondary hopper.
5. Place the detail cards, followed by two /\* cards, in the MFCU primary hopper. (This may be the same as the system input device.)
6. Start the MFCU.
7. Ready the printer.
8. Press console START (or appropriate HALT/RESET key if you have DPF) to load program. When the program is loaded, it reads specifications cards and lists them on the logging device. See *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, for explanations of halts.



• Figure 35. Input for Gangpunch Program

The sort OCL, the sort sequence specifications, or both may be copied from the source library on disk.



The sort specifications are on cards and follow the OCL statements.

Figure 37. Possible Input for Tape Sort

### Execution of a Basic Assembler Object Program

1. Clear cards from MFCU.
2. Place punched absolute loader cards and object deck (Figure 39) in primary hopper of MFCU. Load cards face down, top edge to the left.
3. Press MFCU START. PRIMARY READY light turns on. If cards are in the secondary hopper, the SECONDARY READY turns on.
4. Ready printer.
5. Set program load selector at MFCU.
6. Press console PROGRAM LOAD. The object program is loaded and execution begins.
7. Perform the IPL process after execution of the Basic Assembly object program is complete.

During the execution of the object program, halts can occur. These halts are not necessarily related to the halts described in the *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, because the programmer can use any halts desired. Also, the halt indicating that the object program is complete does not have to be EJ. The program run sheet, supplied to you by the programmer, indicates the halts that will occur and the action you should take.

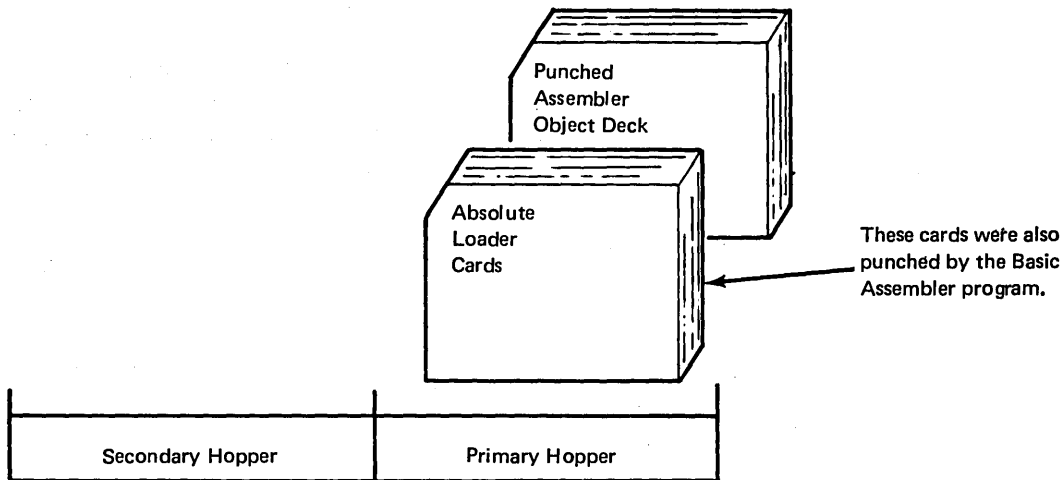


Figure 39. Input for Basic Assembler Object Program Execution

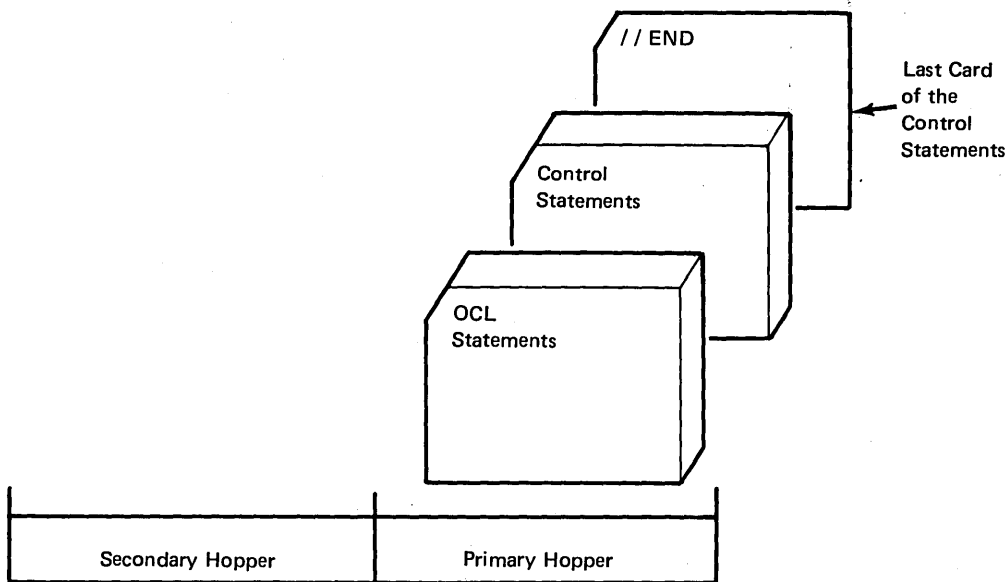


Figure 40. Input for All Utility Programs

*Operating Procedures for Disk Copy/Dump Utility Program*

Operating procedures for disk copy/dump are the same as for the other utility programs except when you have to mount several different cartridges on the same drive during the running of the program. The program run sheet indicates when this type of disk copy/dump program will be run.

1. Mount disk cartridge if specified on program run sheet, and ready disks.
  2. Clear cards from reader.
  3. Place OCL statements and control statements in the reader (primary hopper of the MFCU).
  4. Press reader START. PRIMARY READY comes on on the MFCU; READY on the 1442.
  5. Ready the printer.
  6. Press console START (or appropriate HALT/RESET key if you have DPF).
- For a particular type of disk copy/dump program you will have to mount several different cartridges. Program halts indicate when it is time to do this. This particular form of program works as follows:
1. The preceding steps 1 through 6 have been performed. You have mounted the proper cartridge on R1.
  2. After the program has copied data to the fixed disk, a program halt of 37 will occur. At that time you must mount the cartridge the program is going to copy the data onto. Keep the cartridge you removed handy, you will have to mount it again in step 5.
  3. Set rightmost ADDRESS/DATA switch at 0.
  4. Press console START (or appropriate HALT/RESET key if you have DPF). If you mounted the wrong cartridge, a halt of 38 will occur. To correct this, mount the correct cartridge, set rightmost ADDRESS/DATA switch to 0, and press console START (or appropriate HALT/RESET key if you have DPF).
  5. When the data has been copied, another program halt of 37 will occur. At this time you must remount the cartridge you previously removed.
  6. Set rightmost ADDRESS/DATA switch at 0.
  7. Press console START (or appropriate HALT/RESET key if you have DPF).
  8. Perform steps 2 through 5 as many times as necessary to get all the data copied onto the removable cartridge.
  9. When the utility program is completed, EJ is displayed in the message display unit.

If a permanent error occurs, the following message will be printed at the time of error:

$\left. \begin{array}{l} 1/2 \text{ TRACK} \\ 1 \text{ TRACK} \\ 2 \text{ TRACKS} \end{array} \right\} \text{NOT RESTORED AT } \left\{ \begin{array}{l} \text{CCC/SS} \\ \text{CCC/HH/RR} \end{array} \right.$

At completion of the job the following message will also be printed:

nn TAPE ERRORS OCCURRED. PACK IS NOT COMPLETELY RESTORED.

The copy program prints the following message whether it was a successful copy or a copy with error messages.

COPYPACK IS COMPLETE

If an end-of-job message is not printed, the disk may be unusable.

#### Operating Procedures for Library Maintenance Utility Program

The library maintenance utility program can create, delete, reorganize or change the size of a library, copy data, read from cards to a library (Figure 41), punch data on cards (Figure 42), and print data on the printer from data in a library. The type of library maintenance utility program being run will be indicated on the program run sheet.

The following operating procedures cover the above mentioned possibilities:

1. Mount disk cartridge as specified on program run sheet and ready disks.
2. Clear cards from the reader.
3. Place OCL statements, control statements, and data cards (if any) in the primary hopper of the reader. Place cards face down, top edge to the left.

4. Place blank cards in secondary hopper of MFCU, if specified on the program run sheet.
5. Press reader START. The MFCU PRIMARY READY light (or the 1442 READY light) comes on. SECONDARY READY comes on if cards are in the secondary hopper of the MFCU.
6. Ready the printer.
7. Press console START (or appropriate HALT/RESET key if you have DPF). The utility program performs the functions indicated on the control statements.
8. If punching is to be done from the primary hopper of the MFCU or from the 1442, a CIYH halt will be issued to allow blank cards to be placed in the hopper. When punching is complete, an LM6AIS halt indicates that you are to replace the control statements in the hopper and remove punched cards either from stacker 1 if cards were punched from the primary hopper of the MFCU or from stacker 2 if cards were punched from the 1442.
9. HALT EJ is displayed when the job is completed.
10. Any cards punched from the secondary hopper of the MFCU are deposited in stacker 4. Remove them from the stacker.

If any program halts occur while the utility program is running, see the *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, for recovery procedures.

## DISK RESIDENT TAPE UTILITY PROGRAMS

If your system includes magnetic tape, the following tape utility programs are included in your resident system:

- **Tape Initialization** – prepares tapes for use. Checks labeled tapes for a volume label and unexpired files, writes IBM standard volume labels on them, and displays the volume and header labels.

*Note:* User labels are not checked by System/3 tape data management and cannot be written as part of the label group.

- **Tape Volume Error Statistics** – prints a summary by tape volume and tape unit of certain tape errors. Counters of these errors are recorded on the tracks reserved for the IBM Customer Engineer on disk unit F1.

For complete information about tape utility programs and the related OCL statements and utility control statements, see *IBM System/3 Model 10 Disk System Control Programming Reference Manual*, GC21-7512.

## Operating Procedures

Operating procedures are the same for the two tape utility programs:

1. Mount disk cartridges and tape reels (up to 4 for tape initialization – 1 per tape unit) specified on program run sheet, and ready disks and tape units.
2. Clear cards from MFCU.
3. Place OCL statements and control statements in primary hopper of MFCU (Figure 40).
4. Press MFCU START. The PRIMARY READY light comes on.
5. Ready the printer.
6. Press console START (or appropriate HALT/RESET key if you have DPF). The utility program performs the functions indicated on the control statements. An EJ halt appears on the message display unit when the utility program is completed.

See the *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, for other programmed halts and how to recover from them.

(In order to guarantee the required minimum size for program level 2, a PARTITION statement may be required. Also, to reestablish the log device a LOG statement may be required.)

*Note:* RESTART must not be requested if the program in program level 2 has in use one or more unit record devices or tape drives that were being used by the active checkpointed program.

2. When halt Hb is displayed in the message display unit the logged error code (or subhalt) gives the reason for the halt. You may have:
  - a. Subhalt AC: attempted restart without an active checkpoint.
  - b. Subhalt CS: reserved storage with the PARTITION statement required by the checkpointed program. Proceed to step 11 to cancel.
  - c. Subhalt nn where nn is the number of the requested checkpoint. You may:
    - Cancel, proceed to step 11.
    - Control cancel to delete the active checkpoint and immediate cancel. Proceed to step 11.
    - Check the program run sheet to determine if the checkpoint program was using the MFCU. If the MFCU was not being used, proceed to step 4.
3. Place cards back in appropriate hoppers of the MFCU and press MFCU START.
4. Check the program run sheet to determine if the checkpointed program was using the printer. If the printer was not being used, proceed to step 6.
5. Reposition the paper in the printer to the line that was being printed when the last checkpoint was accepted. To reposition the paper:
  - a. Disengage the carriage clutch.
  - b. Position the forms using the vertical adjustment knob until the crease between the forms is aligned with the upper scribe line on the forms guide.
  - c. Press the CARRIAGE RESTORE key.
  - d. Engage the carriage clutch.
  - e. Press the carriage space key until the paper is at the line at which the checkpoint was accepted.
  - f. If the printer has dual feed carriage feature and two forms were used, both forms must be repositioned. Unequal length forms must maintain the same relative position after repositioning that they had when the checkpoint request was accepted.
  - g. Press printer START.
6. Check the program run sheet to determine if the checkpointed program was using the 1442. If the 1442 was not being used, proceed to step 8.
7. See the program run sheet for 1442 repositioning procedures.
8. Check the program run sheet to determine if the checkpointed program was using the 3741. If the 3741 was not being used, proceed to step 10.
9. Insert the diskette that was being used when the last checkpoint was accepted, position the diskette head at the track/sector address noted, then put the 3741 online.
10. Mount disk cartridges or packs as specified on program run sheet and ready disk drives.
11. Set rightmost ADDRESS/DATA switch at 0 to allow the job to restart, set rightmost ADDRESS/DATA switch at 2 to de-activate checkpoint and immediate cancel, or set rightmost ADDRESS/DATA switch at 3 to cancel the job.
12. Press console START (or appropriate HALT/RESET key if you have DPF). If you cancelled the job, go to step 1.

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System generation must be performed when:

- You first receive System/3.
- You add new devices to System/3.
- Changes to existing programs are extensive enough to merit performing system generation.

Your installation has at least one distribution disk cartridge that contains a system generation program, system control programs (SCP), and program products (PP). (See *Appendix E* for a discussion of determining the amount of space required for the programs contained on the distribution disk cartridge. The requirements depend upon which SCP programs and program products you have in your installation.) Program products may also be on separate disk cartridges.

The system generation program is used to define your system configuration and build your system. System control programs control operation of System/3. They are generated by the system generation program according to your system configuration. (Program generation for MRJE/WS is described in the *IBM System/3 MULTI-LEAVING Remote Job Entry/Work Station Support Reference Manual*, GC21-7621.) Program products (such as RPG II, Disk Sort, Card Utilities, and Basic Assembler) are special programs you may use in your installation. These programs will be included in the system generation procedure when generating your system.

Distribution disk cartridges must be used every time you perform system generation. You should never destroy these disk cartridges until you have received new ones. Therefore, you should label these cartridges and use them only for system generation. Follow the system generation procedures carefully so that you may remove the distribution disks at the appropriate times during system generation.

A program pack contains one or more program products and, if you desire, a minimal system.

Program packs may be built anytime after the completion of system generation. There are several reasons for building program packs. One, if you have 100 cylinder disks there may not be enough room on one pack for a system and all of your program products. Another, you may prefer to have more file space on the system pack.

Normally, system generation is performed using the MFCU or 1442 Card Read Punch; however, you may optionally perform system generation using the 5471 printer/keyboard. See *Performing System Generation Using the 5471 Printer/Keyboard*, later in this chapter for the procedures to use in this case.

## PERFORMING SYSTEM GENERATION USING THE MFCU OR 1442

System generation is divided into six functions:

1. Preparing for system generation.
2. Backing up your resident system (when performing system generation after the first time).
3. System control program generation.
4. Program product generation.
5. Completing system generation.
6. Building a program pack.

*Note:* Later in this chapter, you will be directed to *Appendix E* for information on how to modify the ALLOCATE statement. You may wish to read *Appendix E* before you continue reading this chapter.

### Preparing for System Generation

1. Enter the following cards:

1	4	8	12	16	20	24	28	32	36	40	44
DATE	00	00	00								
PUNCH	1	4	4	2							
CALL	\$/SIGPCH				R1						
RUN											

The // PUNCH card is necessary only if your system input device is the 1442 Card Read Punch.

2. If the printer has the standard 48-character chain, go to step 4.
3. If a printer chain other than the standard 48-character LC chain is used, an IMAGE statement and data cards reflecting the characters on the chain must be prepared. See *Appendix A* for information on how to do this. This has to be done because the system generation program assumes a standard 48-character chain is mounted.

Place the IMAGE statement and data cards between the DATE and CALL statements you punched in step 1. The IMAGE statement causes the characters on the data cards representing the characters on the printer chain to be stored in the chain-image area. This chain-image will become part of your generated system.

