File Number S360(Mod.20)-20
Form C33-6006-2

DPS

IBM

Systems Reference Library

IBM System/360 Model 20
Disk Programming System
System Generation and Maintenance

This reference publication contains specifications and operating procedures for preparing an installation-tailored Disk Programming System. It also covers some considerations to apply in selecting the features that are to be included in a tailored Monitor. This publication is of interest to systems analysts as well as to programmers and operators.

To derive the maximum benefit from this publication, the reader must be thoroughly familiar with the functions and the operation of all components of his System/360 Model 20. The publications describing these components are listed in the SRL publication IBM System/360 Model 20, Bibliography, Form A26-3565.

Third Edition (March, 1969)

This is a major revision of, and obsoletes, C33-6006-1.

The technical changes incorporated in the publication relate to the delivery of IBM System/360 Model 20, Submodel 5.

Most of the text has been rewritten and reorganized to make the publication easier to understand. Therefore, this edition should be reviewed in its entirety.

This edition describes the following component of IBM System/360 Model 20, Disk Programming System and to all subsequent versions and modifications until otherwise indicated in new editions or Technical Newsletters.

Monitor Generation Macro Definitions, version 2, modification 0.

Changes are continually being made to the specifications herein; before using this publication in connection with IBM systems, consult the latest IBM System/360 Model 20 SRL Newsletter, Form N20-0361, for the editions that are applicable and current.

This publication was prepared for production using an IBM computer to update the text and to control the page and line format. Page impressions for photo-offset printing were obtained from an IBM 1403 Printer using a special print chain.

Requests for copies of IBM publications should be made to your IBM representative or to the IBM branch office serving your locality.

A form for reader's comments is provided at the back of this publication. If the form has been removed, comments may be addressed to IBM Laboratories, Programming Publications, 703 Boeblingen/Germany, P.O. Box 210.

Contents

Introduction

This publication provides you with the detailed procedures and operating instructions required to

- prepare operable disk-resident and card-resident systems from IBM-supplied initial distribution and replacement distribution packages;
- update your operable systems with IBM-supplied modification (maintenance) packages; and
- generate a tailored Monitor from IBM-supplied Monitor Generation Macro Definitions.

When you initially order the programming support for the IBM System/360 Model 20 Disk Programming System, IBM supplies you with the latest versions of all IBM-developed programs and macro definitions available for the Model 20 DPS. Initial distribution is sent to you on a disk pack or reel of magnetic tape supplied by you. The procedures you must follow to prepare an operable disk-resident system (or systems) and (optionally) a card-resident system are described in the section System Preparation.

IBM is constantly making improvements or adding new features to the components (programs and macro definitions) of the Model 20 DPS. Whenever any changes to the DPS have been developed by IBM, an announcement is made. If you want to update your existing system with the latest modifications and improvements, you must order the new release.

When the changes that have been made to the system are extensive, IBM distributes a complete system. Such a distribution is called a replacement distribution and requires the preparation of a completely new system. The procedures you must follow for preparing operable disk-resident and card-resident systems from a replacement distribution package are the same as for initial distribution. They are described in the section System Preparation.

When only minor changes have been made to the system, replacement of the entire system would be impracticable. Therefore, the changes are distributed in modification packages which are designed so that you can incorporate all or some of the modified components into your existing systems. The documentation accompanying a new release will indicate whether preparation of a new system is necessary. If it is not necessary to prepare a new system, you must use the procedures described in the section System Maintenance.

Replacement and modification packages are also distributed on a disk pack or a magnetic tape reel supplied by you.

The IBM-supplied distribution and replacement packages contain a standard Monitor. This Monitor corresponds to a generated Monitor defined by the default specifications described in the section Monitor Generation. If the requirements of your installation differ in any way from the features supported by this standard Monitor, you should generate a tailored disk-resident Monitor. Also, if you want to prepare a card-resident system, you must generate a Monitor of the type CDRES to obtain the card-resident control programs (IPL, Monitor, Job Control). The specifications and operating procedures for generating a Monitor are described in the section Monitor Generation.

MAXIMUM SYSTEM CONFIGURATION

Submodel 2

- An IBM 2020 Central Processing Unit, Model D2 (16,384 bytes of main storage), with or without an IBM Binary Synchronous Communications Adapter, Feature No. 2074;
- two IBM 2311 Disk Storage Drives, Model 11 or 12 (both must be the same model);
- an IBM 2415 Magnetic Tape Unit, Model 1 through 6;
- an IBM 2501 Card Reader, Model A1 or A2;
- an IBM 1442 Card Punch, Model 5;
- one of the following card units:

  IBM 2520 Card Read-Punch, Model A1,
  IBM 2520 Card Punch, Model A2 or A3,
  IBM 2560 MFCM, Model A1;

- one of the following printers:

  IBM 1403 Printer, Model N1, 2, or 7,
  IBM 2203 Printer, Model A1;

- an IBM 2152 Printer-Keyboard;

- one of the following magnetic character readers:

  IBM 1419 Magnetic Character Reader, Model 1 or 3,
  IBM 1259 Magnetic Character Reader, Model 1, 31, or 32.

Submodel 4

- An IBM 2020 Central Processing Unit, Model D4 (16,384 bytes of main storage), with or without an IBM Binary Synchronous Communications Adapter, Feature No. 2074;
- two IBM 2311 Disk Storage Drives, Model 12;
- an IBM 2560 MFCM, Model A2;
- an IBM 2203 Printer, Model A2;
- an IBM 2152 Printer-Keyboard.

Submodel 5

- An IBM 2020 Central Processing Unit, Model E5 (32,768 bytes of main storage), with or without an IBM Binary Synchronous Communications Adapter, Feature No. 2074;
- four IBM 2311 Disk Storage Drives, Model 11 or 12;
- an IBM 2415 Magnetic Tape Unit, Model 1 through 6;
- an IBM 2501 Card Reader, Model A1 or A2;
- an IBM 1442 Card Punch, Model 5;
- one of the following card units:

  IBM 2520 Card Read-Punch, Model A1,
  IBM 2520 Card Punch, Model A2 or A3,
  IBM 2560 MFCM, Model A1;

- one of the following printers:

  IBM 1403 Printer, Model N1, 2, or 7,
  IBM 2203 Printer, Model A1;

- an IBM 2152 Printer-Keyboard;
- one of the following magnetic character readers:

  IBM 1419 Magnetic Character Reader, Model 1 or 3,
  IBM 1259 Magnetic Character Reader, Model 1, 31, or 32.

When you order a replacement release or when you initially order programming support for the Model 20 DPS, you receive a full system comprised of all IBM-supplied programs and macro definitions plus a file containing sample programs. These DPS components are listed in Figure 1. Depending on whether or not your system configuration includes magnetic tape drives, IBM distributes this programming material to you on a reel of magnetic tape or a disk pack supplied by you.

If distribution is on tape, it must first be copied onto a disk pack before it can be used. This and the punching out of the card-resident part of the disk IPL are accomplished by executing the first program on the distribution tape. If distribution is on disk, a card deck containing the card-resident portion of the disk IPL program is sent along with the distribution disk pack.

Program Title	Program Name
DPS Initial Program Loader for Disk-Resident System	--
DPS Standard Monitor Program of Disk-Resident System	--
DPS Job Control Program of Disk-Resident System	SYSEOJ
DPS Load System Disk Program	LDSYS
DPS Core-Image Maintenance Program	CMAINT
DPS Macro Maintenance Program	MMAINT
DPS Core-Image Service Program	CSERV
DPS Macro Service Program	MSERV
DPS Directory Service Program	DSERV
DPS Physical and Logical Unit Tables Service Program	PSERV
DPS Library Allocation Organization Program	AORGZ
DPS Copy System Disk	COPSYS
DPS Report Program Generator	RPG
DPS Assembler Program	ASSEMB
DPS Linkage Editor Program	LNKEDT
DPS Tape Sort/Merge Program	TAPSRT
DPS Disk Sort/Merge Program	SORT
DPS Tape-to-Tape Utility Program	TAPTAP
DPS Tape-to-Card Utility Program	TAPCAR
DPS Card-to-Tape Utility Program	CARTAP
DPS Tape-to-Printer Utility Program	TAPPRT
DPS Initialize Tape Utility Program	INITTP
DPS Initialize Disk Utility Program	INTDSK
DPS Disk-to-Disk Utility Program	DSKDSK
DPS Alternate Track Assignment Utility Program	ATASGN
DPS Disk-to-Tape Utility Program	DSKTAP
DPS Tape-to-Disk Utility Program	TAPDSK
DPS Disk-to-Card Utility Program	DSKCAR
DPS Card-to-Disk Utility Program	CARDSK
DPS Disk-to-Printer Utility Program	DSKPRT
DPS Clear Disk Utility Program	CLRDSK
DPS Disk Dump Utility Program	DDUMP
DPS Backup and Restore Program	BACKUP RESTOR
DPS Input/Output and Monitor Macro Definitions	--
DPS Input/Output Macro Definitions for the IBM 1419 and 1259 Magnetic Character Readers	--
DPS Monitor Generation Macro Definitions	--
DPS Input/Output Macro Definitions for Binary Synchronous Communications Adapter	--
DPS Printer-Keyboard Macro Definitions	--
DPS Sample Programs 1 through 9	

Figure 1. Summary of DPS Components

Contents	Location						Number of Sectors
	Begin Address			End Address			
	Cylinder	Track	Sector	Cylinder	Track	Sector	
Disk IPL (Disk-Resident Part)	0	0	0	0	0	9	10
Volume Label	0	1	0	0	1	0	1
Label-Information Area (LIA) for Job Control Program (Standard)	0	1	1	0	1	9	9
VTOC (Standard)	0	2	0	0	9	9	80
Alternate Track Area	1	0	0	3	9	9	300
System Directory	4	0	0	4	0	0	1
Monitor	4	0	1	4	1	9	19
Library Work Area	4	2	0	4	3	9	20
Core-Image Directory	4	4	0				
Core-Image Library*							
Macro Directory*	*These areas immediately follow the core-image directory and are adjacent to one another. The begin and end addresses may be displayed with the aid of the DSERV program.						
Macro Library*							
File containing Sample Programs**	**The begin and end addresses can be obtained by displaying the VTOC on the printer using the Initialize Disk Utility program.						

Figure 2. Organization of the Distribution Disk Pack

ORGANIZATION OF THE DISTRIBUTION DISK PACK

The distribution disk pack supplied by IBM or prepared by executing the first program on the distribution tape contains two files:

- The system file, which contains all disk-resident DPS programs and macro definitions in the form of an operational system.
- A file containing the sample programs of the DPS (in card-image format).

Figure 2 shows the organization of the distribution disk pack.

GENERAL PROCEDURE FOR SYSTEM PREPARATION

The distribution disk pack and the IPL cards together comprise an operable disk-resident system. Therefore, all you need in order to begin system operation is to prepare a backup copy of the system. However, in addition, you may want to punch out the sample programs and prepare a card-resident system, a minimum system, or a modified system.

The recommended procedure for use in preparing the system that meets the requirements of your individual installation is:

1. Backup. If distribution is on disk, copy it onto another disk pack or punch it into cards and save the disk pack or cards as backup. If distribution is on tape, copy it onto disk and save the distribution tape as backup.

2. Punch Sample Programs. If you want the set of IBM-supplied sample programs for operator training or for testing your new system after preparation is complete, punch the sample programs from the sample program file on disk into cards.

3. Prepare Card-Resident System. If you want to use the card-resident control programs (IPL, Monitor, and Job Control), generate a card-resident Monitor. You can also punch out IBM-supplied programs which you may wish to execute under control of the card-resident system.

4. Prepare a Minimum System. If you want a minimum system containing a minimum of IBM-supplied programs and including your own programs and macro definitions, do the following:

   a. Generate a minimum-sized Monitor tailored to your programming requirements.

b. Punch out the required IBM-supplied programs from the distribution disk pack.

c. Load the IBM-supplied programs, the generated Monitor, plus your own programs onto the minimum system disk pack.

5. Prepare Modified System. If you want to use a full disk-resident system, you can modify the IBM-supplied distribution pack by doing the following:

   a. Generate a tailored disk-resident Monitor and replace the standard Monitor by the generated Monitor on the distribution pack.

   b. Delete the IBM-supplied programs and macro definitions you do not require from the core-image and macro libraries and add your own programs and macro definitions to the system.

   c. Redefine the limits of the libraries and directories of your modified system.

   d. Make a copy of your modified system on disk or tape or punch it into cards to use as backup.

The operating procedures to follow and the jobs to perform upon receiving an initial distribution or replacement distribution package are shown in Charts A0 through E:

- Chart A0 shows the overall flow of preparation.
- Chart A1 shows the procedure to follow for disk-tape systems.
- Chart A2 shows the procedure to follow for multi-drive systems (disk only).
- Chart A3 shows the procedure to follow for single-drive systems (disk only).
- Charts B through E show procedures for all three systems to punch out the sample programs (Chart B), to prepare a card-resident system (Chart C), to prepare a minimum system (Chart D), and/or to prepare a modified system (Chart E).

In the // ASSGN cards shown in the charts, substitute the device type (such as tape drive, disk drive, card reader) with the following:

```
// ASSGN SYSxxx,X'cuu',dd,X'ss'

   SYSxxx can be: SYSRES
                  SYSRDR
                  SYSIPT
                  SYSOPT
                  SYS000-SYS019
   X'cuu' -- physical device address
          c  =  1  2501 Card Reader
                2  2520 or 2560
                3  1442 Card Punch
                4  1403 or 2203 Printer
                7  2415 Tape Drive
                8  2311 Disk Drive
         uu  =  01  disk
                02  disk
                03  disk
                04  disk
                08  tape
                 .   .
                 .   .
                 .   .
                FD  tape
      dd -- device type
                D3  2311  Model 11
                D4  2311  Model 12
                L1  1403  Printer
                L3  2203  Printer
                P2  1442  Card Punch
                P3  2520  Card Punch
                R4  2501  Card Reader
                R5  2520  Card Read Punch
                R6  2560  MFCM Primary Feed
                R7  2560  MFCM Secondary
                          Feed
                T1  2415  7-track tape
                T2  2415  9-track tape
   X'ss' -- specification for 9-track tape
                C0  1600  BPI
                C8   800  BPI
```