## System Control Program (SCP) Generation

### *Punching the System Generation Instruction Cards from the Distribution Disk Cartridge*

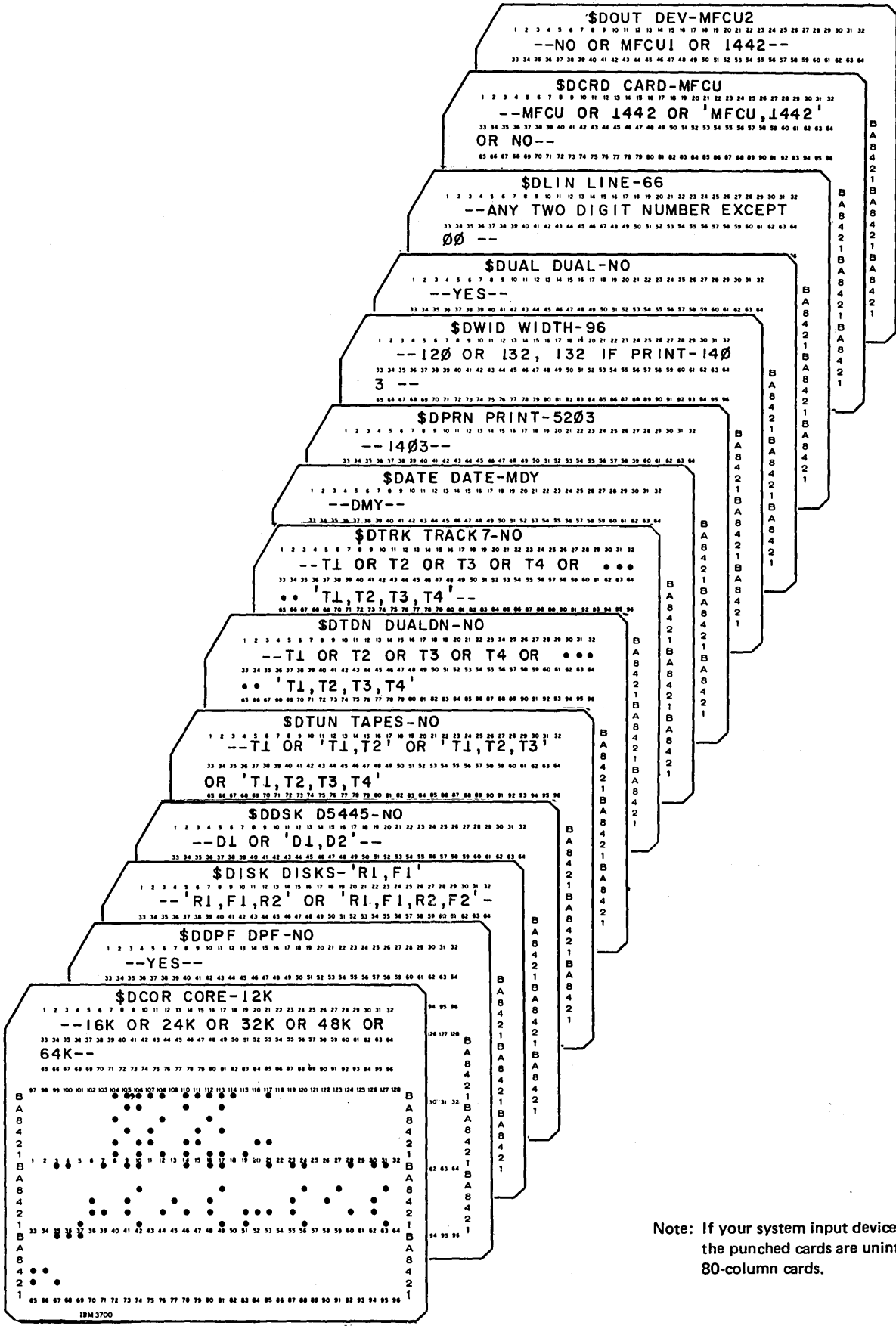
1. Mount distribution disk cartridge for system generation on R1 and ready disks.
2. Place cards punched in *Preparing for System Generation* in primary hopper.
3. Place blank cards in secondary hopper of MFCU, or if your system input device is the 1442, place blank cards behind the cards from step 2.
4. Press reader START. PRIMARY READY light turns on.
5. Ready printer.
6. Set program load selector at REMOVABLE DISK and set the ADDRESS/DATA switches to indicate 1442 if your system input device is the 1442.
7. Press PROGRAM LOAD. Initial program loading is performed and, when complete, the system begins reading cards from the reader.

*Note:* If you are using a printer chain other than the standard 48-character chain set, the DATE, IMAGE, and data cards are not printable. A halt of 7P is displayed in the message display unit. This halt occurs to ensure that you have the correct printer chain mounted. If the correct printer chain is not mounted, mount it at this time. After ensuring the correct printer chain is mounted, press console START (program 1 HALT/RESET key if you have DPF) to continue with system generation.

8. A halt of 91 is displayed in the message display unit. This halt is provided to give you time to read the instructions printed on the printer.
9. After reading the instructions, set rightmost ADDRESS/DATA switch on console at 0.
10. Press console START (program 1 HALT/RESET key if you have DPF). System generation continues.

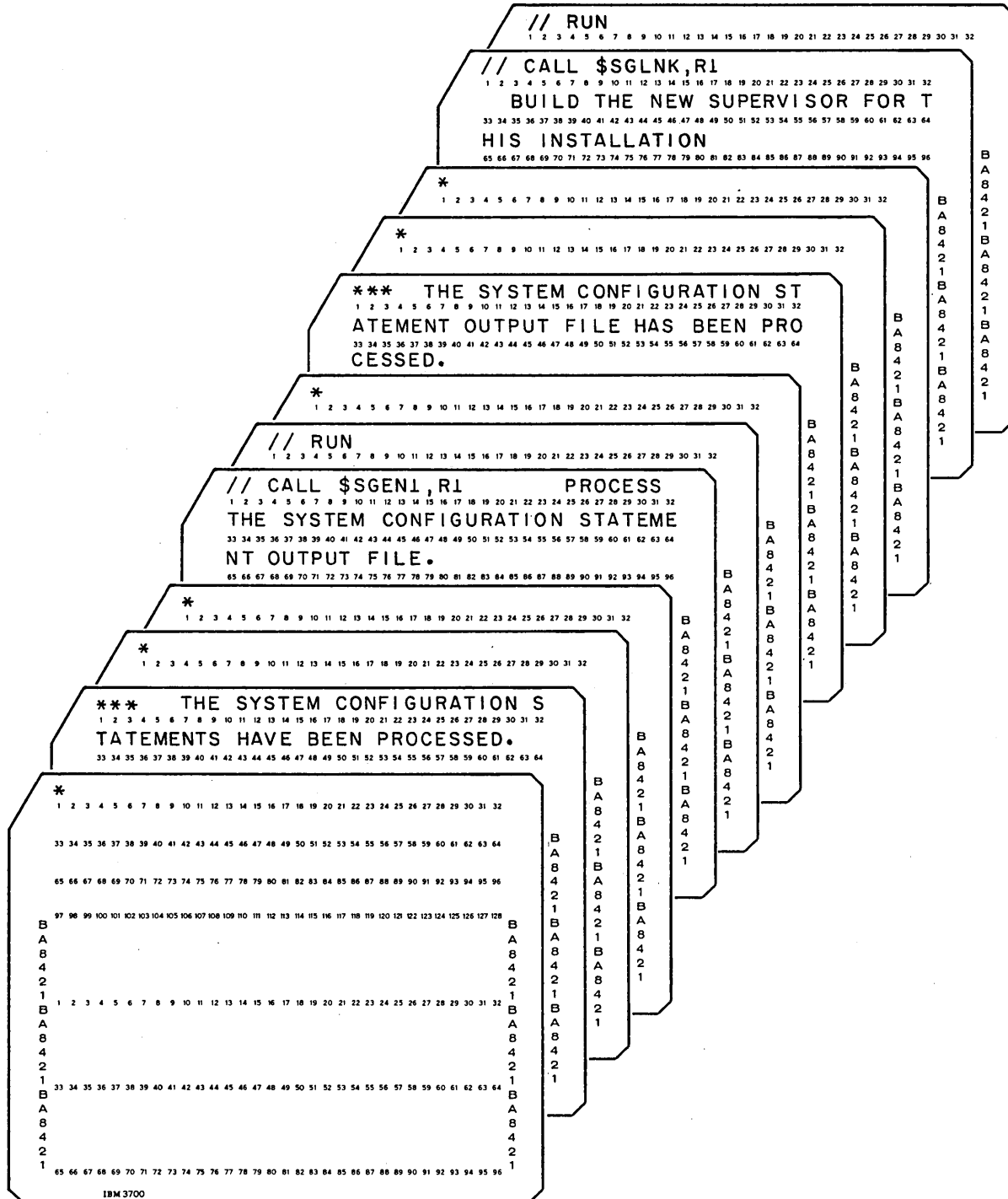
When the EJ halt is displayed on the message display unit, a deck of punched cards (Figure 43) will be in stacker 4 of the MFCU, stacker 2 of the 1442 if your system input device is the 1442, and a listing of the punched cards will be printed on the printer. The deck of punched cards is used to continue with system generation. (Make sure your cards are kept in the correct order.) You can now initialize F1.

*Note:* If you are performing system generation from the 1442, the punched cards in stacker 2 are uninterpreted. It is suggested that you interpret all of these cards before continuing for ease in modifying them later.



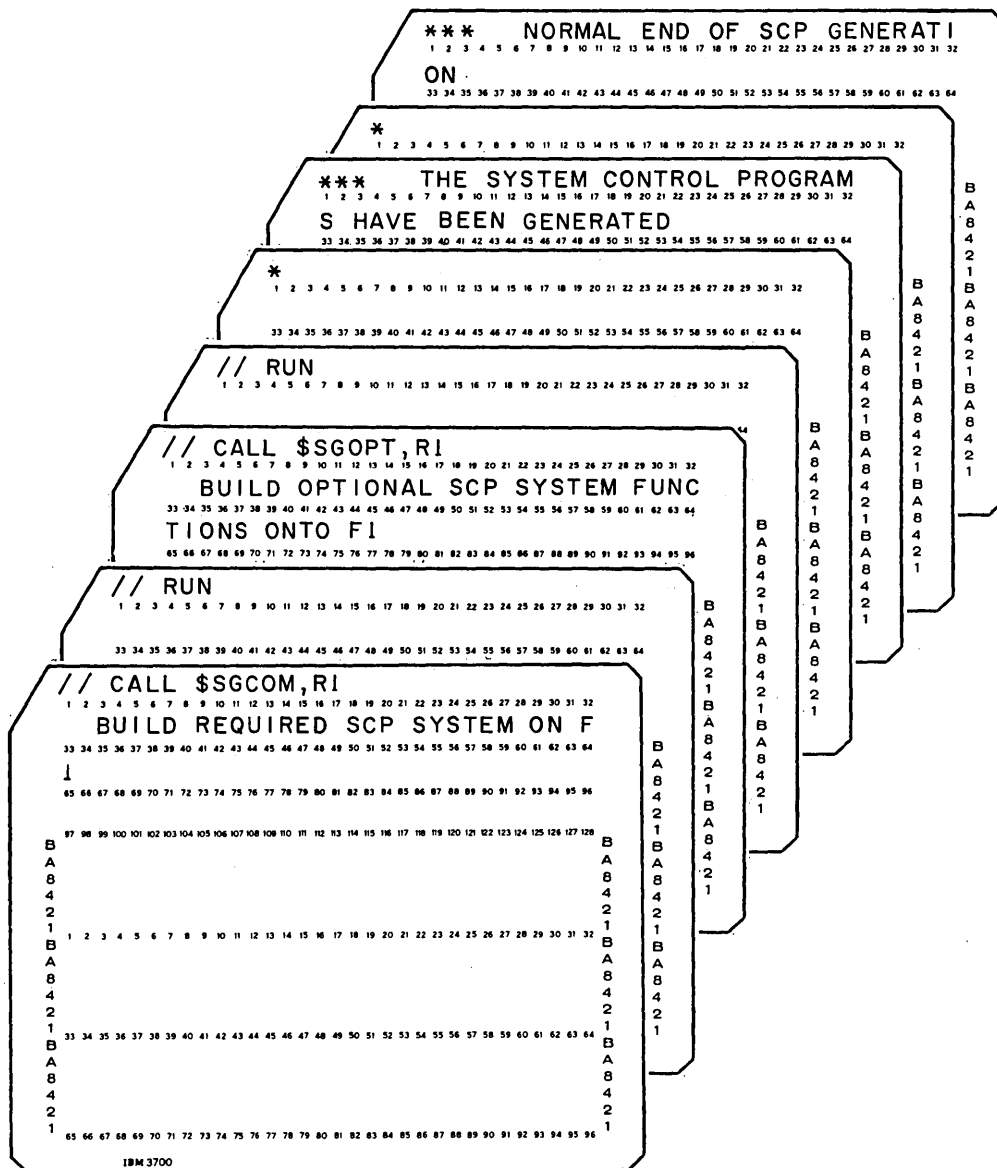
Note: If your system input device is the 1442, the punched cards are uninterpreted 80-column cards.

Figure 43 (Part 2 of 7). Punched Cards for SCP Generation



Note: If your system input device is the 1442, the punched cards are uninterpreted 80-column cards.

Figure 43 (Part 4 of 7). Punched Cards for SCP Generation

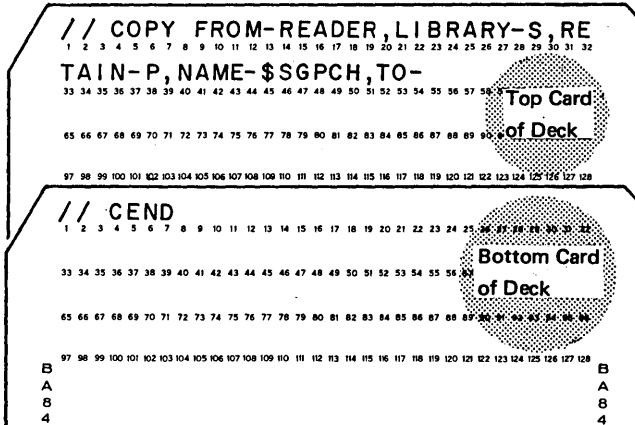


Note: If your system input device is the 1442, the punched cards are un-interpreted 80-column cards.

Figure 43 (Part 6 of 7). Punched Cards for SCP Generation

*Initializing F1*

1. Remove the punched cards from stacker,
2. Remove the following two cards from the deck and discard them:



3. Clear cards from hopper.
4. Remove cards shown in Figure 44 from deck of punched cards and place them in primary hopper.
5. Press reader START. PRIMARY READY turns on.
6. Press console START (program 1 HALT/RESET key if you have DPF). The system begins reading the cards in the primary hopper and initialization of F1 begins.

Halt 90 (caused by a // PAUSE statement) is displayed in the message display unit when the fixed disk (F1) has been initialized. There are still two cards in the primary hopper. Leave them there because they are part of the next procedure.

### *Modifying the System Configuration Statements*

You can now modify the system configuration statements shown in Figure 45, depending on your system configuration. Figure 46 discusses each of the system configuration statements and the options available for each. If you do not have to change any of these statements, leave them in the remaining deck of punched cards and proceed to step 2 in *Procedures for Modifying the System Configuration and Library Allocation Statements*.

*Note:* If you select DPF-NO when you have a DPF system and also select INQUERY-YES, the P2 switch located on the CE panel must be set at OFF when system generation is complete.

*Note:* If you select options that are not valid for your system configuration, you will not be able to successfully perform the IPL process from your generated system.

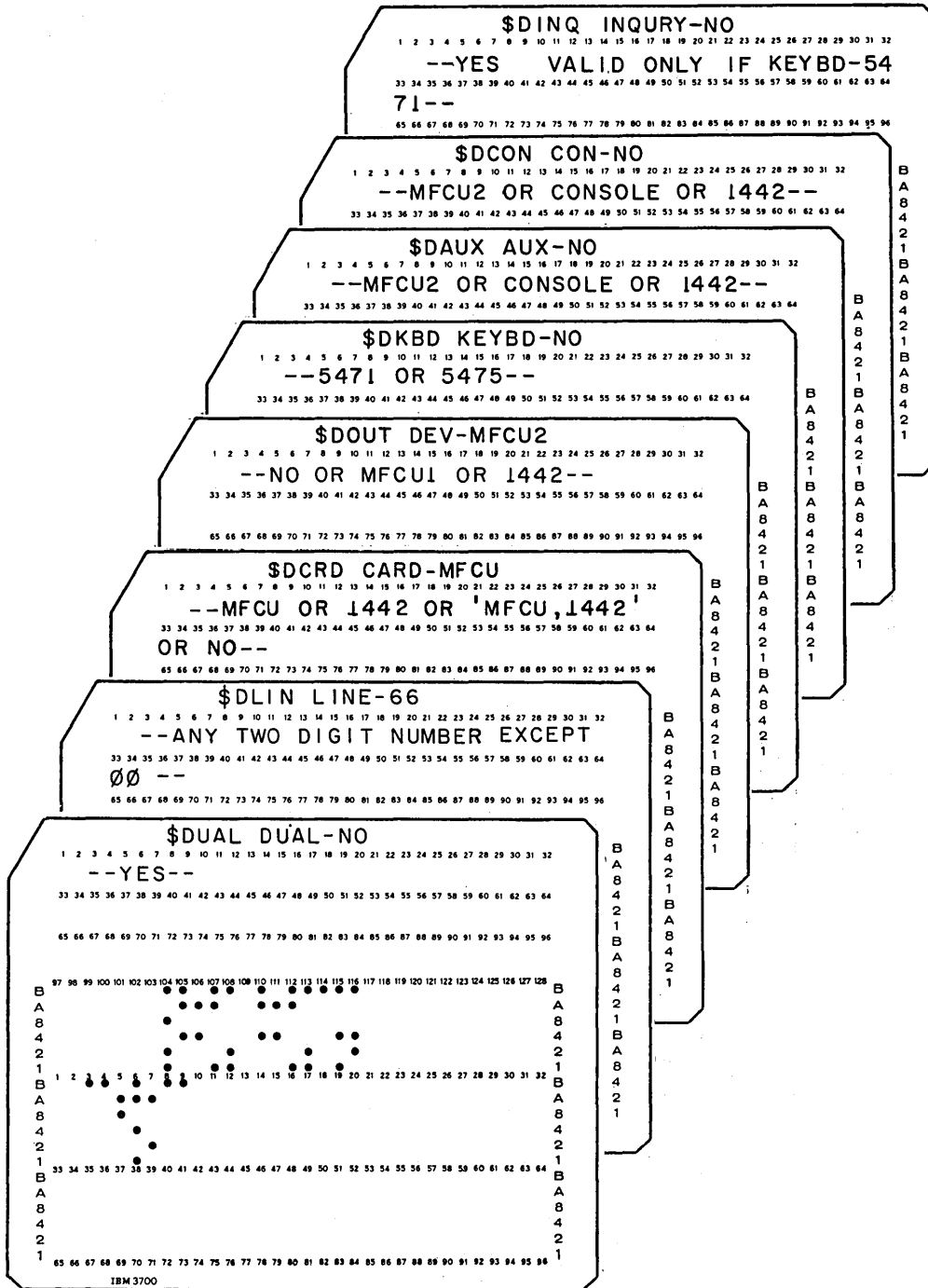


Figure 45 (Part 2 of 3). System Configuration Statements



Description Statement	Assumed Value	Optional Values	Description
\$DCOR CORE—	12K	16K or 24K or 32K or 48K or 64K	Indicates the storage size of your processing unit. (K = 1024 bytes)
\$DDPF DPF—	NO	YES	Indicates whether you have the Dual Programming Feature (DPF). (See <i>Supervisor Size Considerations</i> .)
\$DISK DISKS—	'R1,F1'	'R1,F1,R2' or 'R1,F1,R2,F2'	Indicates the number of 5444 disk units your system has. (See <i>Supervisor Size Considerations</i> .)
\$DDSK D5445—	NO	D1 or 'D1,D2'	Indicates the number of 5445 disk units your system has. (See <i>Supervisor Size Considerations</i> .)
\$DTUN TAPES—	NO	T1 or 'T1,T2' or 'T1,T2,T3' or 'T1,T2,T3,T4'	Indicates the number of magnetic tape units your system has. (See <i>Supervisor Size Considerations</i> .)
\$DTDN DUALDN—	NO	T1 or T2 or T3 or T4 or 'T1,T2' or 'T1,T3' or 'T1,T4' or 'T2,T3' or 'T2,T4' or 'T3,T4' or 'T1,T2,T3' or 'T1,T2,T4' or 'T1,T3,T4' or 'T2,T3,T4' or 'T1,T2,T3,T4'	Indicates which magnetic tape units have the dual density feature.
\$DTRK TRACK7—	NO	T1, or T2 or T3 or T4 or 'T1, T2' or 'T1, T3' or 'T1, T4' or 'T2, T3' or 'T2, T4' or 'T3, T4' or 'T1, T2, T3' or 'T1, T2, T4' or 'T1, T3, T4' or 'T2, T3, T4' or 'T1, T2, T3, T4'	Indicates which magnetic tape units have the 7-track feature.
\$DATE DATE—	mdy	dmy	Indicates the order for specifying month (m), day (d), and year (y) on the DATE OCL statement. Depending on the order you selected the format of the DATE statement is either:  // DATE mmdyy or // DATE ddmmyy  Delimiters (/, -, or any other characters except commas, quotes, numbers, and blanks) may be placed between the month, day, and year. Examples: // DATE mm/dd/yy  //DATE dd-mm-yy  You supply the system a DATE statement in front of the cards for the first job run after you perform the IPL process for the system.
\$DPRN PRINT—	5203	1403	Indicates the system printer being used.
\$DWID WIDTH—	96	120 or 132	Indicates the number of print positions on the printer. If you have the 1403 printer you must select 132 print positions.
\$DUAL DUAL—	NO	YES	Indicates whether your system has the dual feed carriage. Used with \$DPRN PRINT—5203 only.
\$DLIN LINE—	66	Any two digit number except 00	Indicates the number of lines to be printed per page.  <i>Note:</i> Some program products and utilities require a minimum of 12 lines per page.

Figure 46 (Part 1 of 2). Description of System Configuration Statements

*Supervisor Size Considerations:* The size of the supervisor generated for your system depends on the options you choose for the following configuration statements:

\$DDPF (Dual Programming Feature)

\$DISK (5444 disk units)

\$DDSK (5445 disk units)

\$DTUN (magnetic tape units)

\$DKBD (keyboard)

\$DBSC (BSCA Feature)

Supervisor size estimating is discussed in *Appendix E*.

When a halt of 90 is displayed in the message display unit, SCP generation is complete and the following has been accomplished:

- System configuration statements have been processed.
- Required SCP system has been built on F1.

Figure 47 is a sample printout of required SCP generation.

**Generating Additional SCP**

You may at this time generate additional SCP for the Macros Feature or for the Multiple Line Terminal Adapter (MLTA) RPQ Feature if you have ordered either or both of these programs. This is done by entering either or both of the following OCL sequences:

```

// CALL $SGMAC, R1
// RUN
// CALL $SGMLT, R1
// RUN
    
```

An example of the generation of these two programs can be found in Figure 47.

If you have ordered additional SCP for the 3881 Optical Mark Reader, use the following OCL sequence to generate the SCP support:

```

// CALL $SGOMR, R1
// RUN
    
```

**Completing SCP Generation**

You can now perform program product generation, if desired. However, if you do not want to perform program product generation at this time, perform the following:

1. Set rightmost ADDRESS/DATA switch at 0.
2. Press console START (program 1 HALT/RESET key if you have DPF). I/O ATTENTION will then occur.
3. Proceed to *Completing System Generation and Installation Verification* to copy your SCP system on F1 to R1 to create a backup and build a minimal system on F1, if desired.

The following is a printout of the punched cards.

```

$SGPCH
// NOHALT
// CALL $SGINT,R1          INITIALIZE F1
// RUN
*   BE SURE THE SYSTEM CONFIGURATION STATEMENTS HAVE BEEN MODIFIED BEFORE
*   CONTINUING.
*
***  SET RIGHTMOST ADDRESS/DATA SWITCH TO 0,
*   PRESS CONSOLE START --HALT/RESET IF YOU HAVE DPF SYSTEM-- TO CONTINUE.
// PAUSE
// CALL $SGEN,R1          PROCESS THE SYSTEM CONFIGURATION STATEMENTS
// RUN
$DCOR CORE-12K           --16K OR 24K OR 32K OR 48K OR 64K--
$DDPF DPF-NO             --YES--
$DISK DISKS-'R1,F1'      --'R1,F1,R2' OR 'R1,F1,R2,F2'--
$ODSK D5445-NO          --D1 OR 'D1,D2'--
$DTUN TAPES-NO          --T1 OR 'T1,T2' OR 'T1,T2,T3' OR 'T1,T2,T3,T4'
$DTDN DUALDN-NO         --T1 OR T2 OR T3 OR T4 OR ..... 'T1,T2,T3,T4'
$DTRK TRACK7-NO        --T1 OR T2 OR T3 OR T4 OR ..... 'T1,T2,T3,T4'
$DATE DATE-MDY          --DMY--
$DPRN PRINT-5203        --1403--
$DWID WIDTH-96          --120 OR 132, 132 IF PRINT-1403 --
$DUAL DUAL-NO           --YES--
$DLIN LINE-66           --ANY TWO DIGIT NUMBER EXCEPT 00 --
$DCRD CARD-MFCU         --MFCU OR 1442 OR 'MFCU,1442' OR NO--
$DOUT DEV-MFCU2         --NO OR MFCU1 OR 1442--
$DKBD KEYBD-NO          --5471 OR 5475--
$DAUX AUX-NO            --MFCU2 OR CONSOLE OR 1442--
$DCON CON-NO            --MFCU2 OR CONSOLE OR 1442--
$DINQ INQRY-NO         --YES VALID ONLY IF KEYBD-5471--
$OBSC LINE-NU           --L1 OR 'L1,L2'--
$DMLP MLMP-NO           --YES, ONLY IF BSCA WAS SPECIFIED--
$DRJE RJE-NO            --YES, ONLY IF BSCA WAS SPECIFIED--
$DMCR MICR-NO           --YES--
$DCPK CKRS-NO           --YES--
$DLKE OVLNK-NO          --YES--
$DSAM SIAM-NO           --YES--
$DSPV ADD-0             --256 OR 512 OR 768 OR 1024--
$DMOC TRIO-NO           --1270 OR 1255 OR '1270,1255'--
//
END
    
```

Place these cards in the primary hopper of the MFCU and continue with SCP generation.

These are the system configuration statements. You may have to modify some of these statements. After modifying these statements, you will place them in the primary hopper of the MFCU.

Figure 47 (Part 2 of 9). Example of System Control Program Generation

End of the printout of the punched cards.

Beginning of the printout of the cards you placed in the primary hopper of the MFCU.  
The system is executing these instructions.

```
// NOHALT  
// CALL $SGINT,R1          INITIALIZE F1  
XX LOAD $INIT,R1  
XX RUN  
// RUN  
// UIN UNIT-F1,TYPE-CLEAR  
// VOL PACK-F1F1F1  
// END  
INITIALIZATION ON F1 COMPLETE
```

```
* BE SURE THE SYSTEM CONFIGURATION STATEMENTS HAVE BEEN MODIFIED BEFORE  
* CONTINUING.  
*  
*** SET RIGHTMOST ADDRESS/DATA SWITCH TO J,  
* PRESS CONSOLE START --HALT/RESET IF YOU HAVE DPF SYSTEM-- TO CONTINUE.  
// PAUSE
```

This statement causes the system to halt with 90 in the message display unit.  
The system configuration statements must be modified at this time before continuing.

```
// CALL $SGEN,R1          PROCESS THE SYSTEM CONFIGURATION STATEMENTS  
XX LOAD $SGEN,R1  
*  
*** THE FOLLOWING CARDS AFTER THE // RUN AND BEFORE THE // END CARD ARE  
*** THE SYSTEM CONFIGURATION STATEMENTS.  
*  
XX FILE NAME-MACOUT,UNIT-F1,PACK-F1F1F1,RETAIN-T,TRACKS-20  
XX RUN  
// RUN  
$DCOR CORE-12K          --16K OR 24K OR 32K OR 48K OR 64K--  
$DDPF DPF-NO           --YES--  
$DISK DISKS-'R1,F1'    --'R1,F1,R2' OR 'R1,F1,R2,F2'--  
$DASK D5445-NO        --D1 OR 'D1,D2'--  
$DTUN TAPES-NO        --T1 OR 'T1,T2' OR 'T1,T2,T3' OR 'T1,T2,T3,T4'  
$DTDN DUALDN-NO       --T1 OR T2 OR T3 OR T4 OR ..... 'T1,T2,T3,T4'  
$DTRK TRACK7-NO       --T1 OR T2 OR T3 OR T4 OR ..... 'T1,T2,T3,T4'  
$DATE DATE-MDY        --DMY--  
$DPRN PRINT-5203      --1403--  
$DWID WIDTH-96        --120 OR 132, 132 IF PRINT-1403 --  
$DUAL DUAL-NO         --YES--  
$DLIN LINE-66         --ANY TWO DIGIT NUMBER EXCEPT 00 --  
$DCRD CARD-MFCU       --MFCU OR 1442 OR 'MFCU,1442' OR NU--  
$DOUT DEV-MFCU2       --NO OR MFCU1 OR 1442--  
$DKBD KEYBD-NO        --5471 OR 5475--  
$DAUX AUX-NO          --MFCU2 OR CONSOLE OR 1442--  
$DCDN CON-NO          --MFCU2 OR CONSOLE OR 1442--  
$DINQ INQRY-NO        --YES VALID ONLY IF KEYBD-5471--  
$DBSC LINE-NO         --L1 OR 'L1,L2'--  
$MMLP MLMP-NO         --YES, ONLY IF BSCA WAS SPECIFIED--  
$DRJE RJE-NO          --YES, ONLY IF BSCA WAS SPECIFIED--  
$DMCR MICR-NO         --YES--  
$DCPR CKKS-NO         --YES--  
$DLKE DVLNK-NO        --YES--  
$DSAM SIAM-NO         --YES--  
$DSPV ADD-0           --256 OR 512 OR 768 OR 1024--  
$DMOC TRIU-NO         --1270 OR 1255 OR '1270,1255'--  
// END
```

Figure 47 (Part 4 of 9). Example of System Control Program Generation

```

// CALL $SGCJM,R1          BUILD REQUIRED SCP SYSTEM ON F1
XX LOAD $MAINT,R1
XX RUN
// RUN
// COPY FROM-R1,LIBRARY-D,NAME-SYSTEM,TO-F1
// COPY FROM-R1,TO-F1,LIBRARY-J,NAME-$GNSUP,RETAIN-R,NEWNAME-$$SPVR
// DELETE FROM-R1,RETAIN-P,LIBRARY-D,NAME-$GNSUP
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-U,NAME-$AL.ALL
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$BU.ALL
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$CO.ALL
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$DE.ALL
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$IN.ALL
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$LA.ALL
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-U,NAME-$LI.ALL
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-U,NAME-$MA.ALL
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-R,NAME-$S.ALL
// COPY FROM-R1,TO-F1,LIBRARY-P,RETAIN-P,NAME-$SGCPY
// COPY FROM-R1,TO-F1,LIBRARY-P,RETAIN-P,NAME-$SGINX
// COPY FROM-R1,TO-F1,LIBRARY-O,RETAIN-P,NAME-$SGIVP
// COPY FROM-R1,TO-F1,LIBRARY-P,RETAIN-P,NAME-$SGIVP
// COPY FROM-R1,TO-F1,LIBRARY-J,RETAIN-P,NAME-$SGMNT
// END

```

```

// CALL $SGOPT,R1          BUILD OPTIONAL SCP SYSTEM FUNCTIONS ONTO F1
XX CALL $SGP01,R1
XX LOAD $MAINT,R1
XX RUN
// RUN
// DELETE FROM-F1,RETAIN-P,LIBRARY-O,NAME-$$CLER
// DELETE FROM-F1,RETAIN-P,LIBRARY-O,NAME-$$DLGQ
// DELETE FROM-F1,RETAIN-P,LIBRARY-J,NAME-$$STOC
// DELETE FROM-F1,RETAIN-P,LIBRARY-O,NAME-$$STIC
// DELETE FROM-F1,RETAIN-P,LIBRARY-O,NAME-$$STCI
// DELETE FROM-F1,RETAIN-P,LIBRARY-O,NAME-$$DLG7
// DELETE FROM-F1,LIBRARY-J,RETAIN-P,NAME-$$STRI
// COPY FROM-R1,TO-F1,LIBRARY-O,RETAIN-P,NAME-$WDATE
// COPY FROM-F1,TO-PRINT,LIBRARY-SYSTEM,NAME-DIR

```

These COPY and DELETE statements will vary depending on the options you select.

Figure 47 (Part 6 of 9). Example of System Control Program Generation

```

// CALL $SGMAC,R1
XX CALL $SGM01,R1
XX LOAD $MAINT,R1
*
***      MACRO PROCESSOR AND I/O MACROS
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,LIBRARY-O,RETAIN-P,NAME-$MPX.ALL
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$ALOC
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$CLOS
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$DTFD
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$EOJ
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$FTCH
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$FIND
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$GETD
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$IUBD
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$IOED
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$LOAD
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$OPEN
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$PRNT
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$PUTD
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$DTFT
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$DTOT
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$WTT
// END

XX CALL $SGM02,R1
XX LOAD $MAINT,R1
*
***      MACRO PROCESSOR AND I/O MACROS
*
XX RUN
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$RDD
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$DTPU
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$DTPD
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$DTFU
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$SVC
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$WAIT
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$WRD
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$XCTL
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$GPU
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$PKBU
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$COMN
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$GETT
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$PUTT
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$RDT
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$WRTT
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$CTLT
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$CHK
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$CKL
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$SNAP
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$STRAN
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$TRL
// COPY FROM-R1,TO-F1,LIBRARY-S,RETAIN-P,NAME-$TRTB
// COPY FROM-R1,TO-F1,LIBRARY-R,RETAIN-P,NAME=$@COAM,NEWNAME=$@COAM
// COPY FROM-R1,TO-F1,LIBRARY-R,RETAIN-P,NAME=$@BM.ALL,NEWNAME=$@BM
// END

```

Figure 47 (Part 8 of 9). Example of System Control Program Generation

## Program Product Generation

### Consideration 1

Program product generation can be performed:

1. When SCP generation has just been completed. In this case, proceed to *Consideration 2*.
2. At any later time. For example, you did not want to perform program product generation immediately after SCP generation, or you ordered a new program product at a later time which does not require you to perform system control program generation again. In either case, perform the following to prepare F1 as if system control program generation has just been completed before going to *Consideration 2*.