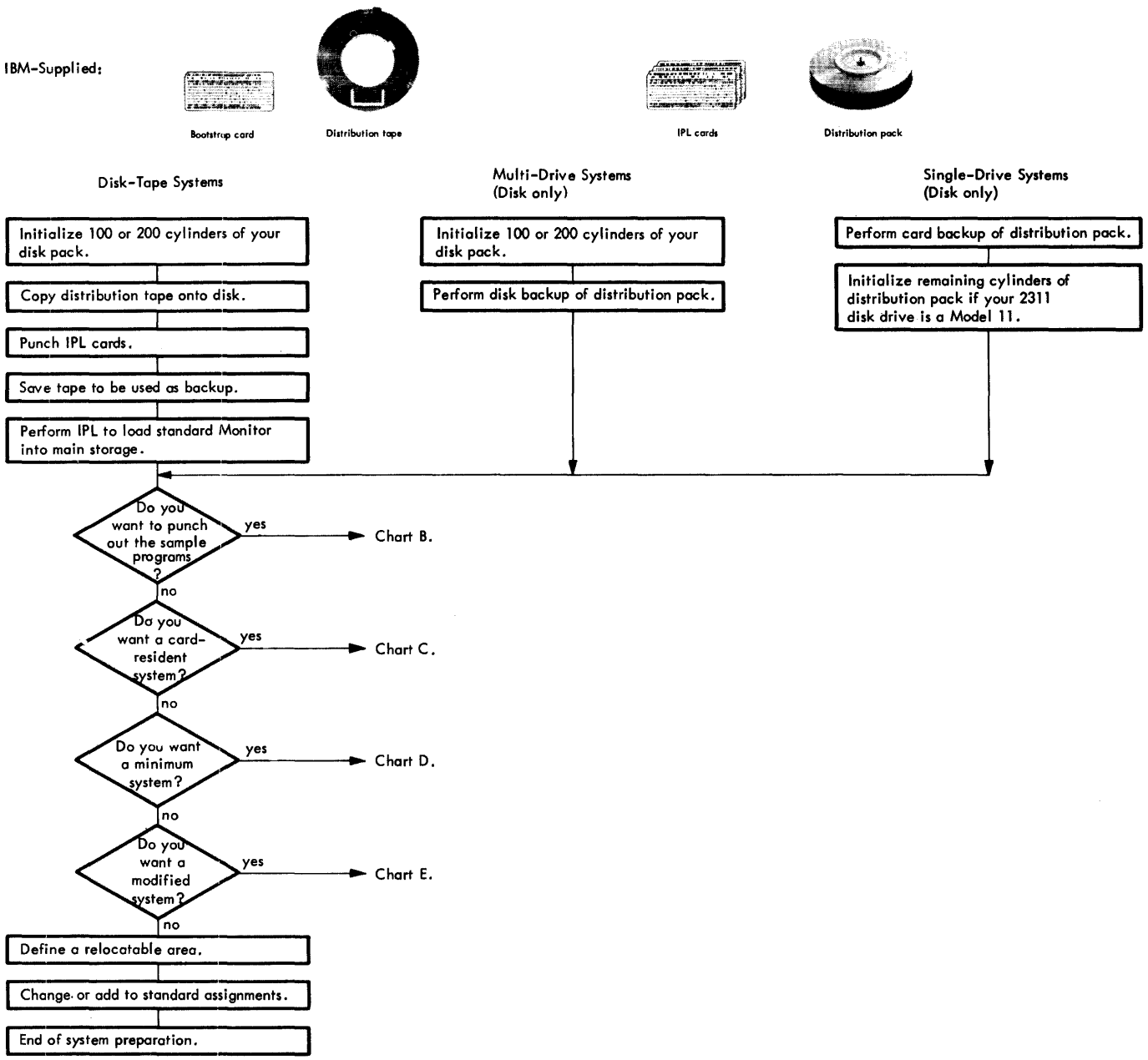
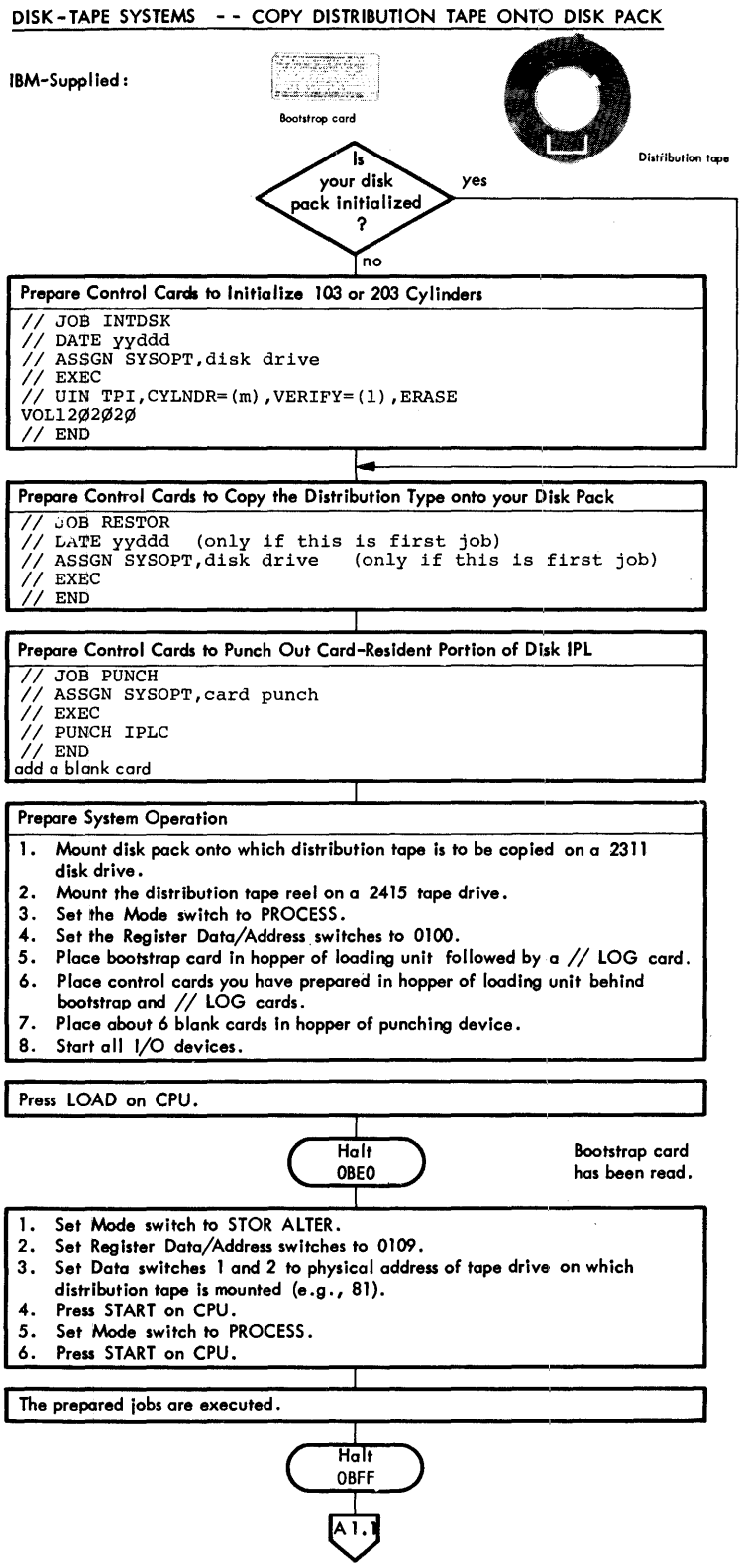


Chart A0. Overall Flow of Preparation



Note: In the // UIN control card m=202 for 3211 Model 11 or, m=101 for 2311 Model 12. If you use a volume serial number other than 202020 to initialize your disk pack, prepare a VOL1 card with your volume serial number.

Chart A1. Prepare Distribution Pack and IPL Cards from Distribution Tape, Part 1 of 2

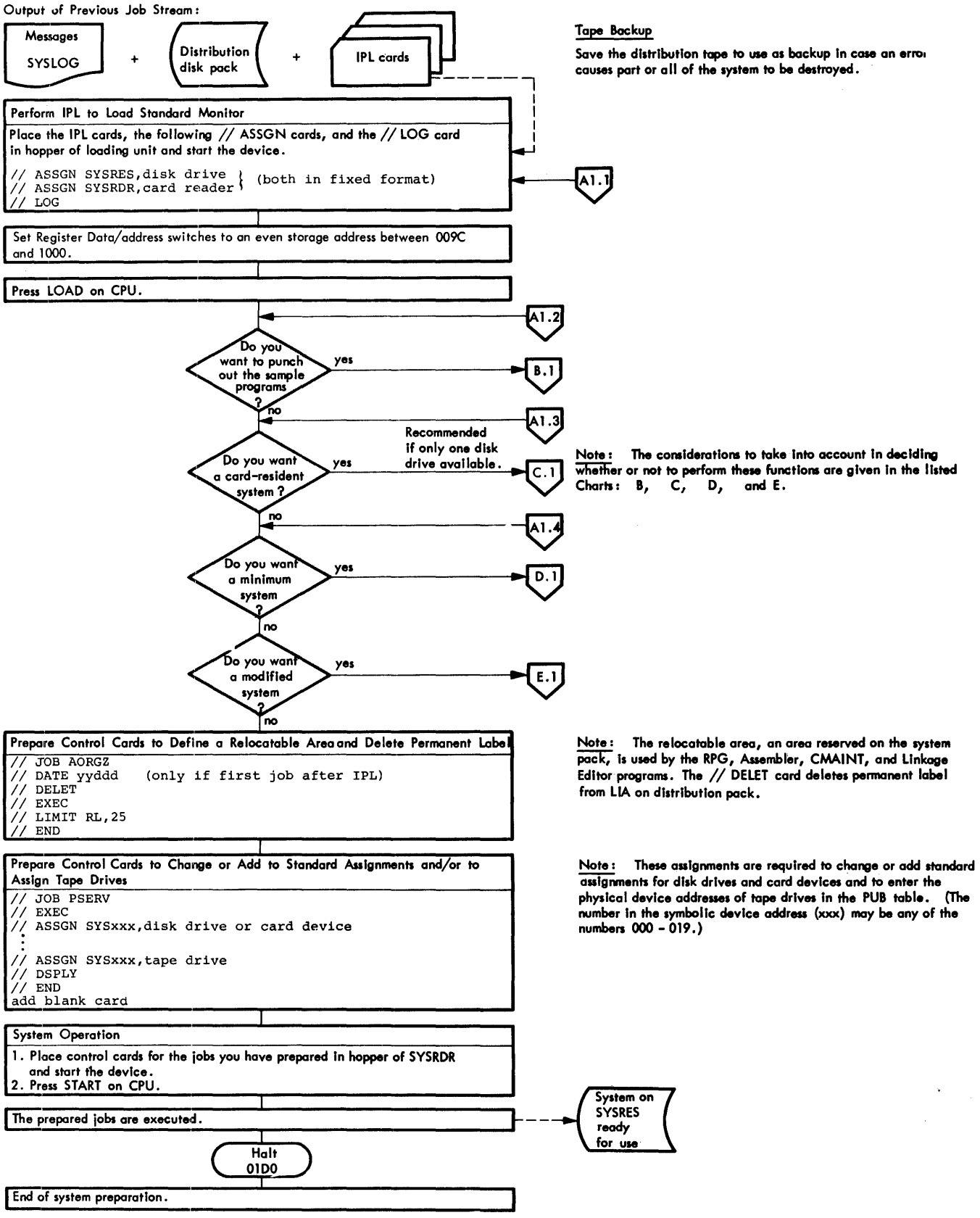
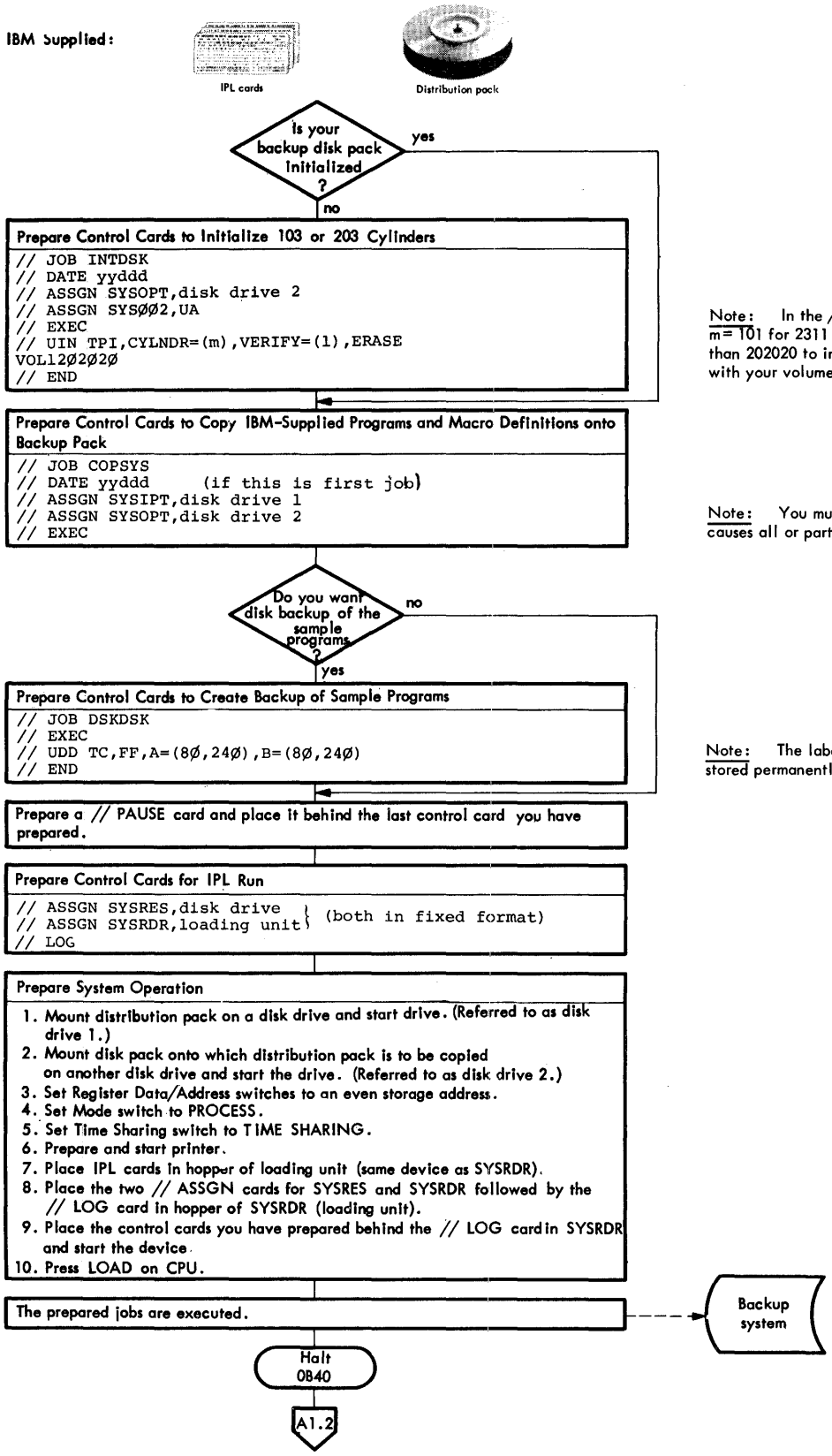


Chart A1. Prepare Distribution Pack and IPL Cards from Distribution Tape, Part 2 of 2

MULTI-DRIVE SYSTEMS (DISK ONLY) - - COPY DISTRIBUTION PACK



Note: In the // UIN control card m=202 for 2311 Model 11 or, m=101 for 2311 Model 12. If you use a volume serial number other than 202020 to initialize your disk pack, prepare a VOL1 card with your volume serial number.

Note: You must have backup of the system in case an error causes all or part of the system to be destroyed.

Note: The label information required for the DSKDSK job is stored permanently in the LIA of the distribution pack.

Chart A2. Create Disk Backup of Distribution Pack

SINGLE DRIVE SYSTEMS (DISK ONLY) - - COPY DISTRIBUTION PACK

IBM-Supplied:


IPL cards


Distribution pack

Prepare Control Cards to Punch Out the IBM Supplied Programs to be Used as Backup

```
// JOB CSERV
// DATE yyddd
// ASSGN SYSOPT,card punch
// EXEC
// PUNCH
// IPL
// PUNCH
// MONTR
// PUNCH ALL
// END
```

Do you want backup of macro library ? — no / yes

Prepare Control Cards to Punch Out the IBM-Supplied Macro Definitions to be Used as Backup

```
// JOB MSERV
// EXEC
// PUNCH ALL
// END
```

Is disk drive a Mod. 11 ? — no / yes

Prepare Control Cards to Initialize Remaining Cylinders of Disk Pack

```
// JOB INTDSK
// ASSGN SYSOPT,disk drive
// EXEC
// UIN TSI,VERIFY=(1)
// END
```

Prepare a // PAUSE card and place it behind the last control card you have prepared.

Prepare Control Cards for IPL Run

```
// ASSGN SYSRES,disk drive  }
// ASSGN SYSRDR,card device } (both in fixed format)
// LOG
```

Prepare System Operation

1. Mount distribution pack on disk drive and start the drive.
2. Place blank cards in the hopper of a punching device.
3. Set Register Data Address switches to an even storage address between 009C and 1000.
4. Set Mode switch to PROCESS.
5. Set Time Sharing switch to TIME SHARING.
6. Prepare and start printer.
7. Place IPL cards in hopper of loading unit (same device as SYSRDR).
8. Place the two // ASSGN cards for SYSRES and SYSRDR, followed by the // LOG card, in hopper of SYSRDR (loading unit).
9. Place the control cards you have prepared behind the // LOG card and start the device.
10. Press LOAD on CPU.

The prepared jobs are executed. ---> Card backup

Halt 0840

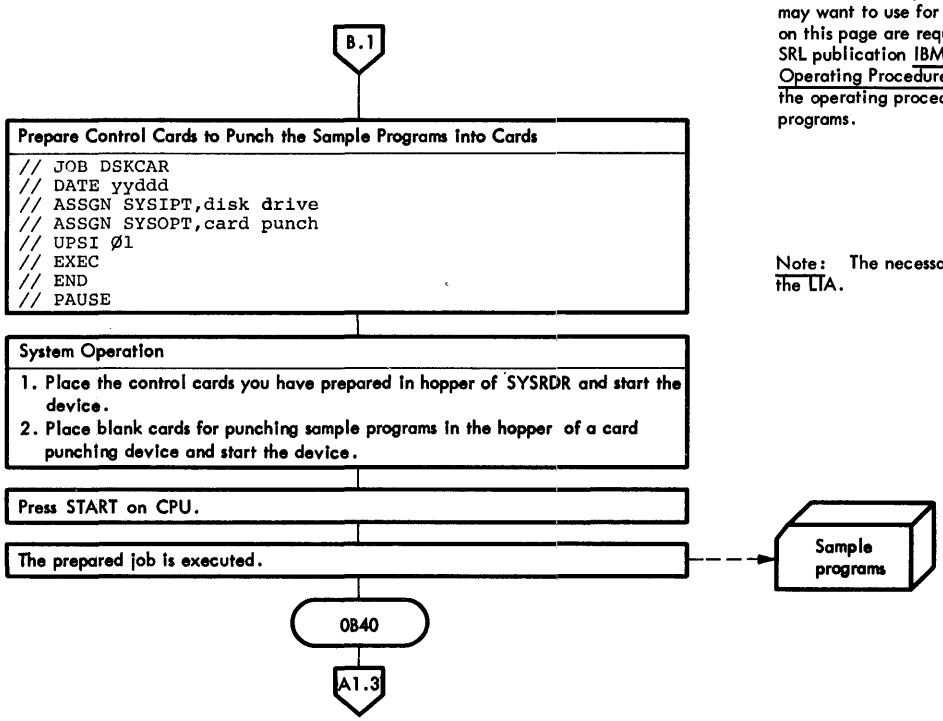
A1.2

Note: You must have backup of the system in case an error causes part or all of the system to be destroyed.