### Backing up F1

1. Mount an initialized scratch disk cartridge on R1.
2. Ready disks.
3. Punch these statements:

1	4	8	12	16	20	24	28	32	36	40	44
//	DATE	00/00/00									
//	LOAD	#COPY,F1									
//	RUN										
//	COPYPACK	FROM-F1,TO-R1									
//	END										

4. Place statements you just punched in primary hopper.
5. Press reader START.
6. Ready printer.
7. Set program load selector at FIXED DISK and data switches to indicate 1442 if your system input device is the 1442.
8. Press PROGRAM LOAD. If your system has DPF, EJ is displayed in both message display units when initial program loading is complete. Press appropriate HALT/RESET key to continue.

When EJ is displayed in the message display unit, your system on F1 has been copied to R1. This is your backup disk cartridge. You now delete all libraries and files on F1.

### Deleting All Libraries and Files on F1

1. Clear cards from reader.
2. Remove cards from stacker 1.
3. Remove backup disk cartridge on R1.
4. Mount your tailored system disk cartridge on R1, and ready disks.
5. Punch these statements:

1	4	8	12	16	20	24	28	32	36	40	44
//	DATE	00/00/00									
//	NOHALT										
//	LOAD	\$MAINT,R1									
//	RUN										
//	ALLOCATE	TO-F1,SOURCE-0,OBJECT-0									
//	END										
//	HALT										
//	LOAD	\$DELET,R1									
//	RUN										
//	REMOVE	UNIT-F1,LABEL-VTOC,PACK-nnnnnn									
//	END										

Note: nnnnnn is the name of the pack.  
You must fill in this parameter.



### Procedure 1

1. Figure 48 shows the OCL needed for each program product. Punch the two cards indicated for each program product ordered.
2. Clear cards from reader.
3. Place punched cards in primary hopper.
4. Press reader START.
5. Ready printer.
6. Set rightmost ADDRESS/DATA switch at 0.
7. Press console START (program 1 HALT/RESET key if you have DPF). The program products are copied to F1.

If the program products are only on the distribution disk cartridge, program product generation is complete. At this point you have a tailored system on F1, because it has been generated according to your system configuration and the programs you wanted. I/O ATTENTION occurs when program product generation is complete, because the system is expecting more cards. Proceed to *Completing System Generation* and punch the indicated cards.

If you also have program products on a separate cartridge, perform *Procedure 2* before going to *Completing System Generation*.

### Procedure 2

1. Mount disk cartridge containing the program product on R1.
2. Clear cards from reader.
3. Punch a DATE statement and place it in the primary hopper.
4. Figure 48 shows the OCL needed for each program product. Punch the two cards indicated for each program product ordered.
5. Place punched cards in primary hopper.

6. Ready printer.
7. Set program load selector at FIXED DISK and the data switches to indicate 1442 if your system input device is the 1442.
8. Press PROGRAM LOAD.
9. Press reader START. The program product is copied to F1 and, when complete, EJ is displayed in the message display unit.  
  
*Note:* Repeat steps 1 through 9 for each program product that is on a separate disk cartridge, then perform steps 10 through 14.
10. Remove disk cartridge containing the program products from R1.
11. Mount distribution disk cartridge (the one you used to perform SCP system generation) on R1.
12. Punch a DATE statement and place it in the primary hopper.
13. Set program load selector at REMOVABLE DISK and ADDRESS/DATA switches to indicate 1442 if your system input device is the 1442.
14. Press PROGRAM LOAD. The DATE statement is read and I/O ATTENTION occurs.

At this point you have a tailored system on F1, because it has been generated according to your system configuration and the programs you wanted. I/O ATTENTION occurs when program product generation is complete, because the system is expecting more cards. Proceed to *Completing System Generation* and punch the indicated cards.

Figure 49 is a sample printout of program product generation.

```

// CALL $SGRPG,R1
XX LOAD $MAINT,F1
*
***      RPG II COMPILER PROGRAM
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-P,NAME-$RPG,NEWNAME-RPG
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$RP.ALL
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-R,NAME-$PG.ALL,NEWNAME-$PG
// COPY FROM-R1,TO-F1,LIBRARY-R,RETAIN-P,NAME-$@R.ALL,NEWNAME-SUBR
// END
// CALL $SGSRT,R1
XX LOAD $MAINT,F1
*
***      DISK SORT PROGRAM
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,LIBRARY-O,RETAIN-P,NAME-$DS.ALL
// END
// CALL $SGASM,R1
XX LOAD $MAINT,F1
*
***      BASIC ASSEMBLER PROGRAM
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,LIBRARY-O,RETAIN-P,NAME-$AS.ALL
// END
// CALL $GBSC,R1
XX LOAD $MAINT,F1
*
***      RPG II SUPPORT FOR BINARY SYNCHRONOUS COMMUNICATIONS
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,RETAIN-R,LIBRARY-R,NAME-$@PB.ALL,NEWNAME-$PG
// COPY FROM-R1,TO-F1,RETAIN-R,LIBRARY-O,NAME-$RB.ALL,NEWNAME-$RP
// END
// CALL $SGRPA,R1
XX LOAD $MAINT,F1
*
***      RPG II 5445 DISK SUPPORT
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,LIBRARY-O,RETAIN-P,NAME-$RXXA,NEWNAME-$RPXA
// END

```

```

// CALL $SGRPT,R1
XX LOAD $MAINT,R1
*
***      RPG II SUPPORT FOR TAPE
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,LIBRARY-O,RETAIN-P,NAME-$RXXB,NEWNAME-$RPXB
// END
// CALL $SGAU,R1
XX LOAD $MAINT,F1
*
***      AUTO REPORT PROGRAM
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-ALL,NAME-$AU.ALL
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-P,NAME-AUTO
// END
// CALL $SGDST,R1
XX LOAD $MAINT,R1
*
***      DISK SORT SUPPORT FOR TAPE INPUT/OUTPUT
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$DZ.ALL,NEWNAME-$DS
// END
// CALL $SGTST,R1
XX LOAD $MAINT,R1
*
***      TAPE SORT
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$TS.ALL
// END

```

Figure 49 (Part 1 of 6). Example of Program Product Generation

```

// CALL $SGSR5,R1
XX LOAD $MAINT,R1
*
***      DISK SORT FOR DISK 5445 SUPPORT
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$DX.ALL,NEWNAME-$DS
// END
// CALL $SGDMO,R1
XX LOAD $MAINT,F1
*
***      TERMINAL READER IN OPTICS UTILITY PROGRAM
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$MO.ALL
// END
// CALL $SGMCR,R1
XX LOAD $MAINT,F1
*
***      1255 MAGNETIC INK CHARACTER READER UTILITY PROGRAM
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,LIBRARY-O,RETAIN-P,NAME-$MI.ALL
// END
// CALL $SGUTL,R1
XX LOAD $MAINT,F1
*
***      CARD UTILITY PROGRAMS
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$CS.ALL
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$REPRO
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$CLIST
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$DREC
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$DVRT
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$GANGP
// COPY FROM-R1,TO-F1,RETAIN-P,LIBRARY-O,NAME-$GPEXC
// END
// CALL $SGCOB,R1
XX LOAD $MAINT,F1
*
***      COBOL COMPILER PROGRAM
*
XX RUN
// RUN
// COPY FROM-R1,TO-F1,LIBRARY-P,RETAIN-P,NAME-COBOL
// COPY FROM-R1,TO-F1,LIBRARY-O,RETAIN-P,NAME-$CB.ALL
// COPY FROM-R1,TO-F1,LIBRARY-R,RETAIN-P,NAME-$CB.ALL
// END

```

Figure 49 (Part 2 of 6). Example of Program Product Generation

```

$SGF03
// LOAD $MAINT,F1
*
***
      FURTRAN COMPILER PROGRAM
*
// RUN
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-READ
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-READ42
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SETINQ
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SIN
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SKIP
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SLITE
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SLITET
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SPACE
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SP1403
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SQRT
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-STACK
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-STAK42
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SUB
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-S1403
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-TANH
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-TYPER
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-UNPAC
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-WHOLE
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-12JR4
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SHIFT
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SHIFTR
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SET1
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-SETO
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-R,NAME-1BTST
// END

```

```

$SGF05
// LOAD $MAINT,F1
*
***
      FURTRAN COMPILER PROGRAM
*
// RUN
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU24
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU25
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU26
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU27
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU28
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU78
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU29
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU31
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU32
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU33
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU34
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU35
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU36
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FJ86
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU37
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU38
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU30
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU30A
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU00D
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FURT
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-P,NAME-FORTRN
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-P,NAME-FORTB
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-P,NAME-FORTL
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-P,NAME-FORTG
// END

```

Figure 49 (Part 6 of 6). Example of Program Product Generation

```

$SGF04
// LOAD $MAINT,F1
*
***
      FURTRAN COMPILER PROGRAM
*
// RUN
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU01
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU02
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU03
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU04
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU05
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU06
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU07
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU08
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU09
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU09
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU10
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU11
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU12
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU13
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU14
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU15
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU16
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU17
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU18
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU19
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU20
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU21
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU22
// COPY FROM-R1,TU-F1,RETAIN-P,LIBRARY-U,NAME-$FU23
// END

```

Note: This example is Fortran Version IX Modification Level 0.

Figure 49 (Part 5 of 6). Example of Program Product Generation

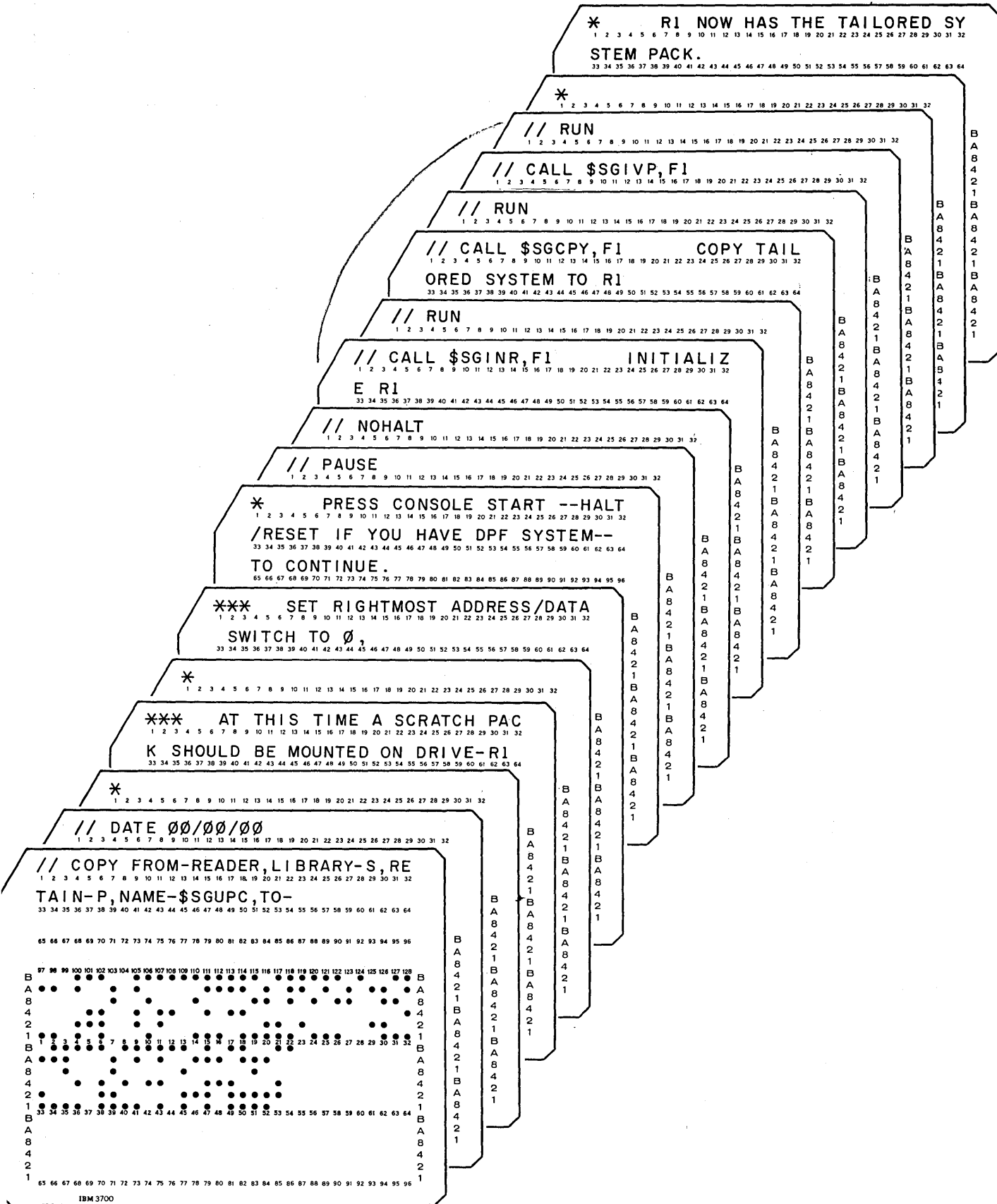


Figure 50 (Part 1 of 2). Punched Cards for Completing System Generation

### Copying Your Tailored System on F1 to R1

1. Set rightmost ADDRESS/DATA switch at 0.
2. Press console START (program 1 HALT/RESET key if you have DPF).

The disk on R1 is initialized and your system is copied to R1. You now have two identical tailored systems on R1 and F1 containing all the programs generated. The system halts with 90 displayed in the message display unit.

Identify the cartridge on R1 as your tailored system disk cartridge (the disk name is SYSTEM). After you have done this, you should run sample programs to ensure that your system has been generated properly. Information necessary to run sample programs is provided in *Appendix C*.

### Options and Considerations After System Generation

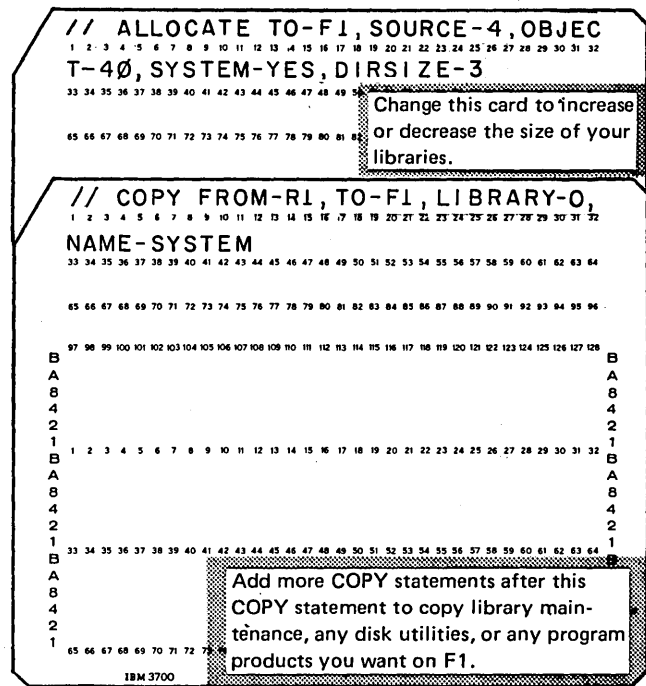
System generation is complete; you do not have to perform the following procedures if you want to leave the entire tailored system on F1. However, if you want to create a minimal system on F1, create program packs, or delete unneeded programs and procedures from these packs, use the procedures in the following sections.

### Building a Minimal Resident System on F1

The following procedures will delete the tailored system on F1 and replace it with a *minimal resident system*. The minimal resident system will consist of the system control programs needed to sustain the IPL process and read OCL statements. If any disk utility programs or program products are desired on F1, COPY statements have to be prepared to include them. The second ALLOCATE statement can also be modified to increase or decrease the size of your libraries. COPY/DELETE statement parameters, number of modules, and library space requirements for all separately-callable programs are given in *Appendix E*, under the heading *Determining Library Requirements on Generated System Packs and Program Packs*. You can determine the number of tracks required for source and object libraries by using the tables and examples in that section. If you expect to add any programs to these libraries later, you should leave space for them now.

Use the following procedure to build a minimal resident system on F1:

1. Modify or add more of the following statements:



2. Press reader STOP and remove the cards from the primary hopper. If you have modified the ALLOCATE statement, replace the second ALLOCATE statement in the deck with the modified statement. If you wish to copy additional programs to F1, place the additional COPY statements in front of the END statement.
3. Press reader START.
4. Set program load selector at REMOVABLE DISK and ADDRESS/DATA switches to 1442 if your system input device is the 1442.
5. Press PROGRAM LOAD. Initial program loading is performed and, when complete, the system begins reading cards from the reader.

If your system has DPF, EJ will be displayed in both message display units when initial program loading is complete. Press program 1 HALT/RESET key to continue.

System generation of the minimal resident system on F1 is complete when a halt of 90 is displayed in the message display unit. Figure 51 is a sample printout of completing system generation.

### Deleting Unneeded Programs and Procedures

At the end of system generation, your tailored system (on R1 or F1) contains some system generation procedures not needed in your day-to-day operation; it may also contain other programs and procedures you do not need (see *Appendix E* for additional considerations in this case, and for DELETE parameters). If you wish to have this space available for some other use, you can simply delete these procedures using the following load sequence. However, you must not attempt to remove these procedures from the distribution disk cartridge.

```

// LOAD $MAINT, (R1)
//              or
//              (F1)
// RUN
// DELETE FROM (R1)          □  PIP.ALL
//              or          □  LIBRARY-P, NAME-$SG.ALL
//              (F1)
//
// (other DELETE statements if desired)
//
// END

```

### Restoring Active Data Files on F1

After completing your system generation, be sure to copy any active data files to F1 from the back-up disk cartridge that contains your previous-release resident system. This will ensure that you do not inadvertently destroy active data files.

### Building a Program Pack

A program pack may be built anytime after system generation. If you have a 100 cylinder disk, there may not be enough room on one pack for the system and all of your program products; or if you want to have more file space on the system pack, separate your program products by putting them on different packs.

The following procedures tell you how to build a program pack. First, be sure you have a back up copy of the system on F1. Next, determine the number of tracks required for the source and object libraries using *Appendix E*.

If you expect to add any programs to these libraries later, leave space for them now.

### Deleting All Libraries and Files on F1

1. Mount tailored system disk cartridge on R1, and ready disks.
2. Set program load selector at REMOVABLE DISK. If your system input device is the 1442 set data switches appropriately. Press PROGRAM LOAD.
3. Enter the following statements.

```

1   4   8   12  16  20  24  28  32  36  40  44
// DATE 03/01/02
// NOHALT
// LOAD $MAINT, R1
// RUN
// ALLOCATE TO- F1, SOURCE-0, OBJECT-0
// END
// HALT
// LOAD $DELETE, R1
// RUN
// REMOVE UNIT- F1, LABEL- VTOC, PACK- nnnnnn
// END

```

Note: nnnnnn is the name of the pack. You must fill in this parameter.

*Statements to Copy All of F1 to R1:*

```
// DATE 00/00/00
// LOAD #MAINT,F1
// RUN
// ALLOCATE TO-R1,SOURCE-nnn,OBJECT-nnn,SYSTEM-YES
// COPY FROM-F1,TO-R1,RETAIN-R,LIBRARY-ALL,NAME-ALL
// END
```

*Statements to Copy the System and Selected Programs:*

```
// DATE 00/00/00
// LOAD #MAINT,F1
// RUN
// ALLOCATE TO-R1,SOURCE-nnn,OBJECT-nnn,SYSTEM-YES
// COPY FROM-F1,TO-R1,LIBRARY-Q,NAME-SYSTEM
// END
```

*Note:* Place a COPY statement for each program you want to copy in front of the // END statement. (See *Determining Library Requirements on Generated System Packs and Program Packs* in *Appendix E* for the detailed information required to copy or delete individual programs.)

*Statements to Copy Selected Programs:*

```
// DATE 00/00/00
// LOAD #MAINT,F1
// RUN
// ALLOCATE TO-R1,SOURCE-nnn,OBJECT-nnn
// END
```

*Note:* Place a COPY statement for each program you want to copy in front of the // END statement. (See *Determining Library Requirements on Generated System Packs and Program Packs* in *Appendix E* for the detailed information required to copy or delete individual programs.)

If you have DPF, EJ is displayed in both message display units when initial program loading is complete. Press the appropriate HALT/RESET key to continue. EJ will be displayed when copying is complete.

The procedure \$SGEN calls a system generation program that enables you to enter system configuration statements on the console. When the 5471 PROCEED light turns on, you may begin entering the statements. The configuration statements must be entered in the correct format and in the correct order. If you make a mistake in entering the statements and a halt occurs, refer to *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540, for instructions to recover from these halts.

The size of the supervisor generated for your system depends upon the system generation statements you enter. For information on controlling the size of your supervisor, see *Appendix E*.

The following is an example of the system generation statements you would enter and some of the options you might choose. See Figure 46 for an explanation of the system generation statements. Remember, you must enter all of the system generation statements. However, if you select an option which is not available on your system, the system you generate will not function properly and you must repeat system generation.

Enter the following statements when the 5471 PROCEED light is on; follow by pressing the END key:

```

1      4      8      12     16     20     24     28
// $DCOR CORE-12K
// $DDPF DPF-NO
// $DISK DISKS-'RL,FL'
// $DDSK D5445-NO
// $DTUN TAPES-NO
// $DTDN DUALDN-NO
// $DTRK TRACK7-NO
// $DATE DATE-MDY
// $DPRN PRINT-5203
// $DWID WIDTH-96
// $DUAL DUAL-NO
// $DLIN LINE-66
// $DCRD CARD-NO
// $DOUT DEV-NO
// $DKBD KEYBD-547L
// $DAUX AUX-NO
// $DCON CON-NO
// $DING INQUIRY-NO
// $DBSC LINE-NO
// $DMLP MLMP-NO
// $DRJE RJE-NO
// $DMCR MICR-NO
// $DCPR CKRS-NO
// $DLKE OVLNK-NO
// $DSAM SIAM-NO
// $DSPV ADD-Ø
// $PMOC TRIO-NO
// END

```

After you have entered the END statement, system generation proceeds to build your system. When EJ is again displayed in the message display unit, press console START (or the program level 1 HALT/RESET key, if you have DPF) to continue and the PROCEED light again turns on.

Enter the following OCL when the 5471 PROCEED light is on:

```

1      4      8      12     16     20     24     28     32     36     40     44     48     52     56
// CALL $SGENL,RL
// RUN
// CALL $SGLNK,RL
// RUN
// LOAD $MAINT,RL
// RUN
// ALLOCATE TO=FL,OBJECT=nvr,SOURCE=n,SYSTEM=YES,DIRSIZE=n
// END
// CALL $SECOM,RL
// RUN
// CALL $SBOPT,RL
// RUN

```

Note: See *Determining Library Requirements on Generated System Packs and Program Packs* in *Appendix E* for procedures to calculate the OBJECT, SOURCE, and DIRSIZE parameters for the ALLOCATE statement.

SCP generation is complete; the required SCP system resides on F1. Optionally, you can generate additional SCP programs, if you have ordered them, by entering the following:

```

// CALL $SGMAC,RL   Macros and Macro Processor
// RUN
// CALL $SGMLT,RL   Multiple Line Terminal
// RUN               Adapter (MLTA) RPO

```

If you wish, you can now perform program product generation. If you do not wish to perform program product generation at this time, continue with *Completing System Generation and Installation Verification*, later in this section.

### Program Product Generation

Program product generation may be performed immediately after SCP generation or at a later time. If SCP generation has just been completed, perform the procedure under *Program Product Generation*; otherwise, proceed with step 1.



You now have two identical tailored systems on R1 and F1, containing all the programs generated. Identify the cartridge on R1 as your tailored system disk cartridge (the disk name is SYSTEM). After you have done this, you should run sample programs to ensure that your system has been generated properly. Information necessary to run sample programs is provided in *Appendix C*.

### Options and Considerations After System Generation

System generation is complete; you do not have to perform the following procedures if you want to leave the entire tailored system on F1. However, if you want to create a minimal system on F1 or delete unneeded programs and procedures from these packs, use the procedures in the following sections. If you want to create separate program packs, see *Building a Program Pack* under *Performing System Generation Using the MFCU or 1442*, modifying the procedure as necessary if your system input device is the 5471.

#### Building a Minimal Resident System on F1

The minimal resident system you build on F1 must contain the system control programs needed for the IPL process and those needed to process OCL statements, in addition to any utility programs and program products you desire.

1. Determine the number of tracks required for the source library and directory, object library, and object library directory for the programs you wish to copy by following the procedures under *Determining Library Requirements on Generated System Packs and Program Packs* in *Appendix E*.
2. Enter the following OCL statements:

```
// LOAD $MAINT, R1
// RUN
// ALLOCATE TO=F1, OBJECT=MAN, SOURCE=n, SYSTEM=YES, DIRSIZE=n
// COPY FROM=R1, TO=F1, LIBRARY=C, NAME=SYSTEM
```

**Note:** The OBJECT, SOURCE, and DIRSIZE parameters in the ALLOCATE statement are those which were calculated in step 1.

3. Enter the COPY statements for the additional utilities, program products, and disk data management routines you wish to include in your minimal system. See *Appendix E* for the LIBRARY and NAME parameters for each program and the library space requirements for each.
4. Enter a // END statement.

You now have a minimal resident system on F1.

#### Deleting Unneeded Programs and Procedures

At the end of system generation, your tailored system (on R1 or F1) contains some system generation procedures not needed in your day-to-day operation; it may also contain other programs and procedures you do not need (see *Appendix E* for additional considerations in this case, and for DELETE parameters). If you wish to have this space available for some other use, you can simply delete these procedures using the following load sequence. However, you must not attempt to remove these procedures from the distribution disk cartridge.

```
// LOAD $MAINT, (R1) or (F1)
// RUN (R1)
// DELETE FROM (or) RETAIN-P, LIBRARY-P, NAME-$SG. ALL (F1)
// (Other DELETE statements if desired)
// END
```

### Characters From Source Library on Disk

To indicate that new chain characters are to be read from the source library on disk, the **FORMAT** parameter must be **MEM**. The following parameters must also be included:

**NAME:** The **NAME** parameter identifies the characters in the library. The only way you can place the cards containing the characters in the source library is by using the library maintenance program. The name you supply in library maintenance control statements is used to identify the characters in the source library.

**UNIT:** The **UNIT** parameter must be used with the **NAME** parameter. It tells the system where the disk containing the library is located on the disk unit. The codes are:

<i>Code</i>	<i>Meaning</i>
R1	Removable disk, drive one.
F1	Fixed disk, drive one.
R2	Removable disk, drive two.
F2	Fixed disk, drive two.

Figure 53 shows an **IMAGE** statement, which tells the system that the new characters are to be read from the source library on disk. The **FORMAT** parameter indicates that the new chain characters are in the source library. The **NAME** parameter indicates that the characters were named **CHAIN1** in the source library. The **UNIT** parameter indicates that the source library containing them is on the removable disk on drive one (**R1**).

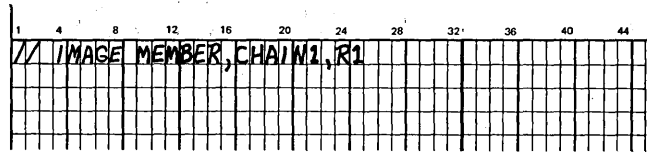


Figure 53. Sample **IMAGE** Statement: Characters on Disk

### USING THE **IMAGE** STATEMENT TO CHANGE THE **CHAIN IMAGE** WHEN PERFORMING SYSTEM GENERATION

If you use a chain other than the standard 48-character chain, the **IMAGE** statement with proper data cards containing the characters of the chain must be prepared. The characters on the data cards can be in either hexadecimal code or EBCDIC form.

The **IMAGE** statement, together with data cards, places the image of the print chain in the communication region. The **IMAGE** statement must be followed by data cards that contain the hexadecimal codes (two columns per character) or the EBCDIC code for the characters in the printer chain. These data cards must contain an exact image of your print chain, character for character.

The **IMAGE** statement and data cards needed for the standard 48-character LC print arrangement chain, when you use hexadecimal codes, are shown in Figure 54. The ones needed when you use EBCDIC codes are shown in Figure 55.

The IMAGE statement data cards needed for the 60-character PN print arrangement chain, when you use hexadecimal codes are shown in Figure 56. The ones needed when you use EBCDIC codes are shown in Figure 57.

*Note:* If your 60-character chain contains characters not shown in Figure 56, refer to the *IBM System/3 Card and Disk System Components Reference Manual, GA21-9103*, for the hexadecimal code for these characters. The chain image data cards you use must be an exact image of your chain.

IMAGE Statement:

1	4	8	12	16	20	24	28	32																										
//	I	M	A	G	E	H	E	X	,	1	2	0																						

Data Card 1:

1	4	8	12	16	20	24	28	32	36	40	44	48																					
F1	F2	F3	F4	F5	F6	F7	F8	F9	F0	E7	E8	61	E2	E3	E4	E5	E6	4F	7A	6D	7F	6B	7E										
Representing Characters:																																	
1	2	3	4	5	6	7	8	9	0	X	Y	/	S	T	U	V	W	I	:	_	"	,	=										

Data Card 2:

1	4	8	12	16	20	24	28	32	36	40	44	48																					
D1	D2	D3	D4	D5	D6	D7	D8	D9	60	E9	4D	C1	C2	C3	C4	C5	C6	C7	C8	C9	4E	4B	5D										
Representing Characters:																																	
J	K	L	M	N	O	P	Q	R	-	Z	(	A	B	C	D	E	F	G	H	I	+	.	)										

Data Card 3:

1	4	8	12	16	20	24					
6C	5B	5C	7B	50	7C	4C	5E	5F	7D	6F	6E
Representing Characters:											
%	\$	*	#	&	@	<	:	-	'	?	>

Figure 56. IMAGE Statement and Data Cards for the 60-Character PN Print Arrangement Chain When Using Hexadecimal Code



Generation Phase Messages

SYSTEM/3 MODEL D SORT/COLLATE VERSION xx,  
MODIFICATION LEVEL xx xx/xx/xx

This heading is printed before the listing of the specification cards. The date is the date entered on the // DATE statement read after you performed the IPL process.

SC 01 W INVALID PRINT OPTION, COL. 27

Header card. Valid entries are blank, 0, 1, 2, or 3. All print (blank or 0) is assumed.

SC 009 W INVALID ALT. COLLATING SEQ. ENTRY,  
COL. 26

Header card. Column 26 must be blank or S. S alters the normal collating sequence. S is assumed.

SC 010 T JOB TYPE, COLS. 7-12 NOT VALID

Header card. Columns 7-12 must contain SORT, MERGE, MATCH, or SELECT. Job is terminated.

SC 011 T LARGEST TOTAL OF CONTROL FIELDS  
INVALID

Header card. Columns 15-17 must contain a number from 1-100. Job is terminated.

SC 012 T SEQUENCE, COL. 18, NOT VALID

Header card. Sequence entry is not A or D or, in the case of a select run, is not A, D, or S. Job is terminated.

SC 013 T INVALID STACKER SELECT, COL. 19-24

Header card. Columns 19-24 must contain a number from 1-4 or be blank. Job is terminated.

SC 014 T INVALID NUMBER SPECIFICATION,  
COL. 25

Header card. For a MATCH job, entry in column 25 must be 1 or N. Job is terminated.

SC 015 A INVALID ALTERNATE COLLATING  
SEQUENCE CARD

An alternate collating sequence card is missing or unidentifiable (columns 1-8 not ALTSEQ blank blank), or a separator card (\*\*\*) is missing. The recovery procedure for this message is listed under the E5 halt in *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540.

SC 016 T ALTERNATE COLLATING SEQUENCE  
DATA INVALID

Entries on ALTSEQ cards must consist of 4-column sets of hexadecimal characters (A-F and 0-9). Asterisks are printed under invalid or missing entries. Job is terminated.

SC 017 T INVALID SPECIFICATION TYPE, COL. 6

Column 6 is not I, O, or F (or H for first card). Card is bypassed.

SC 018 W FIRST SPEC. IN SET NEEDS BLANK  
CONTINUATION

Column 7 in the first record type specification of a set must be blank. Record type specifications have an I or O in column 6. Blank is assumed.

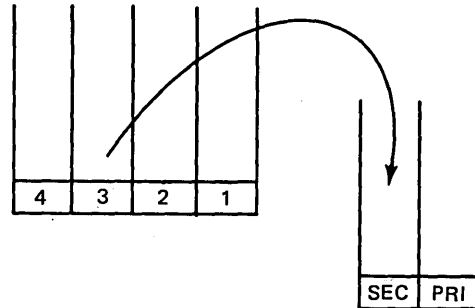
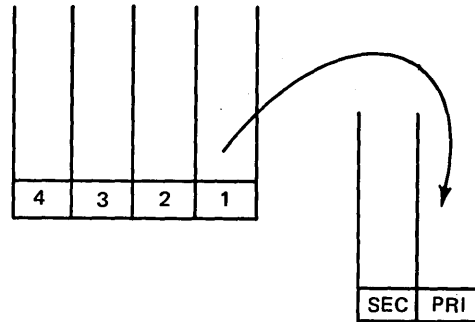
SC 019 T INVALID CONTINUATION, COL. 7

Column 7 of a record type specification (I or O in column 6) is not A, O, or blank. Card is bypassed.