Note: If you want to create backup only for system programs and macro definitions that are to be used in regular system operations, do not use the // PUNCH ALL card for the CSERV and MSERV jobs. Instead, use a separate PUNCH card (of the format // PUNCH operand) for each program or macro definition to be punched out. The operands to use in the PUNCH cards are shown for each IBM-supplied program and macro definition in Appendixes A and B.

Note: Only 103 cylinders of the distribution disk pack are initialized. If your disk drive is a Model 11, the remaining 100 cylinders must be initialized.

Chart A3. Create Card Backup of Distribution Pack

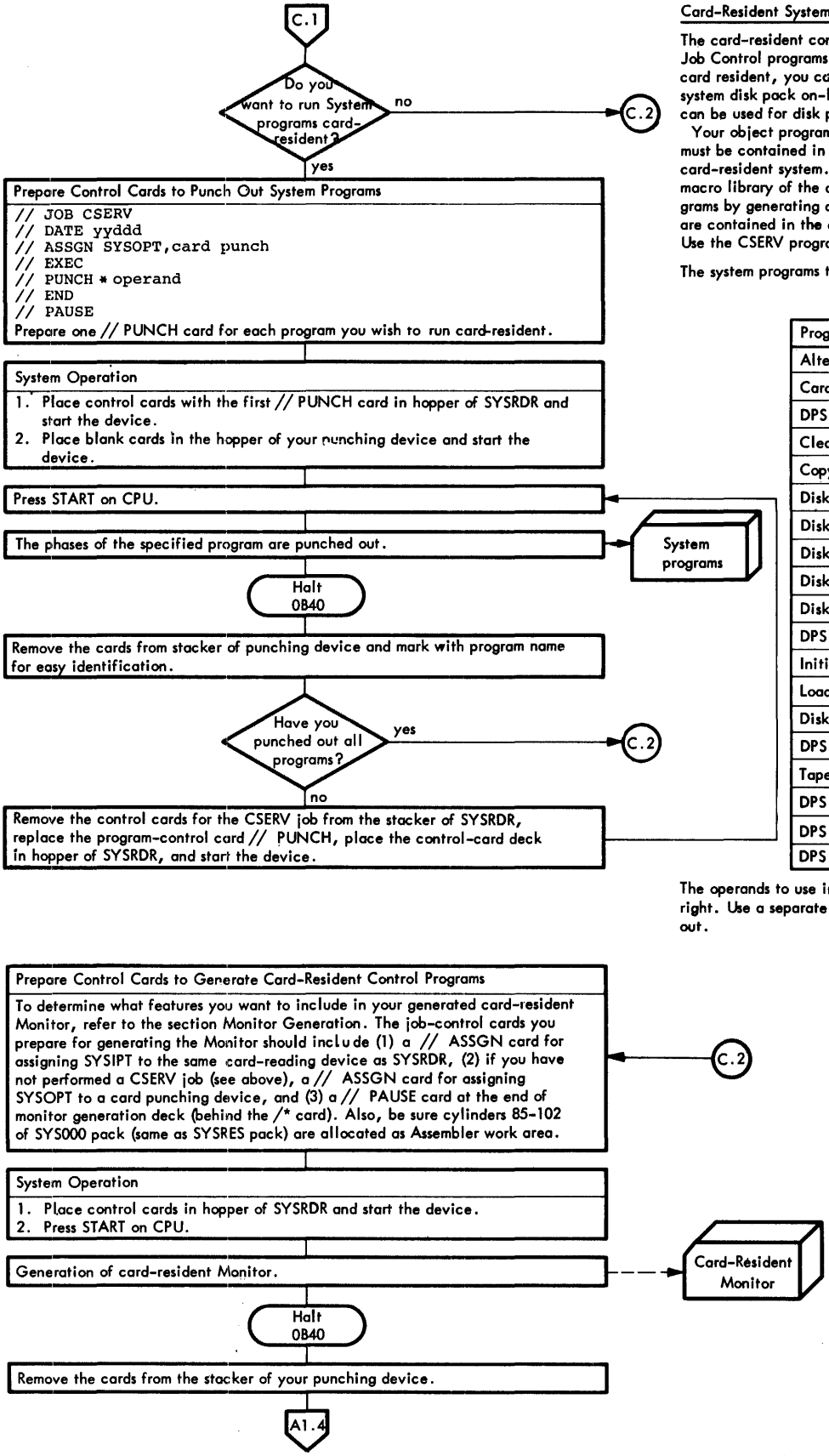


Sample Programs

The distribution package includes sample application programs you may want to use for training and testing purposes. The steps shown on this page are required to punch these programs into cards. The SRL publication IBM System/360, Disk Programming System, Operating Procedures, Form C33-6004 contains a description of the operating procedures required to run each of the sample programs.

Note: The necessary label information is stored permanently in the LIA.

Chart B. Punch Sample Programs (Optional)



Card-Resident System

The card-resident control system consists of the IPL, Monitor and Job Control programs. If you have these three system programs card resident, you can run system operations without having a system disk pack on-line. This means that all attached disk drives can be used for disk packs containing data files and work areas.

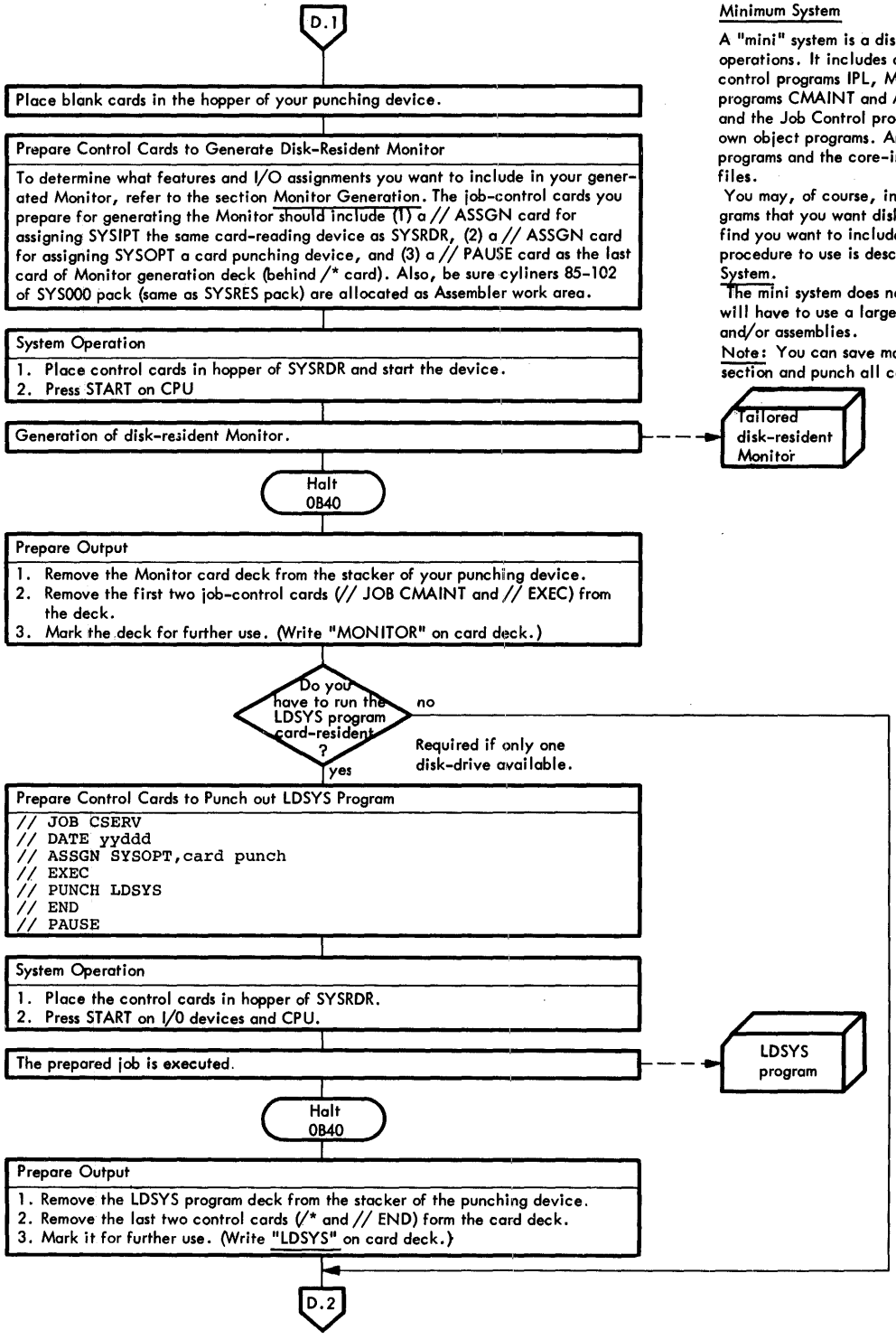
Your object programs and both the control and system programs must be contained in punched cards in order to run under the card-resident system. The control programs are contained in the macro library of the distribution pack: You can obtain these programs by generating a card-resident Monitor. The system programs are contained in the core-image library:
Use the CSERV program for punching them into cards.

The system programs that are listed below can be run card-resident:

Program	* Operand
Alternate-Track Assignment Utility	ATASGN
Card-to-Disk Utility	CARD,ALL
DPS Card-to-Tape Utility	CART,ALL
Clear Disk Utility	CLRDSK
Copy System Disk	COPSYS
Disk Dump Utility	DDUMP
Disk-to-Card Utility	DSKC,ALL
Disk-to-Disk Utility	DSKD,ALL
Disk-to-Printer Utility	DSKP,ALL
Disk-to-Tape Utility	DSKT,ALL
DPS Initialize Tape Utility	INITTP
Initialized Disk Utility	INTDSK
Load System Disk	LDSYS
Disk Sort/Merge	SORT.ALL
DPS Tape-to-Card Utility	TAPC.ALL
Tape-to-Disk Utility	TAPD.ALL
DPS Tape-to-Printer Utility	TAPP.ALL
DPS Tape Sort/Merge	TAPS.ALL
DPS Tape-toTape Utility	TAPT.ALL

The operands to use in the // PUNCH statement are listed on the right. Use a separate CSERV job for each program to be punched out.

Chart C. Prepare a Card-Resident System (Optional)



Minimum System

A "mini" system is a disk-resident system used for day-to-day operations. It includes a minimum number of system programs: The control programs IPL, Monitor, and Job Control, plus the service programs CMAINT and AORGZ. Besides the two service programs and the Job Control program, the core-image library contains your own object programs. Any space not required by the control programs and the core-image library is available for storing data files.

You may, of course, include any additional IBM-supplied programs that you want disk-resident and use frequently; but if you find you want to include many IBM-supplied programs, a better procedure to use is described in Chart E. Prepare a Modified System.

The mini system does not replace a full system. For example, you will have to use a larger system when making RPG compilations and/or assemblies.

Note: You can save machine time by reading through this section and punch all control cards before you execute the jobs.

Chart D. Prepare a Minimum System (Optional), Part 1 of 3

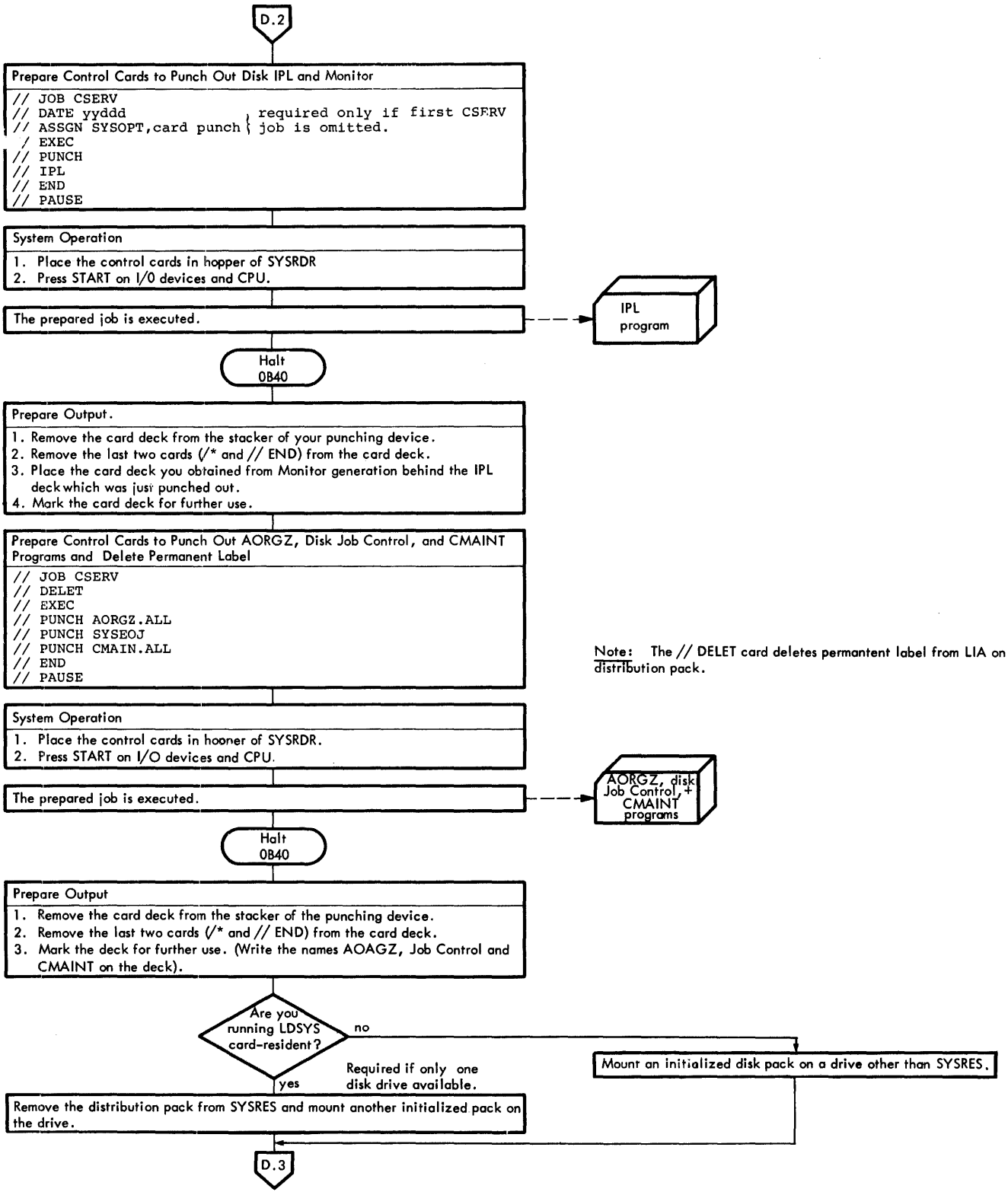


Chart D. Prepare a Minimum System (Optional), Part 2 of 3

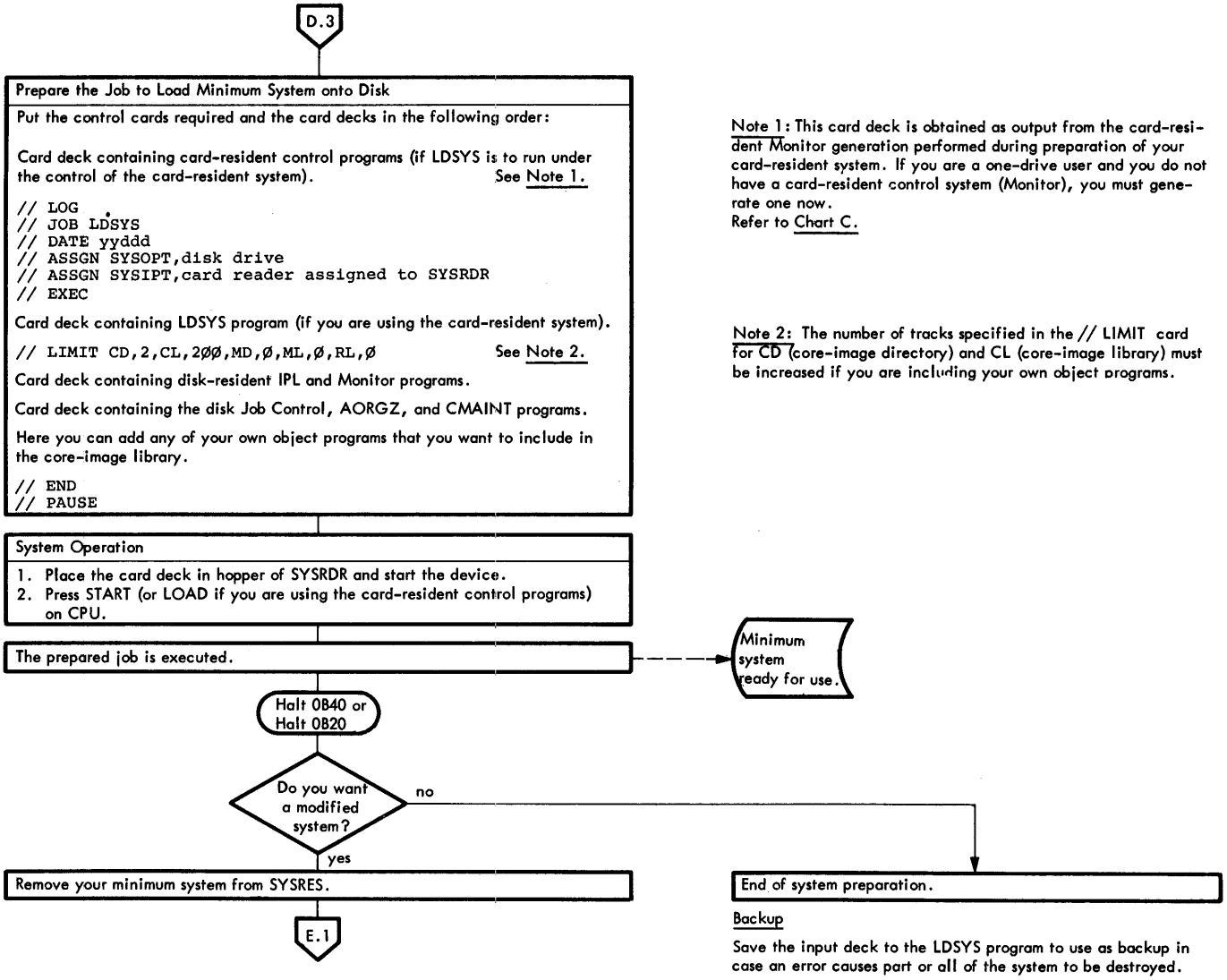
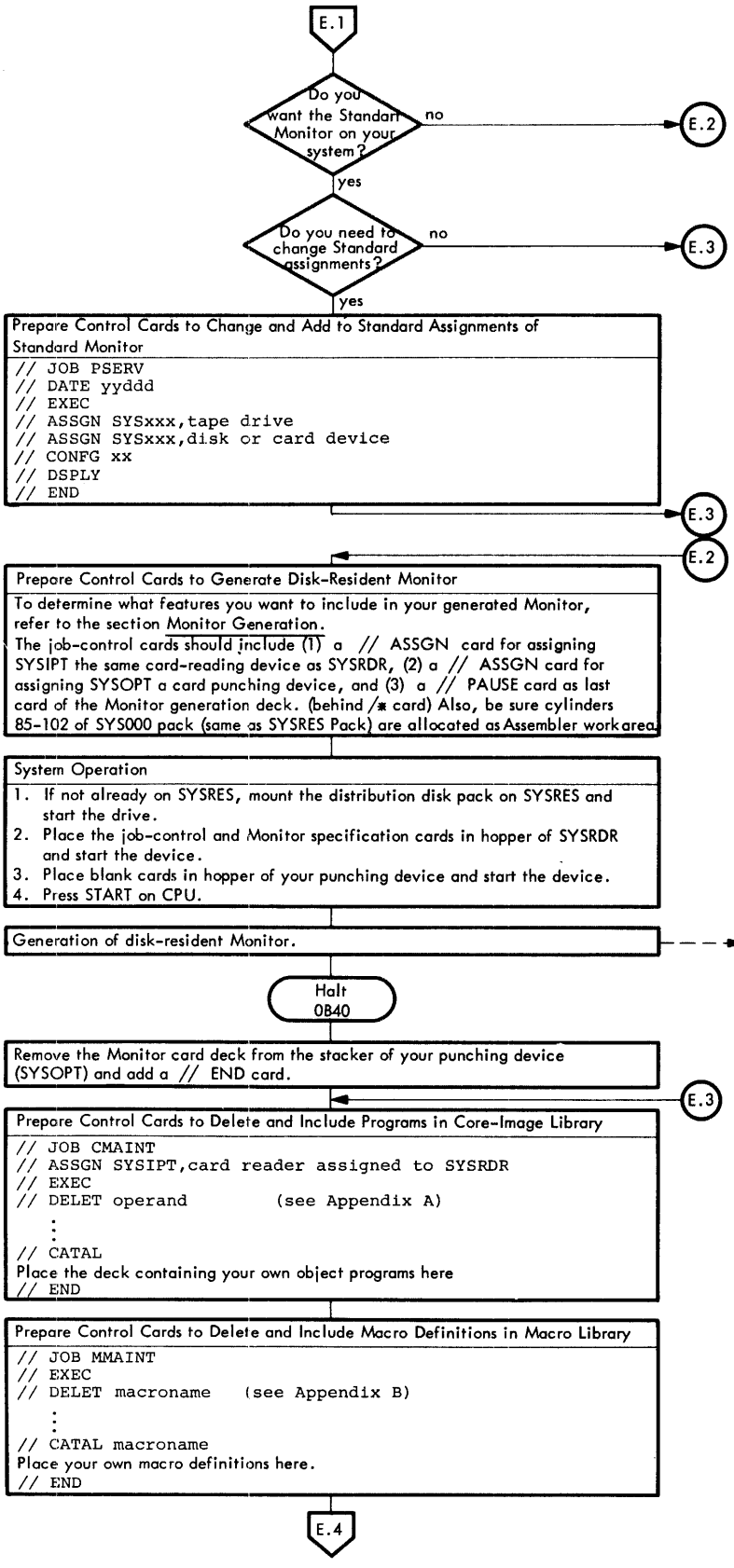


Chart D. Prepare a Minimum System (Optional), Part 3 of 3



Modified System

A modified system is a disk-resident system containing all system components (IBM-supplied programs and macro definitions) that are required for the applications of a particular installation. This modification includes generation of a tailored Monitor and deletion of any IBM-supplied programs and macro definitions you do not intend to use. Most users do not require system components for their particular applications. Use the CMAINT and MMAINT jobs shown below to delete any IBM-supplied programs and macro definitions not required.

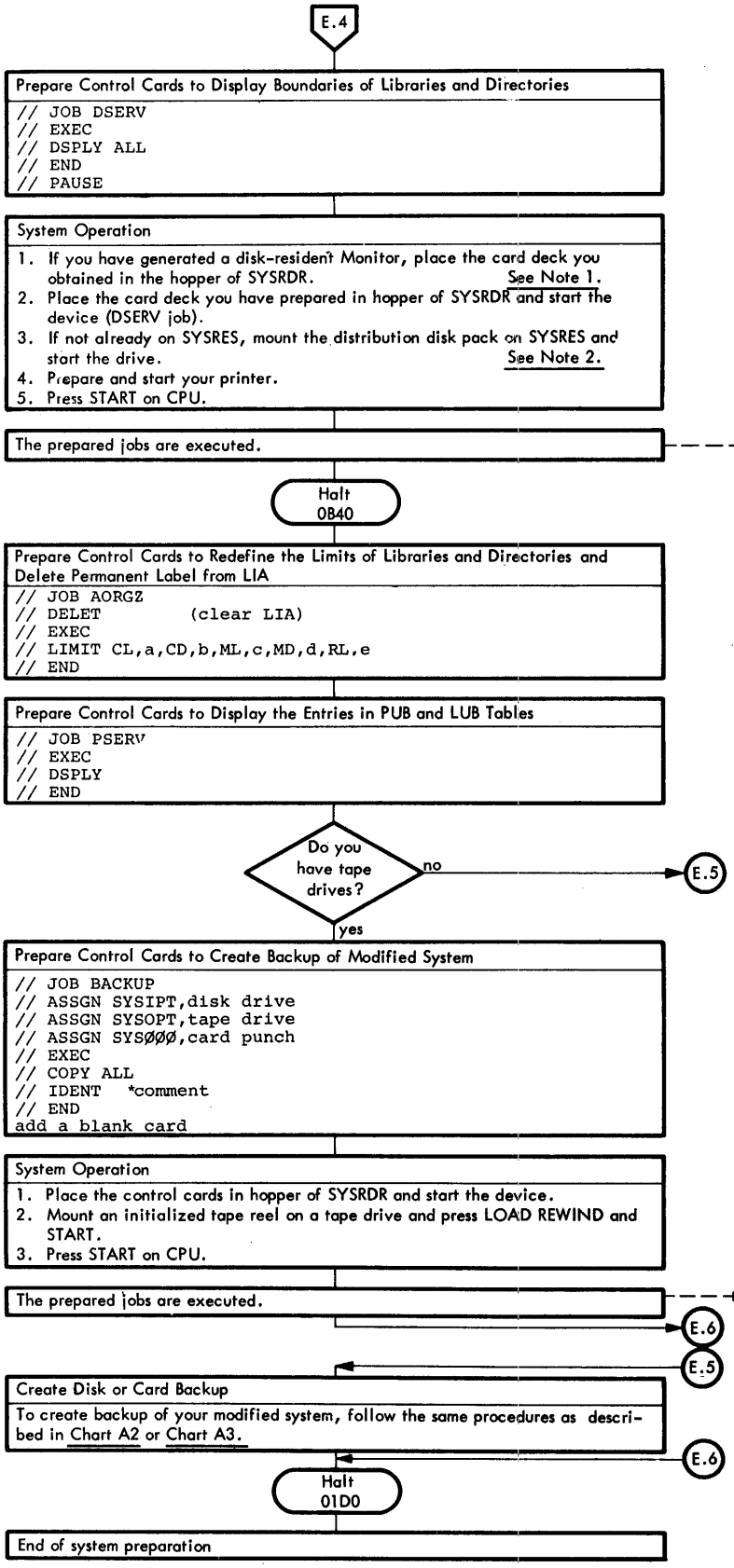
In addition, you may want to include your own object programs (by means of CMAINT) or macro definitions (by means of MMAINT).

Note: Use the // ASSGN SYSxxx,tape drive card format for assigning each tape drive attached. These // ASSGN cards are required to enter the physical device address of tape drives in the PUB table. The number in the symbolic device address (xxx) may be any of the numbers 000-019. Use the // ASSGN SYSxxx,disk drive or card device card format for adding and changing standard assignments in the standard Monitor. If you have a IBM 2203 Printer instead of an IBM 1403, you need not change the standard assignment.

Note: Use the CMAINT program to delete any IBM-supplied programs you do not intend to use. Refer to Appendix A for a complete list of IBM-supplied DPS programs and their phases. This list also shows the operand to use in the // DELET cards for deleting all the phases of a particular program.
To include your own object programs (or phases) in the core-image library, place a // CATAL card in front of each object program deck and insert it in the CMAINT job before the // END card.

Note: Use the MMAINT program to delete any IBM-supplied macro definitions you do not intend to use. Refer to Appendix B for a complete list of IBM-supplied macro definitions. Use a // DELET card of the format shown for each macro definition you want to delete. The macro name to use in the // DELET statement is given in Appendix B. If you wish to delete all IBM-supplied macro definitions, use the // DELET ALL format.
To include your own macro definitions in the macro library, place a // CATAL card in front of each macro definition deck and insert it in the MMAINT job before the // END card.

Chart E. Prepare a Modified System (Optional), Part 1 of 2



Note: Use the DSERV program to determine the extents occupied by the libraries and directories of your system. Use the information in the following AORGZ job for redefining the limits of the libraries and directories.

Printout Example:

SYSTEM D	FIRST SECTOR	LAST OCC	SECT ALLOC	SECT OCC	SECT AVAIL
CORE IMAGE D	004 4 0	004	40	37	3
CORE IMAGE L	004 8 0	034	3020	3013	7
MACRO D	035 0 0	035	10	8	2
MACRO L	035 1 0	078	4380	4379	1
RELOC AREA	078 9 0	078	0		

Note 1: The CMAINT job and program control cards for replacing the Monitor are automatically supplied when the disk-resident Monitor generation output is in punched cards. During execution of the CMAINT job, halt 0B33 occurs. Press START on the CPU to continue processing.

Note 2: If you do not wish to use the distribution pack (full system), you need to copy it first onto another pack.

Note: If you do not plan to include any more entries in the core-image and macro libraries, use the number in the column headed SECTOCC of the above printout to determine the number of tracks to specify in the // LIMIT card (e.g. // LIMIT CL,302,CD,4,ML,438,MD,1). If no macro library is present, set the limits for the macro library and directory to zero (ML,0,MD,0).

Note: Use the PSERV program to display the entries contained in the PUB and LUB tables, and the features of the Monitor contained on your modified system pack.

Note: A bootstrop card is punched during execution of the BACKUP job.

* For example:
BACKUP OF MODIFIED SYSTEM
VERSION xx, MODIFICATION
LEVEL xx, 3/12/69

Chart E. Prepare a Modified System (Optional), Part 2 of 2

System Maintenance

When you order a new release in which only minor modifications or improvements have been made to the components of the IBM-supplied system, you will receive a modification (maintenance) package. If the configuration of your Model 20 installation includes magnetic tape drives, the modification package is distributed on a reel of magnetic tape. This tape is either supplied by you, or, if the modifications can be copied onto a Distribution Tape Reel (length = 200 feet), the modification package is distributed on a DTR. If your installation only includes disk drives, the modification package is distributed on a disk pack supplied by you.

With the distribution tape, a bootstrap card is distributed, and with a distribution disk pack, the card-resident portion of the disk IPL is distributed.

If the modification package is on tape, it must first be copied onto a disk pack by executing the first program on the modification tape using the bootstrap card.

A modification package distributed on disk (or obtained by copying tape onto disk) consists of the following:

- A minimum system file including
  1. A Label-Information Area (LIA).
  2. System control programs (disk IPL, standard Monitor).
  3. Core-image library containing the disk Job Control program and
     a. Disk-to-Card Utility program (DSKCAR) for punching out the IBM-supplied control card file and any new or changed sample programs,
     b. Disk-to-Printer Utility program (DSKPRT) for listing the control card file on the printer,
     c. Physical and Logical Unit Tables Service program (PSERV) for including assignments for any attached tape drives in the standard Monitor,
     d. Initialize Disk Utility program (INTDSK) for printing VTOC and initializing the work pack or backup pack,
     e. Core-Image and/or Macro Service programs (CSERV and MSERV) for obtaining the new program phases and/or macro definitions from the core-image and macro libraries on the modification pack. After these are obtained in cards or on a work tape or disk, they can be used as input to the CMAINT and MMAINT programs. (The CMAINT and MMAINT must be on your system pack to be updated.)
     f. Any new or modified program phases.
  4. Macro library containing any new or changed macro definitions.
- A file containing any new or modified sample programs.
- The control-card file containing all job control and program-control statements for the jobs required to update your disk-resident systems with the new and changed program phases and macro definitions. This file has been prepared to be used in a job stream.

If you receive the modification package on disk, the only cards you have to prepare are the control cards for the Disk-to-Card Utility program (JOB DSKCAR) to punch out the control-card file. When the modification package is distributed on tape, you will also have to prepare control cards for (1) copying this tape onto a disk pack (JOB RESTOR), (2) punching out the card-resident part of the disk IPL (JOB PUNCH), and (3) assigning one or more attached tape drives (JOB PSERV) if you are using the IBM-supplied standard Monitor. At least one tape drive must be assigned if you use a tape as intermediate storage media.

As soon as you have obtained the control-card file in cards, remove the program-control cards that will catalog or include any program phases or macro definitions you do not need in order to update your system.

During execution of the CSERV and MSERV jobs, halt 0B40 (PAUSE) will occur. This is required since some system programs (such as CMAINT and the Monitor) must be cataloged in a predetermined sequence. Therefore, do not change the sequence of the job control cards; remove only program-control cards.

According to the configuration of your Model 20 installation you must complete certain ASSGN cards and prepare your system for the jobs to be performed. Details on how to complete these cards and the operating procedures you should follow to update your systems are shown in the following charts (Charts F through J).

A skeleton of the cards that will be supplied in the control-card file is shown in the following list.