SC 033 T INVALID RELATIONSHIP, COL. 17-18	Columns 17-18 must contain EQ, NE, LT, GT, LE, or GE. Job is terminated.
SC 034 T INVALID FACTOR 2 TYPE, COL. 19	Column 19 must contain C or F. Job is terminated.
SC 035 W DEFAULT STACKER, NO. 1 ASSUMED, COL. 9	Column 9 must contain 1, 2, or 3. 1 is assumed.
SC 036 W UNPACKED FACTOR 1 USED WITH ALTSEQ	Factor 1 and Factor 2 are changed as indicated by ALTSEQ statements. This change may affect the units position (and sign) of an unpacked decimal number. If it does, you may not include or omit the desired records. Do not use U (unpacked) record type entries when you specify alternate collating sequence.
SC 040 W INVALID CONTROL FIELD TYPE, COL. 7	Column 7 must contain N, O, or F. N is assumed.
SC 041 W OPPOSITE SPECIFIED, COL. 7. ONLY D AND U ARE VALID	When column 7 contains an O, column 8 must contain a D or U. D is assumed.
SC 042 TOTAL LENGTH OF CONTROL FIELDS EXCEEDED	Sum of control field lengths is greater than length specified on header card. Job is terminated.
SC 043 T ILLEGAL FORCE SEQUENCE CONTINUATION	Force-all line with continuation entry in column 19 can only follow a force spec. Job is terminated.
SC 090 I END OF GENERATION PHASE	All specification cards have been read and processed. The Sort/Collate program now prints one of the next three messages.
SC 091 I NO ERRORS IN SOURCE DECK	The specification cards were processed successfully. The Sort/Collate program is ready to do the job. The recovery procedures for this message are listed under the EE halt in <i>IBM System/3 Model 10 Disk System Halt Guide</i> , GC21-7540.
SC 092 A REVIEW WARNING MESSAGE	There are no known errors in source deck; however, abnormal conditions as defined by warning messages exist. The recovery procedures for this message are listed under the EL halt in <i>IBM System/3 Model 10 Disk System Halt Guide</i> , GC21-7540.
SC 093 A ERRORS IN SOURCE DECK, JOB TERMINATED	The job cannot be completed because of errors in the source deck. The recovery procedure for this message is listed under the EA halt in <i>IBM System/3 Model 10 Disk System Halt Guide</i> , GC21-7540.

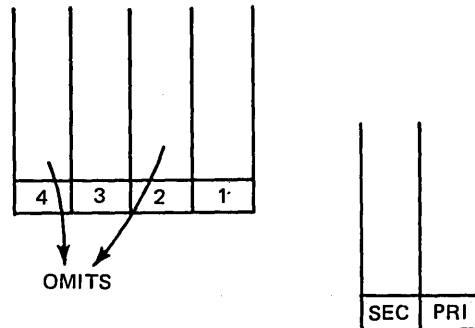
SC 125 A FEED STACK 1 TO PRI – STACK 3 TO SEC

Printed on omit pass to indicate positioning of data cards for start of sort. Also printed on sort job where cards have been selected to two of four stackers. Reposition cards as follows:



SC 127 A SET ASIDE CARDS FROM STACKS 2 AND 4

On an omit pass, the cards in stackers 2 and 4 are the omitted cards. Set these cards aside before continuing.



SC 129 A OUTPUT IN STACK 1 – OMITTS IN STACKS 2 AND 4

This message indicates that all sorting was completed during the omit pass.

SC 131 A ONE STRING TO PRI AND OTHER TO SEC

Instructions for final pass following a three stack pass. Place the cards from stacker 1 in a hopper. It doesn't matter which one. Place the other group of cards in the other hopper. These cards are in stacker 2, 3, or 4, or were set aside for the last pass.

SC 197 A PRESS MFCU START AND CONSOLE START

Instructions for starting next pass.

SC 199 A SORTING COMPLETED

The job is finished. The sorted cards are in stacker 1.

*Select Job*

SC 401 I SORT/COLLATE – SELECT JOB

Heading for select job.

SC 411 I INCLUDED CARDS – STACK 1 nnnnn

nnnnn is the number of cards in stacker 1.

SC 421 I INCLUDED CARDS – STACK 2 nnnnn

nnnnn is the number of cards in stacker 2.

SC 431 I INCLUDED CARDS – STACK 3 nnnnn

nnnnn is the number of cards in stacker 3.

SC 441 I OMITTED CARDS nnnnn

nnnnn is the number of non-selected cards routed to stacker 4.

SC 451 A SEQUENCE ERROR–PRI

Cards are out of sequence in the primary hopper. The recovery procedure for this message is included under the E1 halt in *IBM System/3 Model 10 Disk System Halt Guide*, GC21-7540.

SC 461 A SELECTING COMPLETED

The job is finished. The selected cards can appear in all stackers except stacker 4.





0022	0408	0	T	2	LR				SAMPL1
0023	0409	0							SAMPL1
0024	0410	0					21	'KEYS ARE IN ASCENDING'	SAMPL1
0025	0411	0					42	'SEQUENCE STARTING AT'	SAMPL1
0026	0412	0					64	'000005 AND INCREASING'	SAMPL1
0027	0413	0	T		01 LR		84	'IN INCREMENTS OF 5.'	SAMPL1
0028	0414	0					21	'SAMPLE PROGRAM 2 WILL'	SAMPL1
0029	0415	0					44	'PRINT FROM THE INDEXED'	SAMPL1
0030	0416	0					65	'FILE TO SHOW THAT IT'	SAMPL1
0031	0417	0					86	'WAS PROPERLY LOADED.'	SAMPL1
0032	0501	DDISKOUT E			01N02				SAMPL1
0033	0502	0				COUNT	6		SAMPL1
0034	0503	0					94	'RECORD NUMBER'	SAMPL1
0035	0504	0				RECNR	128		SAMPL1

INDICATORS USED  
LR 01 02

RG 314 UNREFERENCED FIELD NAMES

STMT#	NAME	DEC	LGTH	DISP
0005	NODATA		001	0100

FIELD NAMES USED

STMT#	NAME	DEC	LGTH	DISP
0005	NODATA		001	0100
0006	COUNT	0	006	0106
0007	RECNR	0	003	0109



```
// CALL $RPSP3,F1
XX LOAD SAMPL1,R1
XX FILE NAME-$SOURCE,UNIT-R1,RETAIN-S,PACK-SYSTEM
XX FILE NAME-DISKOUT,UNIT-R1,RETAIN-T,PACK-SYSTEM,RECORDS-100
XX RUN
// RUN
```

SAMPLE PROGRAM 1 HAS LOADED 100 RECORDS INTO AN INDEXED FILE.

KEYS ARE IN ASCENDING SEQUENCE STARTING AT 000005 AND INCREASING IN INCREMENTS OF 5.

SAMPLE PROGRAM 2 WILL PRINT FROM THE INDEXED FILE TO SHOW THAT IT WAS PROPERLY LOADED.

KEY	DESCRIPTION	PAGE	2
000280	RECORD NUMBER	56	
000285	RECORD NUMBER	57	
000290	RECORD NUMBER	58	
000295	RECORD NUMBER	59	
000300	RECORD NUMBER	60	
000305	RECORD NUMBER	61	
000310	RECORD NUMBER	62	
000315	RECORD NUMBER	63	
000320	RECORD NUMBER	64	
000325	RECORD NUMBER	65	
000330	RECORD NUMBER	66	
000335	RECORD NUMBER	67	
000340	RECORD NUMBER	68	
000345	RECORD NUMBER	69	
000350	RECORD NUMBER	70	
000355	RECORD NUMBER	71	
000360	RECORD NUMBER	72	
000365	RECORD NUMBER	73	
000370	RECORD NUMBER	74	
000375	RECORD NUMBER	75	
000380	RECORD NUMBER	76	
000385	RECORD NUMBER	77	
000390	RECORD NUMBER	78	
000395	RECORD NUMBER	79	
000400	RECORD NUMBER	80	
000405	RECORD NUMBER	81	
000410	RECORD NUMBER	82	
000415	RECORD NUMBER	83	
000420	RECORD NUMBER	84	
000425	RECORD NUMBER	85	
000430	RECORD NUMBER	86	
000435	RECORD NUMBER	87	
000440	RECORD NUMBER	88	
000445	RECORD NUMBER	89	
000450	RECORD NUMBER	90	
000455	RECORD NUMBER	91	
000460	RECORD NUMBER	92	
000465	RECORD NUMBER	93	
000470	RECORD NUMBER	94	
000475	RECORD NUMBER	95	
000480	RECORD NUMBER	96	
000485	RECORD NUMBER	97	
000490	RECORD NUMBER	98	
000495	RECORD NUMBER	99	
000500	RECORD NUMBER	100	

100 RECORDS WERE READ FROM THE INDEXED FILE.

```

44 PROCEDURE DIVISION.                                000560
45 BEGIN. READY TRACE.                                000570
*****
*** THE FOLLOWING PARAGRAPH OPENS THE OUTPUT FILE TO BE CREATED***
*** AND INITIALIZES COUNTERS.                        ***
*****
47 STEP-1.                                             000610
48 OPEN OUTPUT FILE-1.                                000620
49 MOVE ZERO TO COUNT, NUMBR.                        000630
*****
*** THE FOLLOWING CREATES THE RECORDS TO BE          ***
*** CONTAINED IN THE FILE, WRITES THEM TO THE CARD PUNCH AND ***
*** DISPLAYS THEM ON THE CONSOLE.                   ***
*****
50 STEP-2.                                             000650
51 ADD 1 TO COUNT. ADD 1 TO NUMBR.                   000660
53 MOVE ALPHA COUNT TO NAME-FIELD.                   000670
54 MOVE DEPEND COUNT TO NO-OF-DEPENDENTS.           000680
55 MOVE NUMBR TO RECORD-NO.                          000690
56 STEP-3.                                             000700
57 DISPLAY WORK-RECORD UPON PRINTER.                 000710
58 WRITE RECORD-1 FROM WORK-RECORD                   000720
   AFTER ADVANCING TO-POCKET-ONE.                   000730
59 STEP-4.                                             000740
60 PERFORM STEP-2 THRU STEP-3 UNTIL COUNT IS EQUAL TO 26. 000750
*****
*** THE FOLLOWING CLOSES THE OUTPUT CARD PUNCH FILE AND REOPENS***
*** IT AS INPUT.                                    ***
*****
61 STEP-5.                                             000760
62 CLOSE FILE-1.                                     000770
63 STOP □ REMOVE PUNCHED DECK AND PLACE IT IN 5424 READER PRIMAR
   □ BY HOPPER, FOLLOWED BY A /* CARD□.             000780
64 OPEN INPUT FILE-2.                                000790
*****
*** THE FOLLOWING READS BACK THE FILE AND SINGLES OUT EMPLOYEES***
*** WITH NO DEPENDENTS.                            ***
*****
65 STEP-6.                                             000800
66 READ FILE-2 RECORD INTO WORK-RECORD               000810
67 AT END GO TO STEP-8.                              000820
68 STEP-7.                                             000830
69 IF NO-OF-DEPENDENTS IS EQUAL TO □□□             000840
70 MOVE □Z□ TO NO-OF-DEPENDENTS.                    000850
71 EXHIBIT CHANGED NAMED WORK-RECORD.              000860
72 GO TO STEP-6.                                     000870
73 STEP-8.                                             000880
74 CLOSE FILE-2.                                     000890
75 STOP RUN.                                         000900
001000
001010
001020
001030
001040

```

DATA DIVISION MAP

STND	ADDR	LNTH	NAME	STND	ADDR	LNTH	NAME	STND	ADDR	LNTH	NAME
F	21	0092	20 FILE-1								
D	22	0005	20 RECORD-1	23	0005	20	FIELD-A				
F	24	0178	20 FILE-2								
D	25	0019	20 RECORD-2	26	0019	20	FIELD-A				
D	28	002D	56 FILL	29	002D	2	COUNT	30	002F	26	ALPHABET
	31	002F	1 ALPHA	32	0049	2	NUMBR	33	004B	26	DEPENDENTS
	34	004B	1 DEPEND								
D	35	0065	20 WORK-RECORD	36	0065	1	NAME-FIELD	38	0067	4	RECORD-NO
	40	006C	3 LOCATION	42	0070	2	NO-OF-DEPENDENT				

```
// LOAD TESTPR.R1
* PLACE BLANK CARDS IN MFCU - PRIMARY HOPPER
// PAUSE
```

```
// RUN
**STND 00047, PRECEDING WERE 00045
**STND 00050
**STND 00056
A 0001 NYC 0
**STND 00059
**STND 00050
**STND 00056
B 0002 NYC 1
**STND 00050
**STND 00056
C 0003 NYC 2
**STND 00050
**STND 00056
D 0004 NYC 3
**STND 00050
**STND 00056
E 0005 NYC 4
**STND 00050
**STND 00056
F 0006 NYC 0
**STND 00050
**STND 00056
G 0007 NYC 1
**STND 00050
**STND 00056
H 0008 NYC 2
**STND 00050
**STND 00056
I 0009 NYC 3
**STND 00050
**STND 00056
J 0010 NYC 4
**STND 00050
**STND 00056
K 0011 NYC 0
**STND 00050
**STND 00056
L 0012 NYC 1
**STND 00050
**STND 00056
M 0013 NYC 2
**STND 00050
**STND 00056
N 0014 NYC 3
**STND 00050
**STND 00056
O 0015 NYC 4
**STND 00050
**STND 00056
P 0016 NYC 0
**STND 00050
**STND 00056
Q 0017 NYC 1
```

\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD J 0010 NYC 4  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD K 0011 NYC 2  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD L 0012 NYC 1  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD M 0013 NYC 2  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD N 0014 NYC 3  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD O 0015 NYC 4  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD P 0016 NYC 2  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD Q 0017 NYC 1  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD R 0018 NYC 2  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD S 0019 NYC 3  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD T 0020 NYC 4  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD U 0021 NYC 2  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD V 0022 NYC 1  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD W 0023 NYC 2  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD X 0024 NYC 3  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD Y 0025 NYC 4  
\*\*STNO 00065  
\*\*STNO 00068  
WORK-RECORD Z 0026 NYC 2  
\*\*STNO 00065  
\*\*STNO 00073



It is the programmer's responsibility to determine the cause of a program loop. He should thoroughly examine the logic of his program to make sure he did not code a loop. If his program appears to be coded correctly, he should have the information supplied by the operator available and contact IBM for assistance.

### **Incorrect Output**

If output is incorrect after a job has apparently been completed successfully, the incorrect output falls into the following categories:

- Missing records.
- Duplicate records.
- Invalid data containing sequence errors, incorrect values, format errors, or meaningless information.

To perform problem determination for errors of this type:

1. Isolate the failing program.
2. Check for a possible hardware error (do other programs fail in the same way?).
3. Perform the appropriate data collection procedure in Figure 61.

If several programs are involved in a failure, locate the program that you know has correct input, but incorrect output. The fastest method of analyzing a series of programs is to check the output of one of the programs in the middle of the job stream, then repeat the check for the remaining programs until one has been isolated. After that, use Figure 61 to complete problem determination.

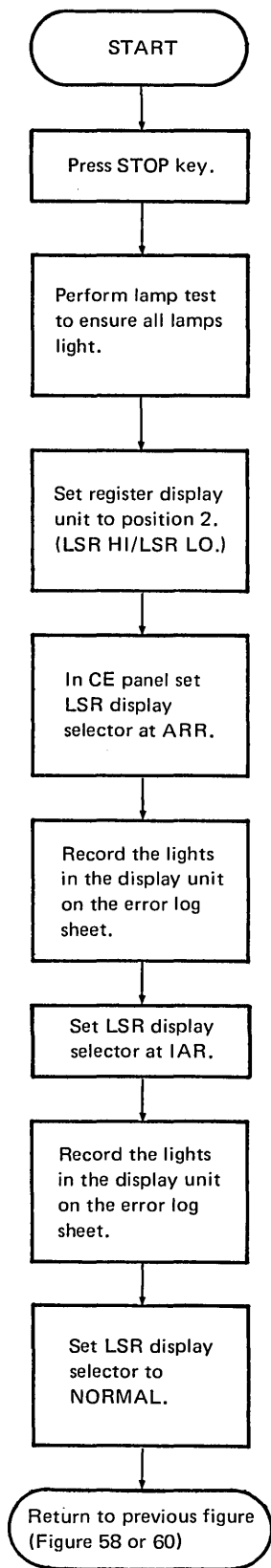


Figure 59. Operator Procedures for Displaying Local Storage Registers

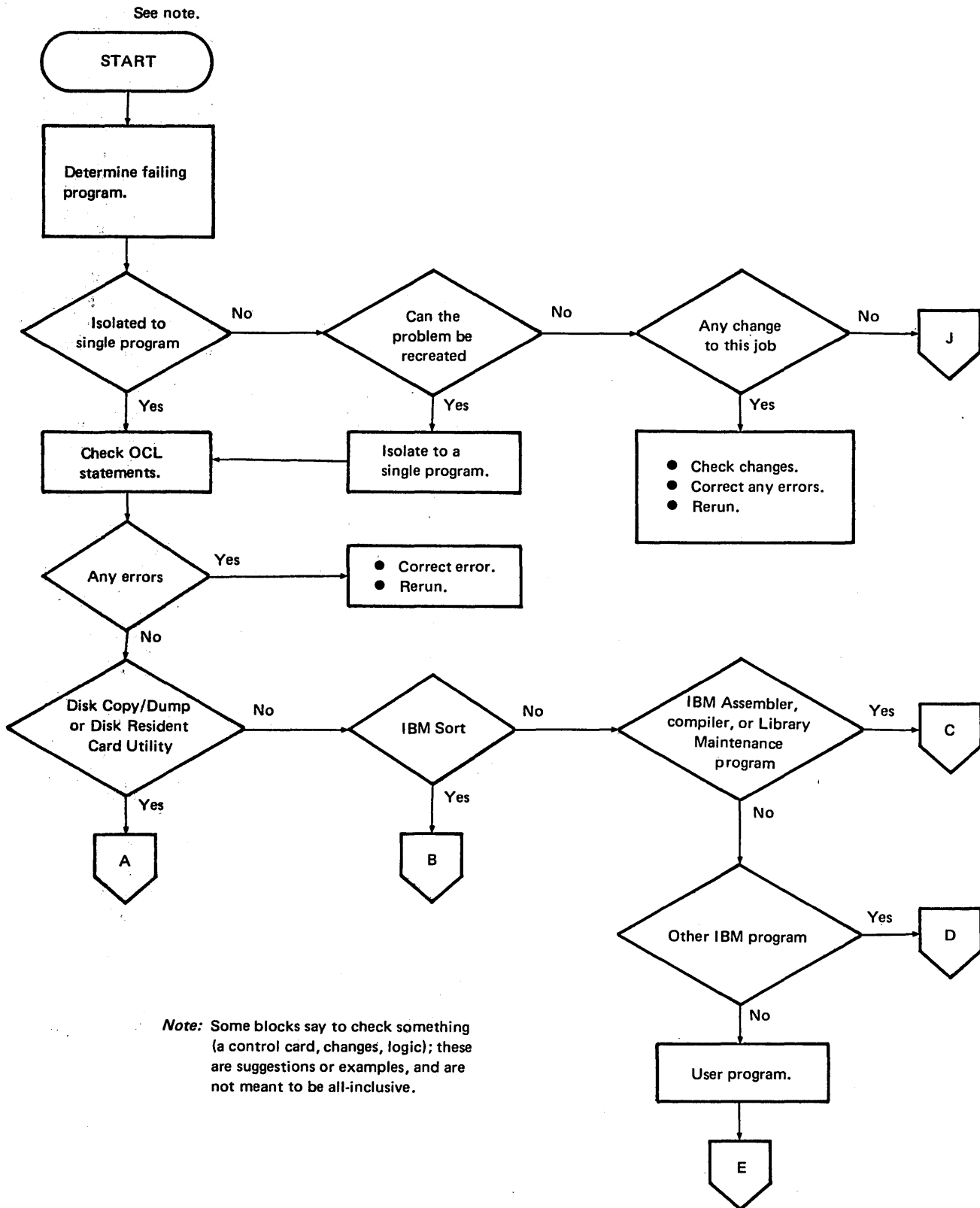


Figure 61 (Part 1 of 7). Operating Procedures for Incorrect Output

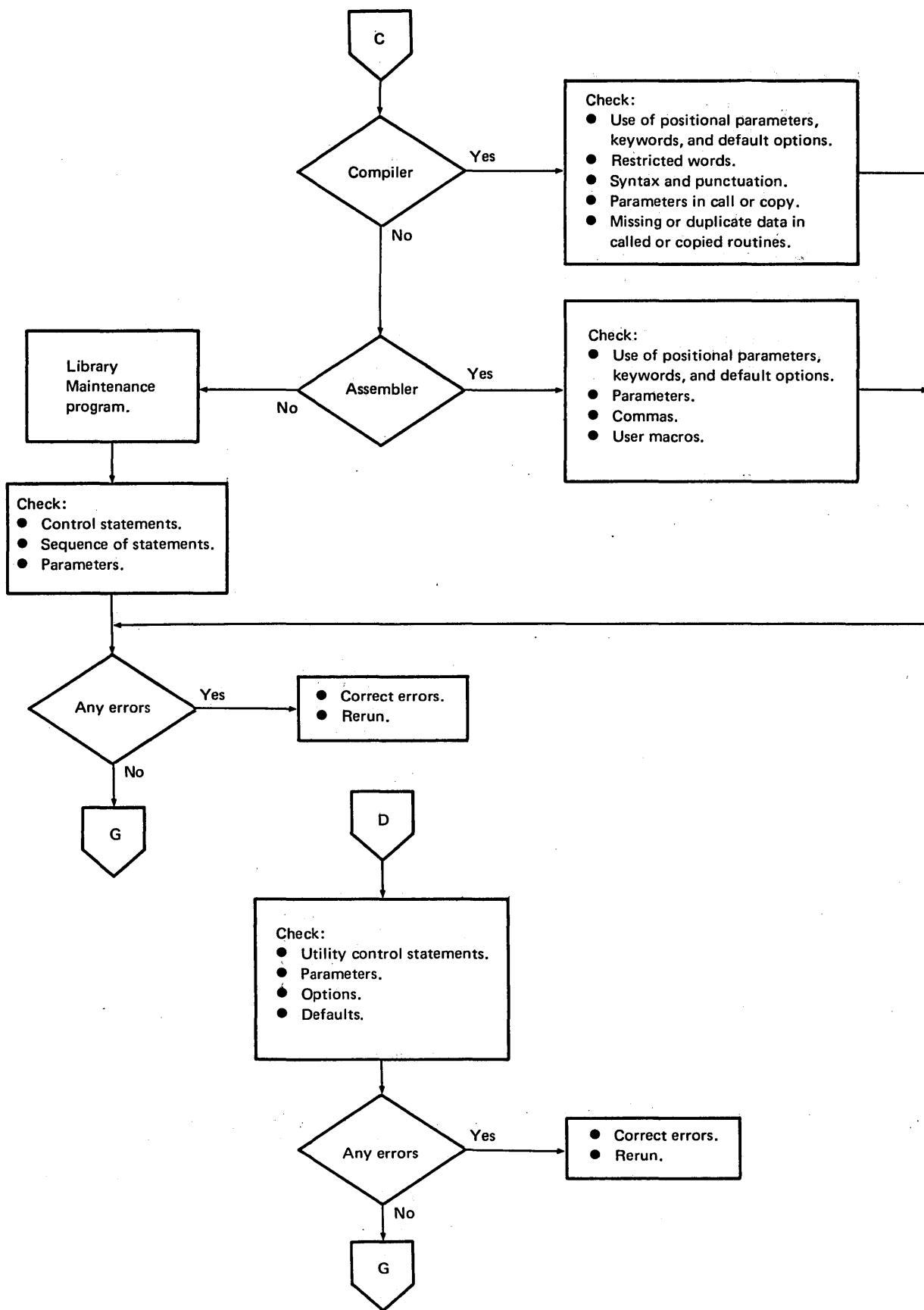


Figure 61 (Part 3 of 7). Operating Procedures for Incorrect Output

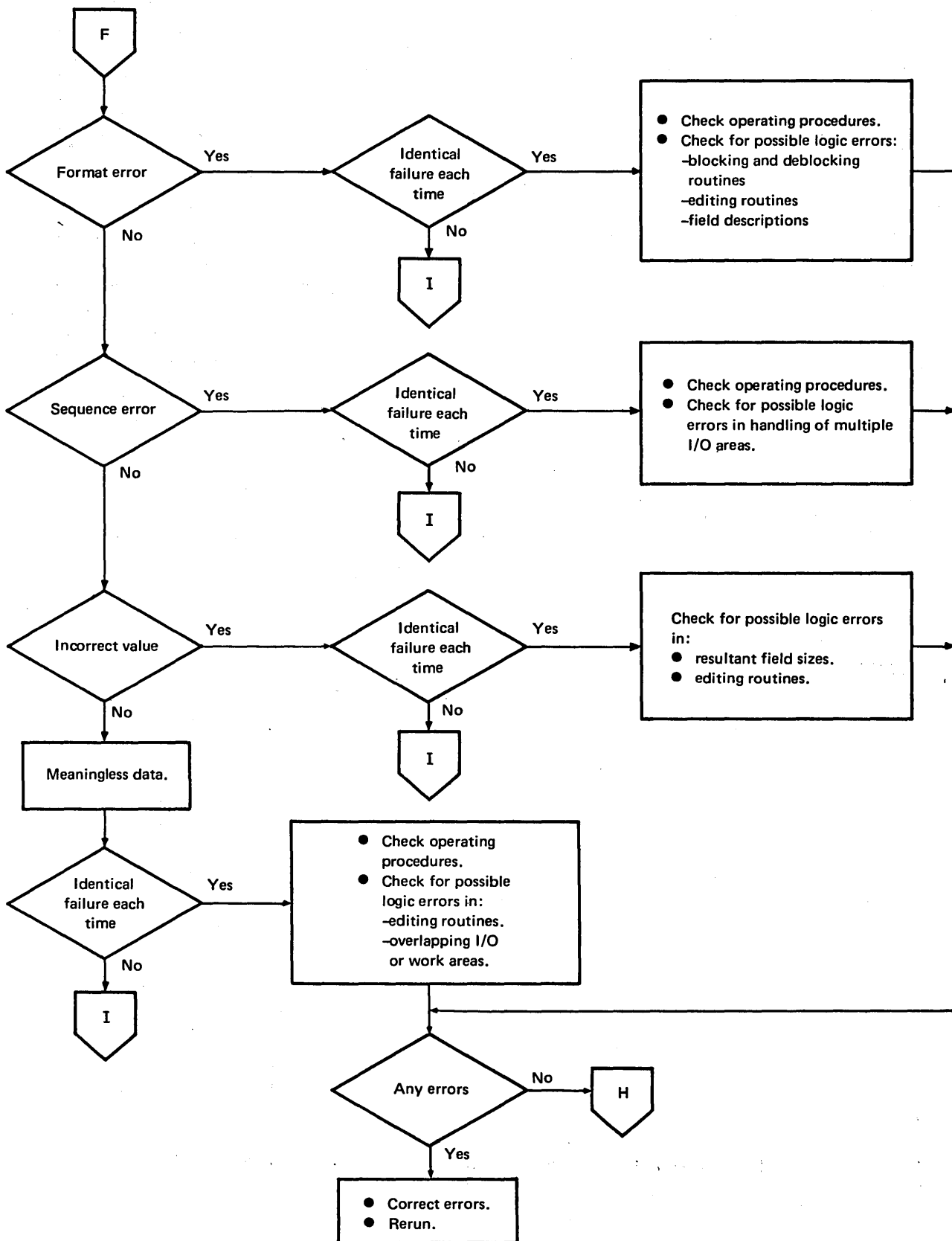


Figure 61 (Part 5 of 7). Operating Procedures for Incorrect Output

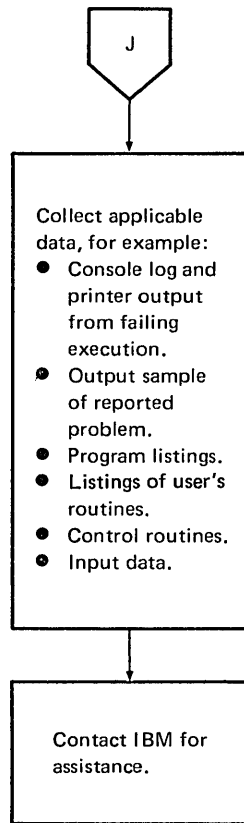


Figure 61 (Part 7 of 7). Operating Procedures for Incorrect Output

Disk Drives **	Dedicated System		Dual Programming	
	With Console	Without Console	With Console	Without Console
R1, F1	3.00K	3.00K	3.75K*	3.50K*
R1, F1, R2	3.25K	3.00K	4.00K	4.00K
R1, F1, R2, F2	3.25K	3.00K	4.00K	4.00K
R1, F1, D1	3.75K	3.75K*	4.75K	4.50K
R1, F1, D1, D2	4.00K	3.75K	4.75K	4.50K
R1, F1, R2, F2, D1	4.00K	3.75K	4.75K	4.50K
R1, F1, R2, F2, D1, D2	4.00K	3.75K	4.75K	4.50K

**\*\*Notes:** K = 1024 bytes (decimal)  
 R1, F1 = 5444 Drive 1  
 R2, F2 = 5444 Drive 2  
 D1 = 5445 Drive 1  
 D2 = 5445 Drive 2

For *tape support* add 0.50K to the above numbers, except for numbers followed by an asterisk (\*) in which case add 0.75K.

For *BSCA support* (with LINE 1 and LINE 2, or with ML/MP), add 0.25K to the above numbers.

● Figure 62. System Control Programming Supervisor Sizes

Since 5093 is not a multiple of 256, it must be rounded up to the next multiple of 256, or 5120.

**Data Management Estimates**

*Data management* includes the SCP modules which allow a program that is processing a data file to organize, locate, write, read, and maintain the records in the file. The data management modules discussed in this section are relocatable object modules (R modules in the object library). The modules required by a particular program are selected by the compiler and are linkage edited with the user program after compilation to form a complete object program.

Figure 63. Estimated Main Storage Requirements of 5444 Disk Data Management Modules

5444 Access Methods (MVF=Multivolume File)	Main Routine (Bytes)	Complete Access Method (Bytes)	Module Name (\$\$----)	Subroutines -- Name (\$\$----) and Size in Bytes																							
				SRBI (152)	SRBP (47)	SRBR (121)	SRCB (76)	SRCL (91)	SRCM (153)	SRDA (153)	SRDF (28)	SRDI (86)	SRIC (109)	SRJU (70)	SRLP (40)	SRMI (51)	SRMO (129)	SRPC (123)	SRPI (41)	SRSB (67)	SRSC (174)	SRSL (97)	SRSM (95)	SRSO (100)	SRTC (28)	SRTS (248)	SRUA (38)
<b>Consecutive</b>																											
Output	29	543	CSOP		X	X				X	X			X			X					X		X			
Output - MVF	43	597	CSOM		X	X				X	X		X	X		X						X		X			
Input	39	525	CSIP		X	X				X				X		X						X		X			
Input - MVF	50	576	CSIM		X	X				X			X	X		X						X		X			
Update	137	435	CSUP		X					X				X								X		X			
Update - MVF	149	487	CSUM		X					X			X	X								X		X			
<b>Direct</b>																											
*Binary Input	64	465	DAIB						X	X					X	X						X					
*Binary Input - MVF	171	572	DAIT						X	X					X	X						X					
Decimal Input	91	568	DAID			X			X	X					X	X						X					
Decimal Input - MVF	196	673	DAIM			X			X	X					X	X						X					
*Binary Update	104	634	DAUB						X	X				X	X	X						X					
*Binary Update - MVF	211	741	DAUT						X	X				X	X	X						X					
Decimal Update	131	737	DAUD			X			X	X				X	X	X						X					
Decimal Update - MVF	236	842	DAUM			X			X	X				X	X	X						X					
<b>Indexed</b>																											
Output	89	755	IOUT		X	X	X			X	X			X			X					X		X			
Output - MVF	134	840	IOUM		X	X	X			X	X		X	X		X						X		X			
Output Add	119	1251	IOAD		X	X	X			X	X			X		X	X	X	X	X	X	X	X	X	X		
Output Add - MVF	240	1413	IOAM		X	X				X	X		X	X	X		X	X	X	X	X	X	X	X	X		
<b>Indexed Random</b>																											
Input	69	683	IRIP							X					X	X		X	X	X	X	X					
Input - MVF	106	1008	IRIM							X		X			X	X		X	X	X	X	X	X	X			
Update	106	919	IRUP							X	X			X	X	X		X	X	X	X	X					
Update - MVF	143	1244	IRUM							X	X	X		X	X	X		X	X	X	X	X	X	X			
Input Add	286	1394	IRAD		X	X				X	X			X	X	X		X	X	X	X	X	X	X			
Input Add - MVF	330	1726	IRAM		X	X				X	X		X	X	X		X	X	X	X	X	X	X	X	X		
Update Add	319	1497	IRUA		X	X				X	X	X		X	X	X		X	X	X	X	X	X	X	X		
Update Add - MVF	362	1828	IRBM		X	X				X	X	X		X	X	X		X	X	X	X	X	X	X	X		
<b>Indexed Sequential</b>																											
Input	59	780	ISIP		X	X				X	X			X	X	X		X				X					
Input - MVF	72	833	ISIM		X	X				X	X	X		X	X	X		X				X					
Input - Limits	80	841	ISIL		X	X				X	X	X		X	X	X		X				X					
Update	125	728	ISUP		X					X	X	X		X	X	X		X				X					
Update - MVF	140	783	ISUM		X					X	X	X	X	X	X		X					X					
Update - Limits	136	779	ISUL		X					X	X	X	X	X	X		X					X					
Input Add	321	1214	ISAD		X	X		X		X	X	X		X	X	X		X	X	X	X	X	X	X	X		
Input Add - MVF	338	1333	ISAM		X	X		X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		
Update Add	395	1358	ISUA		X	X		X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		
Update Add - MVF	415	1480	ISBM		X	X		X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		
Input - Variable Limits	105	866	ISIC		X	X				X	X	X		X	X	X		X				X					
Update - Variable Limits	161	804	ISUC		X					X	X	X	X	X	X		X					X					

\*The direct binary access methods use a disk ADDRUT file to process another disk file. See IBM System/3 Disk Sort Reference Manual, SC21-7522 for a description of ADDRUT files.