The control statements marked with an asterisk (*) are supplied only when the CMAINT, IPL, and Monitor programs have been modified.

```
   Control Statements                    Comments
   // JOB   DSKPRT                       PRINT IBM-SUPPLIED CONTROL CARDS
   // EXEC
   // UDP TL,FF,A=(80,240),B=(120)
   // END                                END OF DISK-TO-PRINTER JOB
   blank card
   // JOB   DSKCAR                       PUNCH SAMPLES
   // DELET
   // VOL   SYSIPT,UIN
   // DLAB
   // XTENT
   // EXEC
   // END                                END OF DISK-TO-CARD JOB
   // PAUSE
   blank card
*  // JOB   CSERV                        PUNCH CMAINT PHASES
*  // ASSGN SYSOPT,
*  // UPSI 01
*  // VOL
*  // DLAB
*  // XTENT
*  // EXEC
*  // PUNCH CMAINT
*  // PUNCH CMAIN1
*  // END
*  // PAUSE                              PREPARE CMAINT DECK
*  // JOB   CSERV                        PUNCH CMAINT PHASES
*  // VOL
*  // DLAB
*  // XTENT
*  // EXEC
*  // PUNCH CMAIN2
*  // PUNCH CMAIN3
*  // PUNCH $$$CMA
*  // PUNCH CMAIN4
*  // END
*  // PAUSE                              PREPARE CMAINT DECK
*  // JOB   CSERV                        PUNCH IPL AND/OR MONITOR
*  // VOL
*  // DLAB
*  // XTENT
*  // EXEC
*  // PUNCH
*  // IPL
*  // PUNCH
*  // MONTR
*  // END                                IPL AND/OR MONITOR PUNCHED
*  // PAUSE
   // JOB   CSERV                        PUNCH REMAINDER OF MODIFIED PHASES
   // VOL
   // DLAB
   // XTENT
   // EXEC
   // PUNCH phasename
   .
   .
   // PUNCH phasename
   // END                                END OF CSERV CONTROL CARDS
   // PAUSE                              REMOVE DECK FROM PUNCH DEVICE
   blank card
   // JOB   MSERV                        PUNCH MODIFIED MACRO DEFINITIONS
   // VOL
   // DLAB
   // XTENT
   // EXEC
```

	Control Statements	Comments
	// PUNCH macroname	
	.	
	.	
	// PUNCH macroname	
	// END	END OF MSERV CONTROL CARDS
	// PAUSE	MOUNT YOUR SYSTEM - PREVIOUS RELEASE
	blank card	
*	// JOB CMAINT	CATALOG CMAINT PHASES
*	// ASSGN SYSIPT,	
*	// FILES SYSIPT,REW	
*	// VOL	
*	// DLAB	
*	// XTENT	
*	// EXEC	
*	// CATAL CMAINT	
*	// CATAL CMAIN1	
*	// END	
*	// JOB CMAINT	CATALOG CMAINT PHASES
*	// VOL	
*	// DLAB	
*	// XTENT	
*	// EXEC	
*	// CATAL CMAIN2	
*	// CATAL CMAIN3	
*	// CATAL $$$CMA	
*	// CATAL CMAIN4	
*	// END	
*	// JOB CMAINT	CATALOG IPL AND/OR MONITOR
*	// VOL	
*	// DLAB	
*	// XTENT	
*	// EXEC	
*	// IPL	
*	// MONTR	
*	// CATAL SYSEND	
*	// END	HALT 0B33
	blank card	
	// LOG	
	// JOB CMAINT	CATALOG REMAINDER OF MODIFIED PHASES
	// DATE yyddd	
	// ASSGN SYSIPT,	
	// VOL	
	// DLAB	
	// XTENT	
	// EXEC	
	// CATAL phasename	
	.	
	.	
	// CATAL phasename	
	// END	END OF CMAINT CONTROL CARDS
	blank card	
	// JOB MMAINT	INCLUDE MODIFIED MACRO DEFINITIONS
	// VOL	
	// DLAB	
	// XTENT	
	// EXEC	
	// INCLD	
	.	
	.	
	// INCLD	
	// END	END OF MMAINT CONTROL CARDS
	// PAUSE	
	blank card	

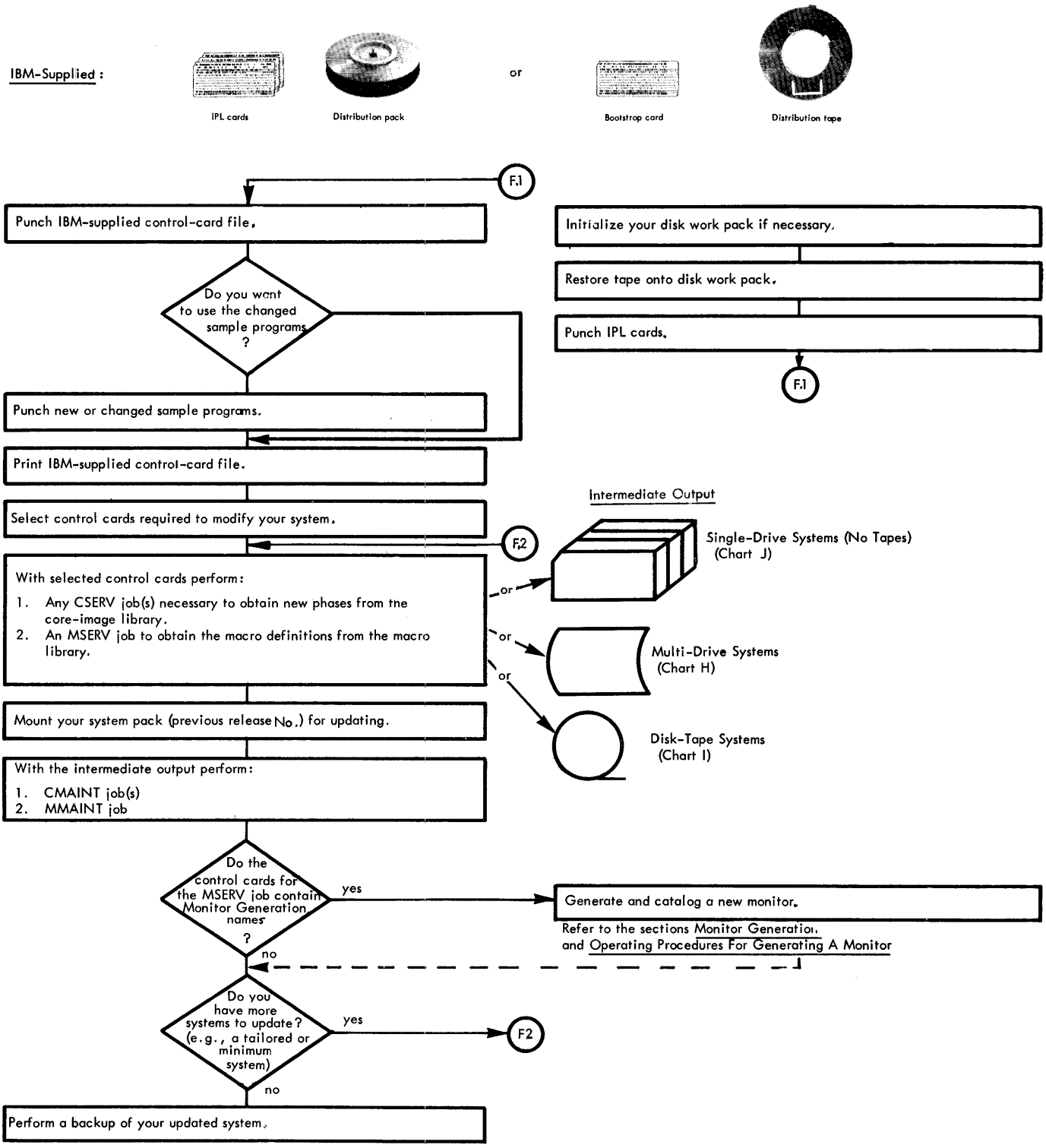
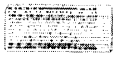
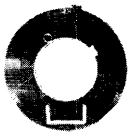


Chart F. Overall Flow of Modification

MODIFICATION DISTRIBUTION

IBM-Supplied:


Bootstrap card


Distribution tape


Distribution pack


IPL cards

COPY MODIFICATION TAPE

Prepare Control Cards to Copy Distribution Tape onto Disk Pack

```
// JOB RESTOR
// DATE yyddd
// ASSGN SYSOPT,disk drive
// EXEC
// END
```

Prepare Control Cards to Punch Out Card-Resident Portion of Disk IPL

```
// JOB PUNCH
// ASSGN SYSOPT,card punch
// EXEC
// PUNCH IPLC
// END
Add one blank card
```

Prepare System Operation

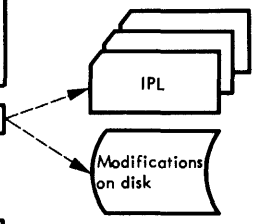
1. Mount an initialized disk pack onto which the modification tape is to be copied on a 2311 disk drive and start the drive.
2. Mount the modification tape reel on a 2415 tape drive and press LOAD REWIND and START on the drive.
3. Set the Mode switch to PROCESS.
4. Set the Register Data/Address switches to 0100.
5. Prepare and start your printer.
6. Place the bootstrap card in the hopper of the loading unit followed by a // LOG card.
7. Place the control cards you have prepared in the hopper of loading unit behind the // LOG card and start the device.

Press LOAD on CPU

Halt 0BE0 — Bootstrap card has been read.

1. Set Mode switch to STOR ALTER.
2. Set Register Data/Address switches to 0109.
3. Set the Data switches 1 and 2 to the physical address of the tape drive on which the distribution tape is mounted (e.g., 81).
4. Press START on CPU.
5. Set Mode switch to PROCESS.
6. Press START on CPU

The prepared jobs are executed.



Halt 0BFF

Perform IPL to Load Standard Monitor into Main Storage

Place the IPL cards, the following two // ASSGN cards, and the // LOG card in the hopper of the loading unit:

```
// ASSGN SYSRES,disk drive with modification pack
// ASSGN SYSRDR,card reader (same as loading unit)
          (both in fixed format)
// LOG
```

Prepare Control Cards to Assign Tape Drives

```
// JOB PSERV
// EXEC
// ASSGN SYSxxx,tape drives
   :       (one for each tape drive attached)
// DSPLY
// END
// PAUSE
```

Note: These // ASSGN cards are required to enter the physical device addresses of tape drives in the PUB table. The number in the symbolic device address (xxx) may be any of the numbers 000-019.

Place the control cards for the PSERV job in the hopper of the loading unit (SYSRDR) and start the device.

Press LOAD on CPU

Halt 0B40

G2.1

PREPARE MODIFICATION

Prepare System Operation

1. Mount distribution pack on a 2311 disk drive and start the drive.
2. Place blank cards in the hopper of the punching device and start the device.
3. Prepare and start your printer.

G2.1

Chart G1. Copy Distribution Tape and Prepare Modification

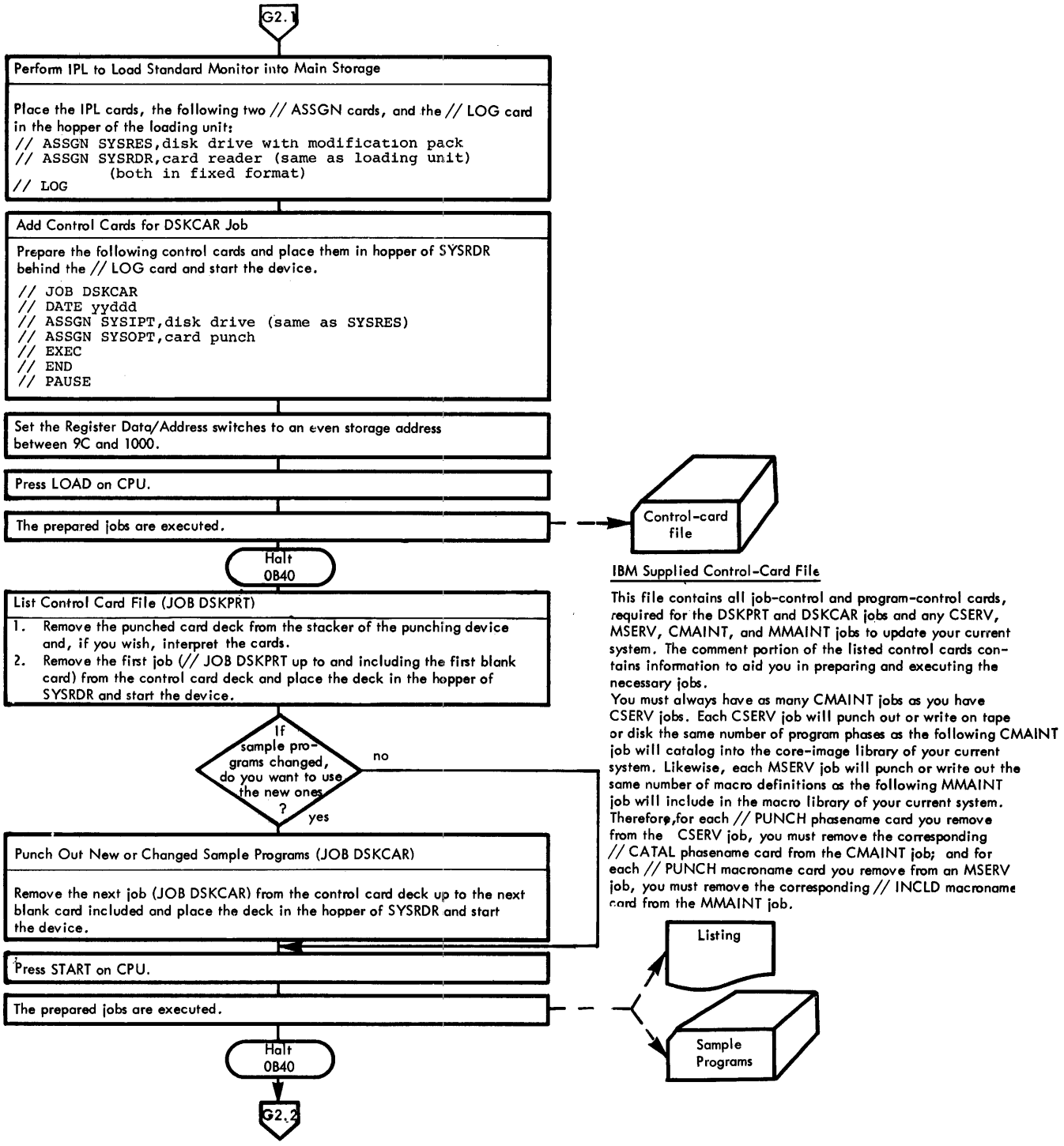


Chart G2. Punch Out IBM-Supplied Control-Card File and, if Desired, New or Changed Sample Programs, Part 1 of 2

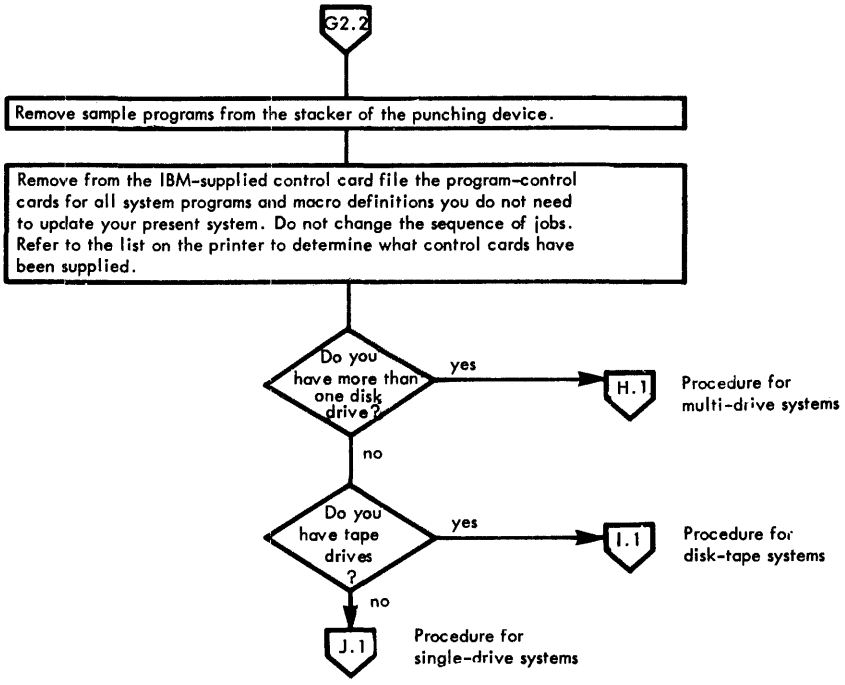


Chart G2. Punch Out IBM-Supplied Control-Card File and, if Desired, New or Changed Sample Programs, Part 2 of 2