Figure 65. Estimated Main Storage Requirements of Data Management Modules for 5444 Disk with Shared I/O

5444 Shared I/O Access Methods	Main Routine (Bytes)	Complete Access Method (Bytes)	Module Name (\$\$---)	Subroutines -- Name (\$\$---) and Size in Bytes																		
				SCBI (74)	SCCB (75)	SCCL (91)	SCDA (151)	SCDF (33)	SCDJ (35)	SCIC (70)	SCIF (46)	SCIU (70)	SCLC (28)	SCMI (51)	SCMO (155)	SCRI (50)	SCSC (172)	SCSI (92)	SCSO (95)	SCTC (21)	SRTC (28)	SCUA (65)
<b>Consecutive</b>																						
Output	22	351	SCCO				X	X					X						X		X	
Input	63	387	SCCI					X		X	X								X		X	
Update	96	420	SCCU					X		X	X								X		X	
<b>Direct</b>																						
*Binary Input	68	528	SCBR			X	X		X	X	X								X			
Decimal Input	93	628	SCDR	X	X	X			X	X	X								X			
*Binary Update	94	554	SCBU		X	X	X		X	X	X								X			
Decimal Update	113	648	SCDU	X	X	X	X		X	X	X								X			
<b>Indexed</b>																						
Output	82	613	SCIO	X			X	X				X							X	X	X	
Output Add	72	934	SCIA	X			X	X				X		X	X	X	X		X		X	
<b>Indexed Random</b>																						
Input	48	621	SCRR					X		X	X	X	X						X			
Update	69	712	SCRU					X		X	X	X	X						X			
Input Add	144	1112	SCRA	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Update Add	169	1207	SCRB	X			X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
<b>Indexed Sequential</b>																						
Input	63	488	SCSR					X	X	X	X	X	X						X			
Input -- Limits	90	515	SCIL					X	X	X	X	X	X						X			
Update	83	578	SCSU					X	X	X	X	X	X	X				X				
Update -- Limits	122	617	SCUL					X	X	X	X	X	X	X				X				
Input Add	166	1033	SCSA	X	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
Update Add	192	1129	SCSB	X	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X

\*The direct binary access methods use a disk ADDROUT file to process another disk file. See *IBM System/3 Disk Sort Reference Manual*, SC21-7522 for a description of ADDROUT files.

Certain 5444 and 5445 disk data management access methods are able to support more than one type of file processing. For example, some multivolume access methods can support either single volume or multivolume files; direct and indexed random access methods that support update files also support input files. Figure 67 and 68 show the relationships among the access methods for 5444 and 5445 disk.

In calculating the main storage requirement for data management, these relationships must be taken into account. For example, if a program consecutively processes two 5444 disk input files, a multivolume sequential input file and a single volume sequential input file, only the multivolume access method (\$\$CSIM) is used for data management support (see Figure 67), since that access method can also support a single volume file.

Access Method	Performs Functions Of
<i>Sequential Files</i>	
\$\$CSOM	\$\$CSOP
\$\$CSIM	\$\$CSIP
\$\$CSUM	\$\$CSUP
<i>Direct Files</i>	
\$\$DAUM	\$\$DAIM, \$\$DAUD, \$\$DAUT, \$\$DAID, \$\$DAIT, \$\$DAUB, \$\$DAIB
\$\$DAIM	\$\$DAID, \$\$DAIT, \$\$DAIB
\$\$DAUD	\$\$DAID, \$\$DAUD, \$\$DAIB
\$\$DAUT	\$\$DAIT, \$\$DAUB, \$\$DAIB
\$\$DAID	\$\$DAIB
\$\$DAIT	\$\$DAIB
\$\$DAUB	\$\$DAIB
<i>Indexed Files (Sequential Processing)</i>	
\$\$ISIL	\$\$ISIP
\$\$ISUL	\$\$ISUP
\$\$ISUA	\$\$ISAD
<i>Indexed Files (Random Processing)</i>	
\$\$IRUA	\$\$IRUP, \$\$IRAD, \$\$IRIP, \$\$IOAD
\$\$IRUP	\$\$IRIP
\$\$IRAD	\$\$IRIP, \$\$IOAD

Figure 67. Relationships Among 5444 Disk Data Management Access Methods

Device	Module Name	Bytes (decimal)
1442 Card Read Punch	\$\$ARFF	493
5471 Printer/Keyboard (console)	\$\$CODM	164
(add for Macros Feature)	\$\$COAM	129
5424 MFCU Read/Punch	\$\$MFRU	372
Read/Print	\$\$MFRP	441
Read Only	\$\$MFRD	325
Punch Only	\$\$MFPU	452
Print Only	\$\$MFPR	266
Print/Punch	\$\$MFPP	316
Full Function	\$\$MFFF	487
5203/1403 Printer	\$\$LPRT	251

Figure 69. Main Storage Requirements for Other Data Management and IOS

For example, suppose you have received the base SCP (5702-SC1 with no features) and RPG II (5702-RG1). You can calculate the secondary storage requirement of the distribution disk cartridge as follows:

- Using Figure 70, determine the number of directory entries and sectors required for the source and object libraries.

	Base SCP	RPG II	Total
Object library directory entries	461	147	608
Object library sectors	2025	1233	3258
Source library directory entries	41	9	50
Source library sectors	166	23	189

- Convert these totals to tracks for the object library.

Note:  $\lceil \quad \rceil$  means the resulting quantity should be rounded upward to the next whole number.

Number of directory tracks:

$$\left\lceil \frac{608 \text{ entries}}{288 \text{ entries/track}} \right\rceil = 3 \text{ tracks}$$

(287 on the last track)

Total tracks for object library and directory:

$$\left\lceil \frac{3258 \text{ sectors}}{24 \text{ sectors/track}} \right\rceil + 3 \text{ tracks for directory} = 139 \text{ tracks}$$

- Convert these totals to tracks for the source library.

Number of directory sectors (minimum of 2 sectors):

$$\left\lceil \frac{50 \text{ entries}}{19 \text{ entries/sector}} \right\rceil = 3 \text{ sectors}$$

Total sectors for source library and directory:

$$189 \text{ sectors library} + 3 \text{ sectors directory} = 192 \text{ sectors}$$

Total tracks:

$$\left\lceil \frac{192 \text{ sectors}}{24 \text{ sectors/track}} \right\rceil = 8 \text{ tracks}$$

- Find the total number of tracks required on the distribution disk cartridge by the programs you have ordered:

	Tracks
Object library directory	3
Object library and directory	139
Source library and directory	8
Scheduler work area (always required)	2
Cylinder zero (always reserved for system use)	2
<b>Total</b>	<b>154</b>

In this example, the features ordered for the system easily fit onto either a half-capacity disk (200 tracks) or a full-capacity disk (400 tracks). If several large SCP programs and program products are ordered, however, the storage requirement of the system can exceed the capacity of a single half-capacity disk cartridge.

#### **Determining Library Requirements on Generated System Packs and Program Packs**

This topic provides you with the information you need to estimate the disk space requirements of generated SCP programs and program products, and provides the COPY statement and DELETE statement parameters you will need to transfer your programs from one pack to another or delete them from a pack. (See *Tailoring System or Program Packs for Unique Requirements* later in this section for COPY and DELETE statement models.)

You may need this information for several reasons. Perhaps you need to know the disk storage requirements of the SCP programs and program products so that you can determine the adequacy of the library allocations during system generation and modify those allocations if necessary. You might need to determine library size requirements on separate system packs you are creating or on program packs you are building for certain program products. Perhaps you want to calculate the amount of file space which will be available on a pack that contains one or more of your system programs.

Figures 71 and 72 list the library space requirements and the COPY/DELETE parameters for selected SCP programs and data management modules and for all program products. The library space requirements reflect the latest estimates for these programs.

Program	COPY/DELETE Parameters		Object Library		Source Library		Notes
	LIBRARY-	NAME-	Directory	Sectors	Directory	Sectors	
			Entries		Entries		
* Disk Initialization <sup>5</sup>	O	\$IN.ALL	5	39	-	-	
Add for 5445 Feature			4	24	-	-	
* File and Volume Label Display <sup>5</sup>	O	\$LA.ALL	3	25	-	-	
Add For 5445 Feature			2	19	-	-	
* Library Maintenance	O	\$MA.ALL	35	206	-	-	6 Sector and directory entry counts include the macro processor and all macros; the COPY/DELETE parameters apply only to the macro processor.
5445 Data Interchange Utility	O	\$VT.ALL	3	27	-	-	The source library names of the individual macros are:
* Linkage Editor (see note under RPG II in the next figure)	O	\$LI.ALL	12	64	-	-	\$ALOC \$FTCH \$PUTT \$CHK \$FIND \$RDD \$CKL \$GETD \$RDT \$CLOS \$GETT \$SNAP \$COMN \$GPU \$SVC \$CTLT \$IOBD \$STRAN \$DTFD \$IOED \$TRL \$DTFT \$LOAD \$WAIT \$DTFU \$OPEN \$WRTD \$DTOD \$PKBU \$WRTT \$DTOT \$PRNT \$WTT \$DTOU \$PUTD \$XCTL \$EOJ
Overlay Linkage Editor (see note under COBOL/FORTRAN IV/assembler in the next figure)	O	\$OL.ALL	16	199	-	-	
Tape Initialization	O	\$TI.ALL	2	20	-	-	
Magnetic Tape Error Summary Utility	O	\$TVES	1	9	-	-	7 Directory entries and sectors are counted under data management.
Dump/Restore	O	\$DCOP.ALL	5	42	-	-	8 The source library names of the individual macros are:
System Generation	O P	\$SG.ALL \$SG.ALL	2	2	3	3	\$CLM \$RC40 \$SB40 \$CTLM \$RC41 \$SDRM \$DTFM \$RC50 \$SD40 \$DTOM \$RDM \$SD41 \$GEN \$RF40 \$SD50 \$OPM \$RF41 \$WRTM \$POLM \$RF50 \$RB40 \$RU40
Macros Feature <sup>6</sup>	O R R R R	\$MP.ALL \$COAM <sup>7</sup> \$BMCC <sup>7</sup> \$BMCH <sup>7</sup> \$BMDP <sup>7</sup>	10	75	38	256	
MLTA (Multiple Line Terminal Adapter) RPQ <sup>8</sup>	O R	\$MLMC1 \$ML.ALL <sup>9</sup> \$ML.ALL <sup>7</sup>	1	10	22	205	9 Directory entries and sectors are counted under <i>Minimum SCP Options</i> .
ML/MP (Multiline/Multipoint) Feature <sup>10</sup>	O R	\$BS.ALL <sup>9</sup> \$BS.ALL <sup>7</sup>	-	-	13	160	10 The source library names of the individual macros are: \$BCPL \$CANB \$GETB \$PUTB \$DFOB \$DTFB \$POLB \$RFT

\* = Part of Base SCP(5702-SC1)

Figure 71 (Part 2 of 4). Library Requirements and COPY/DELETE Parameters for SCP Programs

Program	COPY/DELETE Parameters		Object Library		Source Library		Notes	
	LIBRARY-	NAME-	Directory	Sector	Directory	Sector		
			Entries		Entries			
Add for ML/MP			3	24	-	-	14 See figure entitled "Estimated Main Storage Requirements of 3410/3411 Magnetic Tape Units Data Management" under <i>Data Management Estimates</i> , earlier in this appendix, for a list of individual modules and subroutines.	
MLTA or ML/MP	R	\$\$BM.ALL	8	38	-	-		
Magnetic Tape Data Management 12								
Variable/fixed 14	R	\$\$CSTI \$\$CSTO \$\$CSAI \$\$CSAO	4	12	-	-		
Fixed 14	R	\$\$CSIA	8	22	-	-		
	R	\$\$CSIT						
	R	\$\$CSOA						
	R	\$\$CSOT						
Magnetic Tape Sub-routines 14	R	\$\$TS.ALL	13	30	-	-		15 Planned for FORTRAN IV only.
MLTA (RPQ) IOS 12	R	\$\$ML.ALL	22	65	-	-		* = Part of Base SCP (5702-SC1)
Basic Tape Data Management 15	R	\$\$BTAM	1	3	-	-		
3881 Optical Mark Reader	O	\$OMRD	1	4	-	-		

Figure 71 (Part 4 of 4). Library Requirements and COPY/DELETE Parameters for SCP Programs

### *Changing the Default Library Allocations*

When halt 91 is issued during system generation, the following message is given (see *Chapter 12. System Generation* for an example of SCP generation):

THE ALLOCATION FOR THE OBJECT LIBRARY IS  
170 TRACKS, FOR THE SOURCE LIBRARY 5 TRACKS,  
AND FOR THE OBJECT LIBRARY DIRECTORY  
4 TRACKS. YOU SHOULD DETERMINE THE ADE-  
QUACY OF THESE ALLOCATIONS AND, IF NECES-  
SARY, ALTER THE ALLOCATE CONTROL STATE-  
MENT WHICH FOLLOWS IN THE READER.

This halt allows you to change the default allocations. You may want to change the allocations for two reasons:

1. If the system you generate fills or nearly fills the libraries, you must reallocate at the completion of system generation before you can add your own programs to the libraries.
2. If you have ordered the SCP including all of its features and several of the larger program products or features, the required object library allocation may be in excess of 200 tracks. If you allow system generation to continue with the default object library allocation of 170 tracks, a halt of 68 is displayed on the message display unit. This halt indicates that the library is full. If a halt 68 occurs, you should take option 3, check your allocation, and repeat the system generation procedure.

The following example uses Figures 71 and 72 to estimate a library allocation. Suppose you wish to generate the Base SCP (5702-SC1), RPG II, and Disk Sort. Assume that you have the following devices: MFCU, 5203 printer, 5471 printer/keyboard, and 5444 disk; you want no other SCP or program product options or features. You can calculate library requirements for these programs as follows:

1. Determine the number of directory entries and sectors required for the source and object libraries.

*Total sectors for source library and directory:*

```

    2 sectors directory
    1 sector library
    -----
    3 total sectors
  
```

*Total tracks:*

$$\left[ \frac{3 \text{ sectors}}{24 \text{ sectors/track}} \right] = 1 \text{ track}$$

4. Use the results of these calculations to code the ALLOCATE statement.

```
// ALLOCATE TO-F1,OBJECT-122,SOURCE-1,
SYSTEM-YES,DIRSIZE-2
```

In this case, the default allocations could have been reduced. In order to add user programs and to provide adequate library space on the system pack for the maintenance of these programs, you should increase these allocations beyond those necessary to complete system generation. For example:

```
// ALLOCATE TO-F1,OBJECT-122,SOURCE-1,
SYSTEM-YES,DIRSIZE-2
```

*Note:* If the total number of tracks required for your system plus program products is in excess of your disk capacity, you must generate two system packs (see *Generating Two System Packs*).

If Inquiry and/or Checkpoint/Restart are selected during system generation, the size of the scheduler work area varies with the size of main storage and whether the system is dedicated or DPF:

Main Storage Bytes	Scheduler Work Area with Inquiry and/or Checkpoint/Restart		Scheduler Work Area without Inquiry and/or Checkpoint/Restart	
	Dedicated	DPF	Dedicated	DPF
12K (12,228 bytes)	6	8	2	4
16K (16,384 bytes)	7	9	2	4
24K (24,576 bytes)	8	10	2	4
32K (32,768 bytes)	10	12	2	4
48K (49,152 bytes)	12	14	2	4
64K (65,536 bytes)	15	17	2	4

Figure 73. Determining the Number of Tracks Required for the Scheduler Work Area



1	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72															
// COPY FROM																(R1) F1	TO	(R1) F1	RETAIN-R, LIBRARY-										Obtain from Figure 71 or 72		NAME-	Obtain from Figure 71 or 72	
																(R2) F2		(R2) F2															
																(R2) F2		(R2) F2															
// DELETE FROM																(R1) F1		(R1) F1	RETAIN-P, LIBRARY-										Obtain from Figure 71 or 72		NAME-	Obtain from Figure 71 or 72	
																(R2) F2		(R2) F2															
																(R2) F2		(R2) F2															



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