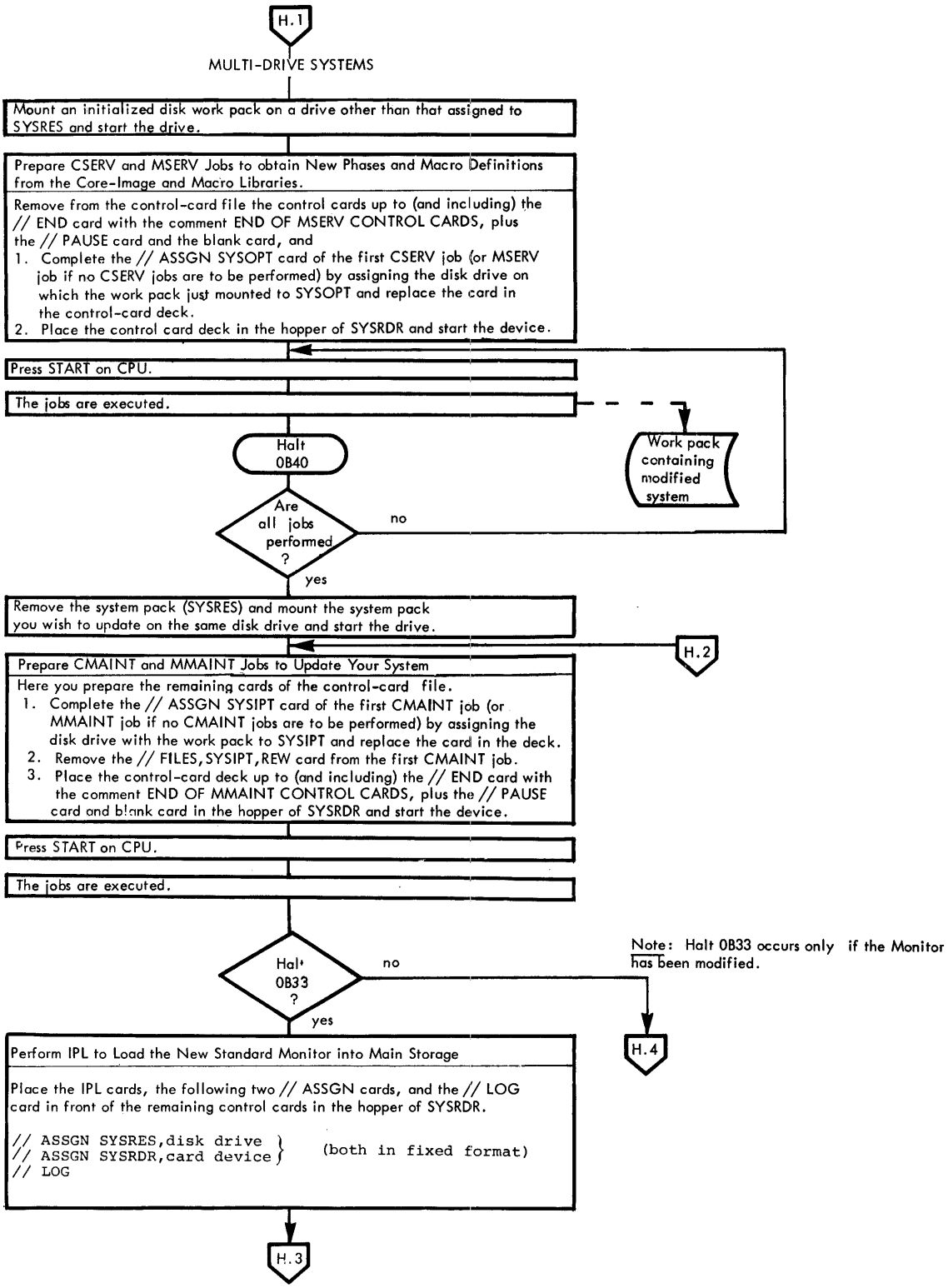


Chart H. Multi-Drive Systems -- Update Your Current System, Part 1 of 2

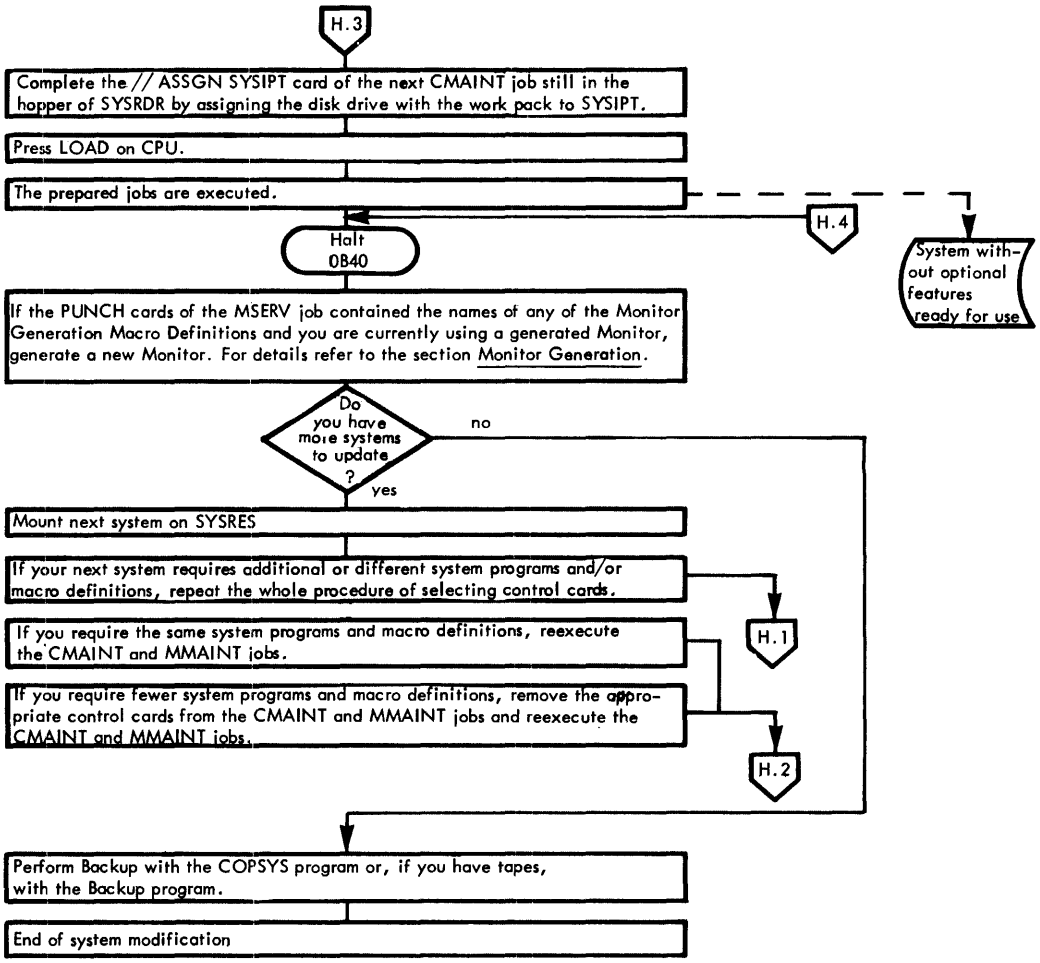


Chart H. Multi-Drive Systems -- Update Your Current System, Part 2 of 2

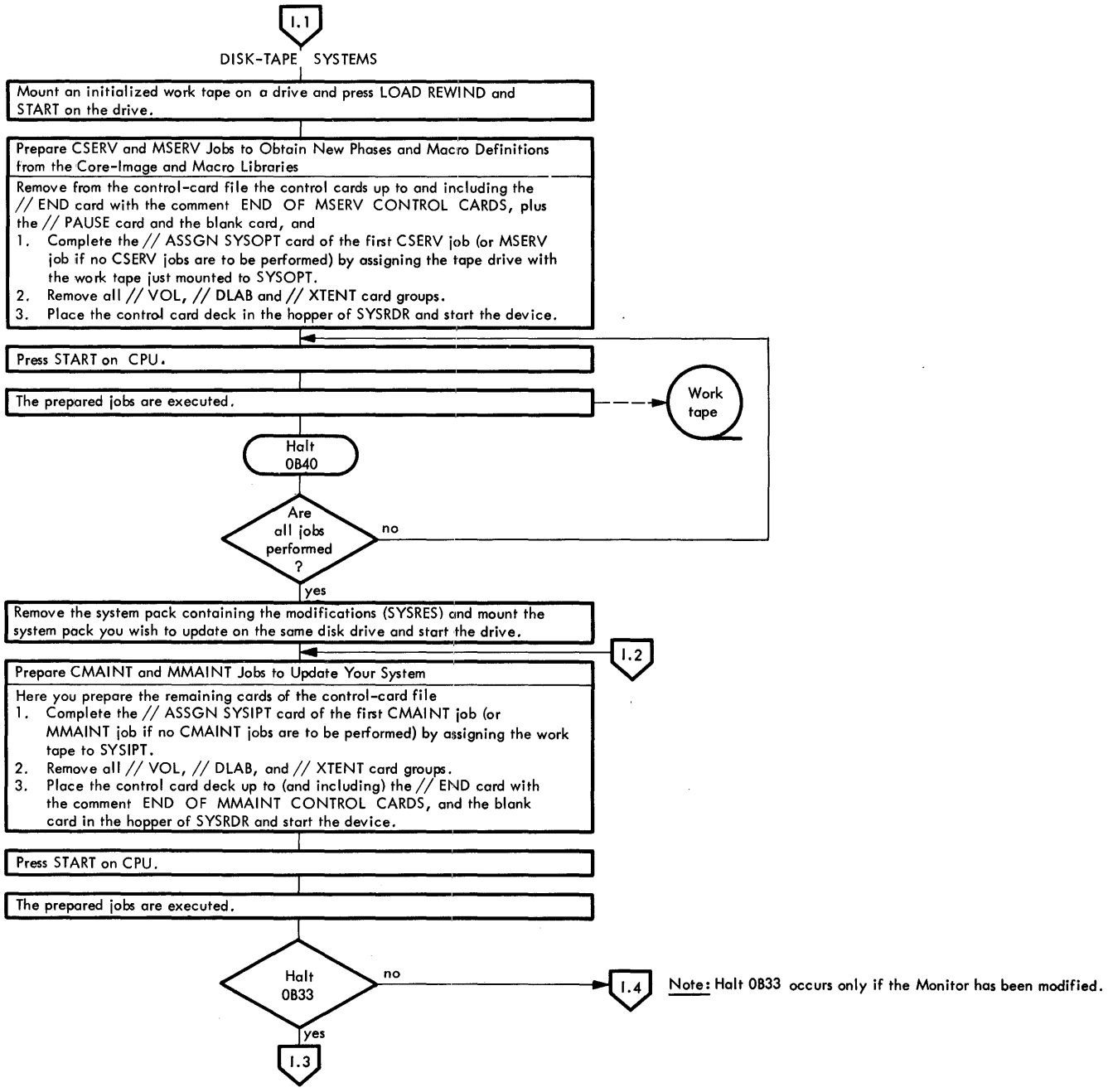


Chart I. Disk-Tape Systems -- Update Your Current System, Part 1 of 2

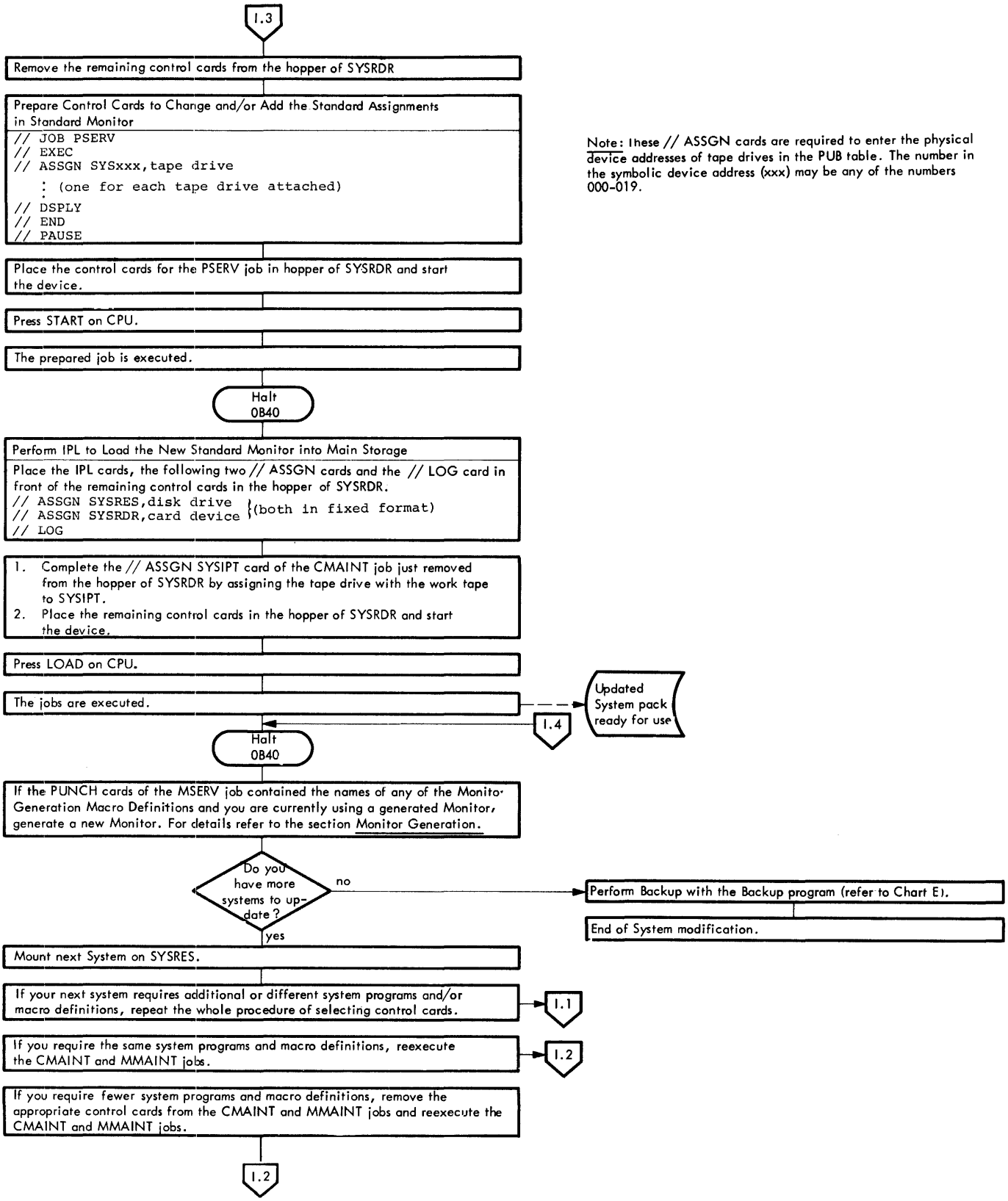


Chart I. Disk-Tape Systems -- Update Your Current System, Part 2 of 2

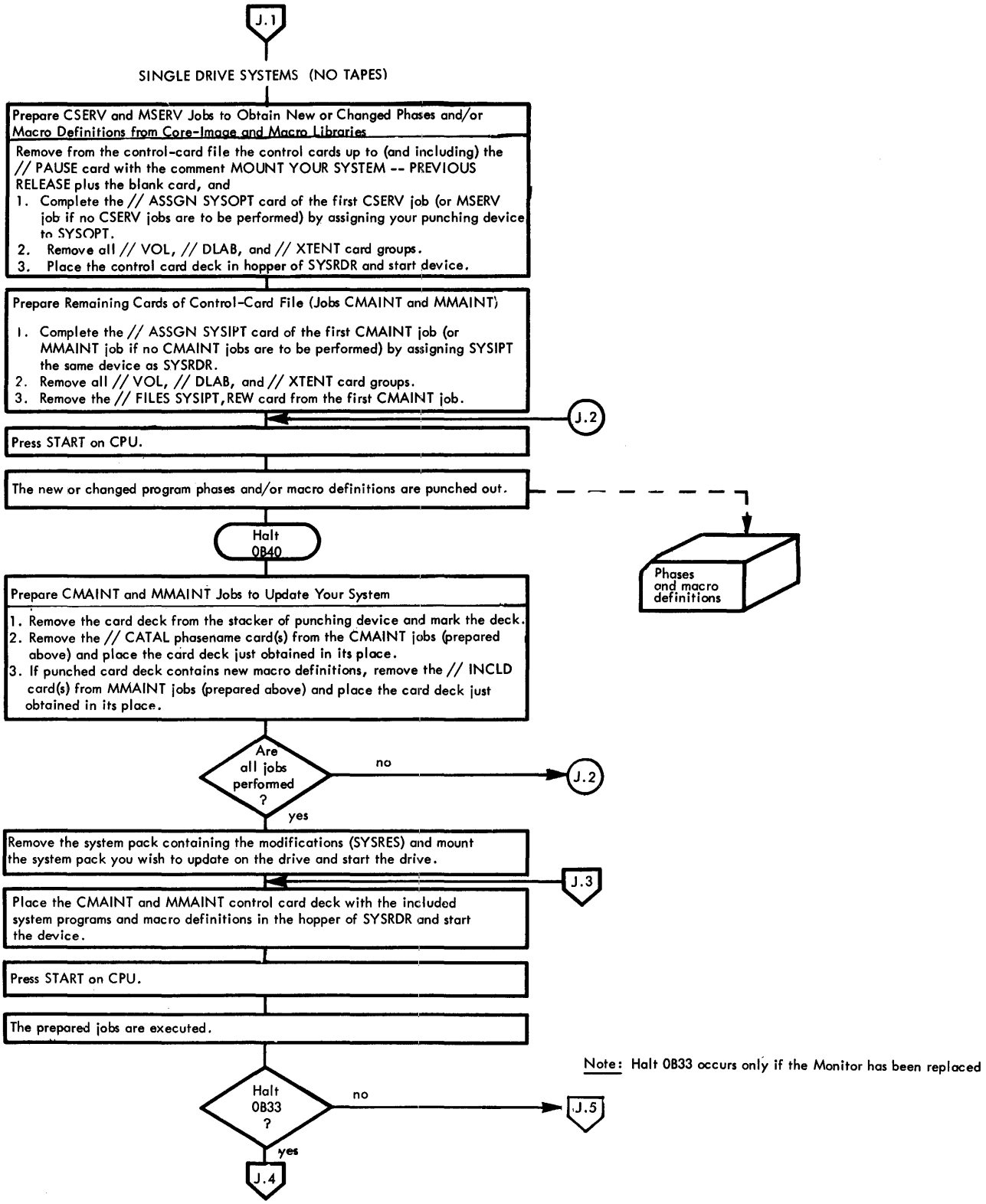


Chart J. Single-Drive Systems -- Update Your Current System, Part 1 of 2

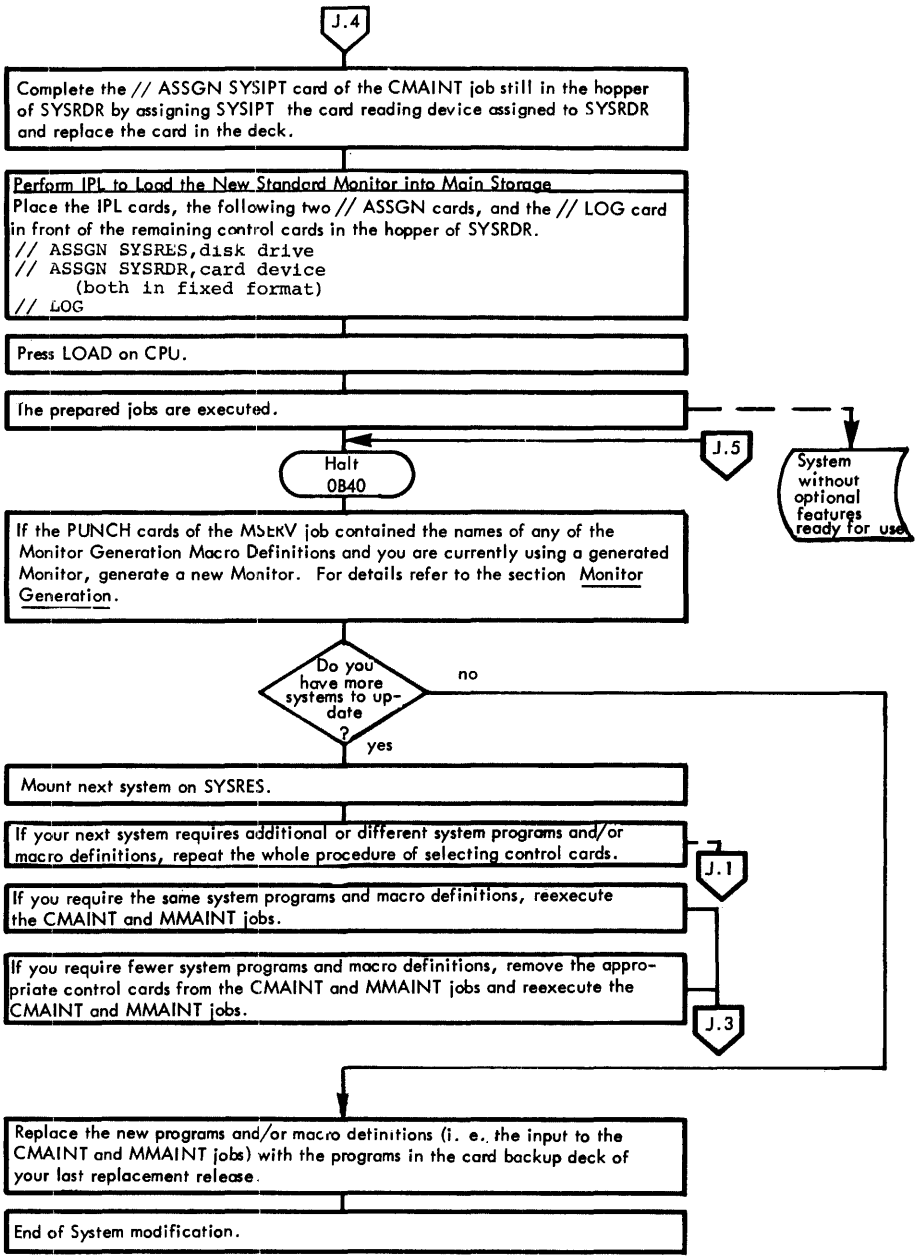


Chart J. Single-Drive Systems -- Update Your Current System, Part 2 of 2

The IBM-supplied distribution package contains the standard Monitor. The standard Monitor corresponds to the generated Monitor defined by the default specifications (refer to Figure 4). Maintenance is provided only for the disk-resident standard Monitor and the macro definitions for Monitor generation. To implement any changes and improvements in your generated Monitor, you must generate a new Monitor using the Monitor Generation Macro Definitions supplied in the replacement or modification package.

The Monitor generation concept allows you to generate a Monitor according to the requirements of your System/360 Model 20 installation.

The Monitor consists of a standard nucleus and a number of routines that can be generated according to the requirements of your installation. The standard nucleus consists of the following:

- Permanent Link Data Area
- Communication Region
- Scheduler
- Disk Error Recovery routine
- Fetch routine
- Monitor I/O area.

The optional portion of the Monitor contains the following:

- Tape Error Recovery routine
- Tape Error Statistics routine
- Printer-Keyboard PIOCS
- Inquiry routines
- BSCA routines
- BSCA error statistics routines

MONITOR TYPES

There are four different types of Monitors which you can generate:

- the card-resident Monitor,
- the disk-resident Monitor,
- the disk-resident Monitor with transient routines,
- the disk-resident Monitor with transient routines and inquiry support.

During Monitor generation, you specify which type of Monitor you want by using the specifications for the TYPE operand of the MONTR macro instruction. The four specifications for the operand TYPE are CDRES, DKRES, TRANS, and INQRY. The features available for each type are indicated below.

Card-Resident Monitor (CDRES). All Monitor features except transient routines and inquiry support are available. (The card IPL and Job Control programs are also generated.)

Disk-Resident Monitor (DKRES). All features except transient routines and inquiry support are available.

Disk-Resident Monitor with Transient Routines (TRANS). Except for inquiry support, all features are available.

Disk-Resident Monitor with Transient Routines and Inquiry Support (INQRY). All features are available.

The card-resident Monitor (CDRES) offers the same features as the disk-resident Monitor (DKRES). The disk-resident transient and inquiry Monitors (TRANS and INQRY) both provide for transient routines. This means that certain Monitor routines are included in the core-image library and are called into main storage by the Monitor only when they are needed. The inquiry Monitor is the only monitor type which supports the use of printer-keyboard inquiry programs. Refer to Figure 4 for a list of all optional features of the Monitor and the macro instructions and keywords (operands) you must specify to generate each feature.

MONITOR GENERATION REQUIREMENTS

Monitor generation can only be performed under control of a disk-resident Monitor (DKRES, TRANS, or INQRY).

To generate a Monitor, the disk-resident system must include:

1. the disk-resident control programs (IPL, Monitor, Job Control),

2. the following system programs:

   - DPS Assembler,
   - DPS Core-Image Maintenance (CMAINT),
   - DPS Macro Maintenance (MMAINT),
   - DPS Library Allocation Organization (AORGZ).

   Note: MMAINT and AORGZ are required to include or delete the Monitor Generation Macro Definitions in the macro library and to reallocate the boundaries of the system pack.

3. a macro library containing the macro definitions, CDIPL, MONTR, ASSGN, ENDMT, and the inner macro definitions called by them. If you are not using a full system and the necessary macro definitions are not contained in the macro library, they must be included with an MMAINT run. The storage space required for all generation macros is 148 tracks. If you wish to enlarge the macro library, you can do this with the aid of the AORGZ program. After generation of a Monitor, you may delete the macro definitions (MMAINT run) and redefine the boundaries of the macro library (i.e., you may reduce the size of the macro library with the aid of the AORGZ program).

   The names of the DPS Monitor Generation Macro Definitions and the inner macro definitions they require are listed in Figure 3.

Macro definitions for specifying the desired Monitor features:	
ASSGN	ENDMT
CDIPL	MONTR
Inner macro definitions called by the above macro definitions:	
MAINT	MJOB6
MCIPL	MPPK
MDERP	MRIN
MFET	MROUT
MINQ	MSC00
MJOB1	MSC10
MJOB2	MSC11
MJOB3	MSCED
MJOB4	MTRAN
MJOB5	

Figure 3. Summary of DPS Monitor Generation Macro Definitions

If the output of a disk-resident Monitor generation is to be written only into the relocatable area, a relocatable area of at least eight tracks in length is required.

You may redefine the boundaries of the relocatable area, if required, with the aid of the AORGZ program.

The Assembler program requires a work area of 18 cylinders. The work area must be on a disk drive with the symbolic device address SYS000.

MONITOR GENERATION MACRO INSTRUCTIONS

There are four Monitor generation macro instructions, CDIPL, MONTR, ASSGN, and ENDMT. To generate a tailored Monitor, choose the macro instructions with the keywords (operands) that define the features required in your Model 20 installation. Then, supply these (in the sequence CDIPL, MONTR, ASSGN, ENDMT) as input to the DPS Assembler. The Assembler program assembles the macro instructions and generates a Monitor with the features specified.

A summary of the macro instructions and keywords you use to generate the Monitor is shown in Figure 4. The values listed under "Default Specification" are assumed whenever a keyword is omitted. The standard DPS Monitor corresponds to a Monitor defined with all of the default specifications. If your machine configuration or programming requirements differ from the default specifications, you should generate your own Monitor.

Some specifications restrict other specifications. Usually, one of the specifications has priority. Therefore, if you specify an option which does not comply with another, one of the specifications will automatically be corrected and generation will continue. An error, which causes the generation to be discontinued, is only recognized if the LUBSIZE specification is too small (i.e., not ≥ DISKS+TAPES), or if a specification does not conform to the allowed entries/limits for a keyword.

The formats and coding specifications for macro instructions are described in the SRL publication IBM System/360 Model 20, Disk and Tape Programming Systems, Assembler Language, Form C24-9002.

Operation	Keyword/Operands	Default Specification	Comments
CDIPL	2501, 2520, 2560P, 2560S / 01D3, 01D4, 02D3, 02D4, 03D3, 03D4, 04D3, 04D4, UA	2501,01D3	2501 -- SYSRDR - 2501 Card Reader 2520 -- SYSRDR - 2520 Card Read Punch 2560P-- SYSRDR - 2560 MFCM, primary feed 2560S-- SYSRDR - 2560 MFCM, secondary feed 01D3 -- SYSRES - 2311 Disk Storage Drive, Mod.11, Drive 1 01D4 -- SYSRES - 2311 Disk Storage Drive, Mod.12, Drive 1 02D3 -- SYSRES - 2311 Disk Storage Drive, Mod.11, Drive 2 02D4 -- SYSRES - 2311 Disk Storage Drive, Mod.12, Drive 2 03D3 -- SYSRES - 2311 Disk Storage Drive, Mod.11, Drive 3 03D4 -- SYSRES - 2311 Disk Storage Drive, Mod.12, Drive 3 04D3 -- SYSRES - 2311 Disk Storage Drive, Mod.11, Drive 4 04D4 -- SYSRES - 2311 Disk Storage Drive, Mod.12, Drive 4 UA -- SYSRES - unassigned
MONTR	TYPE= DKRES / CDRES / TRANS / INQRY	DKRES	Disk-resident Monitor Card-resident Monitor Disk-resident Monitor with transient routines Disk-resident Monitor with transient routines and with inquiry support
	INQIPT=nnn	20	Length of inquiry input area (maximum 511 bytes unless RWC=YES, in which case maximum is 125 bytes).
	INQOPT=nnn	125*	Length of inquiry output area (maximum 511 bytes).
	INQMSG= YES / NO	YES*	If YES, the message ENTER PROGNAME will be printed on the printer-keyboard when the operator has to enter the inquiry program name.
	PRINTKB= NO / YES	NO	If YES, physical IOCS routines for printer-keyboard are included (automatically included if TYPE=INQRY).
	TELEPR= NO / STANDARD / HISPEED	NO	No support for BSCA transmission. Standard-speed BSCA transmission supported. High-speed BSCA transmission supported (unless RWC=YES, in which case specification is automatically reset to STANDARD).

*Default specification only when TYPE=INQRY is specified; otherwise, these specifications are ignored.

Figure 4. Summary of Macro Instructions and Operands Required for Monitor Generation (Part 1 of 2)

Operation	Keywords/Operands	Default Specification	Comments
	CORE= {12 / 16 / 24 / 32}	12	Main-storage capacity in K bytes.
	DISKS=n	2	Number of disk drives attached (n = 1 - 4).
	TAPES=n	6	Number of tape drives attached (n = 0 - 6).
	TES= {YES / NO}	YES	If NO, tape error statistics routines are not included. (Specification is ignored if TAPES=0 is specified.)
	RWC= {NO / YES}	NO	If YES, read/compute and write/compute overlap feature is supported (only available for Submodel 5).
	QUEUES= {YES / NO}	YES	If NO, disk and tape I/O requests will not be queued.
	LUBSIZE=nn	20	Number of LUBs to be included in addition to the six standard assignments (minimum specification equals number of disk and tape drives specified in the keywords DISKS and TAPES).
ASSGN	SYSIPT,X'cuu',dd,x'ss'	2501 Card Reader	SYSIPT may be unassigned or assigned to a card reading device, or a disk or tape drive.
	SYSOPT,X'cuu',dd,x'ss'	not assigned	SYSOPT may be unassigned or assigned to a card punching device, or a disk or tape drive.
	SYSLST,X'400',Ld	Printer attached	SYSLST may be unassigned or assigned to the printer.
	SYSLOG,X'400',Ld	Printer attached	SYSLOG may be unassigned or assigned to the printer.
	SYS000,X'cuu',dd,x'ss'	2311, Mod.11,Drive 1	SYS000 may be unassigned or assigned to a disk or tape drive.
	SYS001,X'cuu',dd,x'ss'	2311, Mod.11,Drive 2	SYS001 may be unassigned or assigned to a disk or tape drive (default specification is assumed only if DISKS=2, 3, or 4).
	SYS002,X'cuu',dd,x'ss'	2311, Mod.11,Drive 3	SYS002 may be unassigned or assigned to a disk or tape drive (default specification is assumed only if DISKS=3 or 4).
	SYS003,X'cuu',dd,x'ss'	2311, Mod.11,Drive 4	SYS003 may be unassigned or assigned to a disk or tape drive (default specification is assumed only if DISKS=4).
	SYS004,X'cuu',dd,X'ss' . . .	not assigned	SYS004-SYS019 may be unassigned or assigned to disk or tape drives.
	SYS019,X'cuu',dd,X'ss'		Note, the ASSGN macro instruction should be used to make assignments for each tape drive to be supported by the Monitor.
ENDMT			Monitor end -- generates the Monitor in accordance with the preceding specifications (or in accordance with default specifications where macro instructions or operands are omitted).

Figure 4. Summary of Macro Instructions and Operands Required for Monitor Generation (Part 2 of 2)

CDIPL Macro Instruction

Use the CDIPL macro instruction to specify the assignments of SYSRDR and SYSRES for a card-resident system. You can omit CDIPL when generating a card-resident system if the default specifications correspond with the desired assignments. If used, CDIPL must precede the MONTR macro instruction.

Note: If disk files are to be processed under control of the card-resident system, you must assign SYSRES. SYSRES, when assigned, must always be assigned a disk drive.

MONTR Macro Instruction

Use the operands of the MONTR macro instruction to specify the type of Monitor you want and the various features you want to include. If the desired features correspond to the default specifications, which are shown underlined below, you may omit the appropriate operands. To override a default specification, you need only specify the operand with another option.

TYPE= { DKRES / CDRES / TRANS / INQRY } Use this operand to specify the type of Monitor you want to generate.

The Monitor types DKRES and CDRES have a similar structure. All generated Monitor routines (except the Job Closing routines) are resident in main storage throughout a system run. If support for tape error statistics and BSCA is included, the Job Closing routines of the DKRES and CDRES-type Monitors include (1) Print Tape Error Statistics routine, (2) Print BSCA Error Statistics routine, (3) Tape Error Statistics routine, and (4) Tape Error Recovery routines.

The disk-resident Monitor without transient routines and inquiry support (TYPE=DKRES) is stored on the system disk pack. The card-resident Monitor (TYPE=CDRES) is normally contained in punched cards. When you specify TYPE=CDRES, the card-IPL (including ASSGN cards for SYSRDR and SYSRES) and the card Job Control program are generated with the card Monitor. Thus, you generate your complete card-resident control system by specifying TYPE=CDRES. For a description of how to separate the card decks of the card-resident control programs, refer to the section Separation of Card Decks under Description of Output.

The Monitor types TRANS and INQRY also have a similar structure. Both types consist of two parts: (1) one part that is resident in main storage throughout a system run and (2) another disk-resident part which consists of routines that are called on an as-needed basis. The routines of the disk-resident part (transient routines) are stored in the core-image library on disk and are loaded into main storage only when they are needed. For these routines, a transient area of 580 bytes is reserved in the main-storage resident part of the Monitor.

If support for tape error statistics (TES) and BSCA is included, the Job Closing routines of the TRANS and INQRY-type Monitors include (1) the Print Tape Error Statistics routine, (2) the Print BSCA Error Statistics routine, and (3) the Tape Error Statistics routine. The Tape Error Recovery routines are included in the transient routines, which also include a transient Fetch routine and, if TYPE=INQRY, the inquiry routines.

A Monitor with support for the printer-keyboard inquiry feature (TYPE=INQRY) is generated with a set of routines that allow you to interrupt a job in progress and save the status of that job; then, load and execute a specified program (called the inquiry program); and, finally, restore the original job (called the mainline program) and continue processing it. When you specify TYPE=INQRY, the printer-keyboard physical I/O routines are automatically included with the support for the printer-keyboard inquiry feature.

INQIPT= { 20 / nnn } Use this operand to specify the length of the printer-keyboard input area. The operand is ignored unless a Monitor with inquiry support (TYPE=INQRY) is to be generated.

The minimum length for the printer-keyboard input area is 2 bytes. (The specification INQIPT=1 is automatically corrected to INQIPT=2.) The maximum specification is 511 bytes unless the Monitor also supports the read/compute, write/compute overlap feature (RWC=YES), in which case, the maximum size is 125 bytes. You can also have a Monitor with inquiry support and no printer-keyboard input area (INQIPT=0). The printer-keyboard input area (INQIPT) is used only for the inquiry record, which you enter on the printer-keyboard when an inquiry request is initiated.

INQOPT= { 125 / nnn } Use this operand to specify the length of the printer-keyboard output area. The operand is ignored unless a Monitor with inquiry support (TYPE=INQRY) is to be generated.

The minimum specification for INQOPT is 0, the maximum is 511. The combined lengths of the printer-keyboard input and output areas must not exceed certain limits. For a maximum sized Monitor (i.e., Monitor including support for all available features), the sum of the length specified in INQIPT and the length specified in INQOPT must not exceed 480 bytes. For a Monitor including all features except RWC support, this sum must not exceed 490 bytes. Note that when RWC=YES, the length of the inquiry input area (INQIPT) is limited to 125 bytes. Therefore, in the first case, the length specified in INQOPT must not exceed 355 bytes. To determine the limits for the sum of the specifications for INQIPT and INQOPT when different features are supported, you must estimate the size of the Monitor to be generated. To estimate the Monitor size, refer to the SRL publication IBM System/360 Model 20, Disk Programming System, Performance Estimates, Form C33-6003. Note that tape error statistics cannot be handled if the end address of the Monitor is beyond 4608.

The printer-keyboard output area (INQOPT) is used for printer-keyboard output records in an inquiry program. The use of this output area by an inquiry program makes it possible to overlap the printing of the last output record on the printer-keyboard with the rolling-in and processing of the interrupted mainline program. This overlapping is only possible on a Model 20, Submodel 5 using a Monitor with read/compute, write/compute overlap support (RWC=YES).

Note: To achieve overlapping when you use the printer-keyboard output area on a Submodel 5 with a Monitor including RWC support (RWC=YES), you must ensure that no part of the output area is overlaid by the interrupted mainline program. You must also ensure that an inquiry program using the printer-keyboard output area is loaded following the output area. If you have a Submodel 2 or 4 and plan to switch to a Submodel 5 and use the RWC feature, it is advisable to consider the size of your future Monitor when writing programs that will later be run on the Submodel 5.

INQMSG= {YES / NO} Use this operand to specify whether you want the message ENTER PROGNAME to be printed on the printer-keyboard when the operator has to enter the name of an inquiry program.

The operand is ignored unless a Monitor with inquiry support (TYPE=INQRY) is to be generated.

PRINTKB= {NO / YES} Use this operand to specify whether you want support for printer-keyboard input/output operations.

The specification in this operand does not influence the generation of inquiry routines; it only indicates whether printer-keyboard physical I/O routines are to be included in the Monitor. The printer-keyboard physical I/O routines are automatically included when you specify TYPE=INQRY.

TELEPR= {NO / STANDARD / HISPEED} Specify TELEPR=STANDARD or TELEPR=HISPEED if you want support for the Binary Synchronous Communications Adapter (BSCA).

The specification TELEPR=STANDARD provides support for standard-speed BSCA transmission; the specification TELEPR=HISPEED provides support for high-speed BSCA transmission. A Monitor with read/compute, write/compute overlap feature cannot support highspeed BSCA transmission, i.e., the specification TELEPR=HLSPEED is automatically set to STANDARD if you specify RWC=YES. BSCA support automatically includes the BSCA error recovery routines and the print routine for BSCA error statistics.

CORE= {12 / 16 / 24 / 32} Use this operand to specify the main-storage capacity to be supported by the Monitor. The options 12, 16, 24, and 32 represent 12K, 16K, 24K, and 32K bytes, respectively.

The option you specify in this operand is primarily significant in connection with a Monitor with inquiry support (TYPE=INQRY). During the generation of a Monitor of the type INQRY, an area in the core-image library is reserved for storing a mainline program during the execution of an inquiry program. The size of this area depends on the specification you enter for the keyword CORE. Before an inquiry program is loaded, the contents of main storage between the first location following the Monitor and the end of main storage (as indicated by the option specified for CORE) is saved in the core-image library.

DISKS= {2 / n} Use this operand to specify the number of disk drives to be supported by the Monitor.

You must specify support for at least one disk drive. The minimum specification for DISKS is 1, the maximum is 4.

TAPES= { 6 / n } Use this operand to specify the number of magnetic-tape drives to be supported by the Monitor.

The specification for TAPES can be 0 - 6. If you specify TAPES=0, the Monitor will not handle any tape I/O requests.

TES= { YES / NO } Use this operand to specify whether you want support for tape error statistics.

If you specify TAPES=0, the specification TES=YES will be ignored. Support for tape error statistics includes the Tape Error Statistics print routine. The Tape Error Statistics routine will be permanently overlaid if the end address of the Monitor exceeds 4608. This is only possible for an inquiry type Monitor. Therefore, you must limit the length specified for inquiry input and output areas. Refer to the decriptions of the keywords INQIPT and INQOPT for details.

RWC= { NO / YES } Specify RWC=YES if you want to generate a Monitor for a System/360 Model 20, Submodel 5 with read/compute, write/compute overlap (RWC) for disk and magnetic tape I/O operations. This specification is also required to achieve overlapping when you use the printer-keyboard output area (INQOPT) in an inquiry program.

If you generate a Monitor for a Model 20, Submodel 5, it is recommended that you always specify RWC=YES.

If you use a Monitor without the RWC-feature (RWC=NO) on a Submodel 5, the scheduling technique of the generated Monitor is compatible with that of the Monitor supporting Submodel 2 or 4. If you want to use a Monitor on a Model 20, Submodel 2 or 4, you must not specify RWC=YES. When you attempt to run a Monitor with the RWC feature on a Submodel 2 or 4, a locked halt occurs.

QUEUES= { YES / NO } Use this operand to specify whether you want queuing of disk and magnetic tape I/O requests.

The standard scheduler (QUEUES=YES) provides for queuing of all disk and magnetic tape I/O requests. If you specify QUEUES=NO, the Monitor will contain a smaller scheduler which does not perform any queuing of disk and tape I/O requests. A Monitor with the smaller scheduler is about 220 bytes shorter than a Monitor with the standard scheduler.

The amount of processing time that is saved by using a Monitor that provides for queuing of disk and tape I/O requests varies for different programs depending on whether the time interval between two I/O requests for the same channel is longer than the time required to execute the I/O requests (no queuing benefit). This time interval depends on the IOCS features used, and the number of files processed in a program.

A Monitor with the standard scheduler (QUEUES=YES) is recommended for programs that do multi-file processing, sequential disk file processing, direct-access file processing, or tape file processing. A Monitor without the queuing feature (QUEUES=NO) is recommended for programs that do indexed-sequential file processing or processing of card and printer files. The queuing feature also has no time advantage for any of the IBM-supplied system programs including the language translators (the RPG and Assembler program). For individual cases, it is useful to compare processing times using a Monitor with QUEUES=YES and a Monitor with QUEUES=NO.

LUBSIZE= { 20 / nn } Use this keyword to specify the number of logical unit blocks (LUBs) to be included in addition to the six standard entries for SYSRES, SYSRDR, SYSIPT, SYSOPT, SYSLST, and SYSLOG.

The minimum specification is the sum of the numbers you specify in the keywords DISKS and TAPES. It is necessary to specify at least 10 LUBs if you plan to use the Sort/Merge program. For a Monitor with inquiry support, it is recommended that you reserve at least two logical unit blocks (LUBs) to be used exclusively by inquiry programs.

ASSGN Macro Instruction

The ASSGN macro instruction is similar to the ASSGN job control statement. It assigns physical I/O device addresses to symbolic device addresses. The assignments made during generation of a Monitor, i.e., using the ASSGN macro instruction, are permanently stored in the Monitor resident either on disk or in cards. If your system includes tape drives, you should use the ASSGN macro instruction to assign all tape drives to be supported by the Monitor. Apart from this, the ASSGN macro instruction is only required to override the standard assignments and to include permanent assignments in the Monitor. (The format of the ASSGN macro instruction is identical to that of the ASSGN job control statement which is described in the SRL

publication IBM System/360 Model 20, Disk Programming System, Control and Service Programs, Form C24-9006).

Do not use the ASSGN macro instruction to assign SYSRES and SYSRDR. These assignments are made using the CDIPL macro instruction for a card-resident system, or at IPL time for a disk-resident system.

Assigning Tape Drives. When you specify a certain number of disk drives (DISKS=n), the corresponding physical device addresses for the disk drives are automatically included in the physical unit blocks (PUBs) of the Monitor. But when you specify tape support (TAPES=n), you must make assignments for your tape drives to insert their physical addresses in the appropriate PUBs. Unless these physical device addresses are in the Monitor, you cannot assign your tape drives in a Job Control run.

When the ASSGN macro instruction assigns a tape drive to a symbolic address, it also inserts the physical device address for the tape drive in the corresponding PUB. Therefore, for both the disk-resident and the card-resident systems, it is a good practice to use the ASSGN macro instruction to make assignments for the same number of tape drives as will be supported by the Monitor. If you want to change the assignments for a disk-resident system (or you forgot to make tape assignments during Monitor generation), you may also use the Physical and Logical Unit Tables Service program (PSERV), but you cannot use the PSERV program to make assignments in a card-resident Monitor. Therefore, when you generate a card-resident Monitor, you should always use the ASSGN macro instruction to assign all magnetic tape drives supported by the Monitor. If you wish to change the assignments in the card-resident Monitor without generating a new Monitor (or if you forgot of to make tape assignments during Monitor generation) you can make assignments by means of REP cards. Refer to the section Card-Resident Control System in the SRL publication IBM System/360 Model 20, Disk Programming System, Operating Procedures, Form C33-6004 for details on how to change assignments in the card-resident Monitor by using REP cards.

ENDMT Macro Instruction

This macro instruction must be the last you specify when generating a Monitor. The ENDMT macro instruction refers to a routine that generates the Monitor according to the specifications given in the other Monitor generation macro instructions or according to the default specifications where macro instructions or keywords have been omitted.

REQUIRED CODING

Figure 6 shows a master copy of the coding sheets used for generating a Monitor. They list, in sequence, all control statements and macro instructions that may be required to generate the Monitor. The statements indicated by a check mark in the left margin must always be specified. They represent the job control and Assembler statements and the macro instructions required to generate a standard Monitor. Use the remaining statements when generating a Monitor tailored to the specific requirements of your Model 20 installation.

The coding required for Monitor generation consists of three major parts.

1. Job Control Statements. Prepare the job control cards required for the assembly run as described in the SRL publication IBM System/360 Model 20, Disk Programming System, Operating Procedures, Form C33-6004, in the section DPS Assembler Program.

2. Source Program. The source program must contain all specifications required for Monitor generation.

   The following is a summary of what you must code in the source program:

   a. AOPTN
      Required to include or omit certain Assembler program options.

   b. START 0
      Required for defining the begin address of generation.

   c. CDIPL
      Optional -- refer to the section Monitor Generation Macro Instructions.

   d. MONTR
      Required -- refer to the section Monitor Generation Macro Instructions.

   e. ASSGN
      Optional -- refer to the section Monitor Generation Macro Instructions.

   f. ENDMT
      Required -- refer to the section Monitor Generation Macro Instructions.

   g. END SYSMONTR
      Required. Assembler END card. An end-of-file (/* in cols. 1-2) must follow the END card which is the last statement in the source program.

3. CMAINT Control Statements. The CMAINT program reads the program control cards from the device assigned to SYSRDR and the Monitor phases from the device assigned to SYSIPT. The control cards required for the CMAINT run are shown after the /* card in Figure 6. These control cards (except the // DATE, the // ASSGN SYSIPT, and the // END cards) are included automatically in the Assembler output for a disk-resident Monitor.

   If the output of Monitor generation is a card deck and if SYSRDR and SYSIPT are assigned the same card-reading device, you need only insert a // END card behind the Assembler output deck before making the CMAINT run.

   If the output of Monitor generation is a card deck and if SYSRDR and SYSIPT are assigned different card-reading devices, remove the first two job-control cards (// JOB CMAINT and // EXEC) from the deck you supply to SYSIPT. In this case, or if the input for the CMAINT program is to be read from a magnetic-tape drive, you must supply the following control cards and place them in the hopper of SYSRDR:

   - All job-control statements including // ASSGN SYSIPT (refer to Figure 6).
   - a // MONTR card.
   - // CATAL cards (the required number is listed in Figure 5).

Monitor Type	// CATAL		
	Additional Monitor Features		
	No Tapes No BSCA	Tapes, No TES No BSCA	Tapes, TES and/or BSCA
DKRES	-	1	1
TRANS	1	1	2
INQRY	1	1	2

Figure 5. Number of Required // CATAL Statements

   If the input for the CMAINT program is to be read from the relocatable area, you must include the following control cards:

   - The // EXEC R statement and all other Job Control statements except // ASSGN SYSIPT (refer to Figure 6).
   - a // MONTR card.
   - // CATAL cards (the required number is listed in Figure 5).

   Note: You must always include a // END card behind the card deck containing the control cards.

You can run the assembly under the control of any disk-resident Monitor. If this Monitor already contains all the assignments required for the assembly run, you can omit the // ASSGN job control statements from the input deck.

You can also omit the VOL, DLAB, and XTENT control cards from the input deck if the label information for the Assembler work files is already present in the label-information area (i.e., identified as permanent).

If there is more than one disk drive available for Monitor generation, it is advisable to include an AWORK 2 Assembler option in order to use two work files. Note, if the label information for this work file is not a permanent entry in the label information area, you must also supply the necessary VOL, DLAB, and XTENT statements.

The system pack on SYSRES must contain the Assembler program and the Monitor Generation Macro Definitions before the assembly run can begin. SYSOPT must be assigned a card punching device if the output of the assembly run is to be punched into cards. SYSOPT may be assigned a magnetic-tape unit. If tape output is desired, the Monitor used during assembly must support tapes.

If the assembly output is to be in cards or on tape and the Monitor is to be placed immediately on the system pack by means of a CMAINT run, it is advisable to include a // PAUSE control statement preceding the control statements for the CMAINT run. If the assembly output is to be written only into the relocatable area (i.e., the statement AOPTN NODECK is included in the set of Assembler statements), a // PAUSE control statement may also prove useful (e.g., to allow you time to check the program listing before the CMAINT run is started).

All control statements (except the // END statement) required for the CMAINT run are generated with the disk-resident Monitor and included in the Assembler output. These control statements are only useful if the output of the Monitor generation is in cards, because they must be read on SYSRDR during a CMAINT run. Therefore, if the Assembler output is a card deck and SYSRDR and SYSIPT are assigned the same card read-

ing device, you need only add a // END card to the Assembler output deck before submitting it as input to the CMAINT program.

After the CMAINT run is complete, the generated Monitor can be loaded into main storage by means of the IPL program.

If the CMAINT program detects an error (i.e., an incorrect number of transient and/or Job Closing routines) during Monitor replacement, the CMAINT intermediate Monitor, which is in main storage during replacement is written into the Monitor area on the system disk pack. The CMAINT intermediate Monitor corresponds to a Monitor generated with the following specifications for the MONTR macro instruction:

TYPE=TRANS (disk-resident Monitor with transient routines)

PRINTKB=NO (printer-keyboard not supported)

TELEPR=NO (BSCA not supported)

CORE=12 (main-storage capacity of 12K)

DISKS=4 (four disk drives supported)

TAPES=6 (six tape drives supported)

TES=NO (no tape error statistics performed)

RWC=NO (read/compute and write/compute overlap feature not included)

QUEUES=NO (small scheduler with no queuing of disk and tape I/O requests)

LUBSIZE=20 (26 logical unit blocks)

Standard assignments include the following:

SYSRES - unassigned
SYSRDR - unassigned
SYSIPT - 2501 Card Reader
SYSOPT - unassigned
SYSLST - 1403 Printer
SYSLOG - 1403 Printer
SYS000 - 2311 Disk Drive 01 (Model 11)
SYS001 - 2311 Disk Drive 02 (Model 11)
SYS002 - 2311 Disk Drive 03 (Model 11)
SYS003 - 2311 Disk Drive 04 (Model 11)
SYS004-SYS019 - unassigned (all attached tape drives must be assigned by a PSERV run if the previous Monitor did not contain tape assignments).

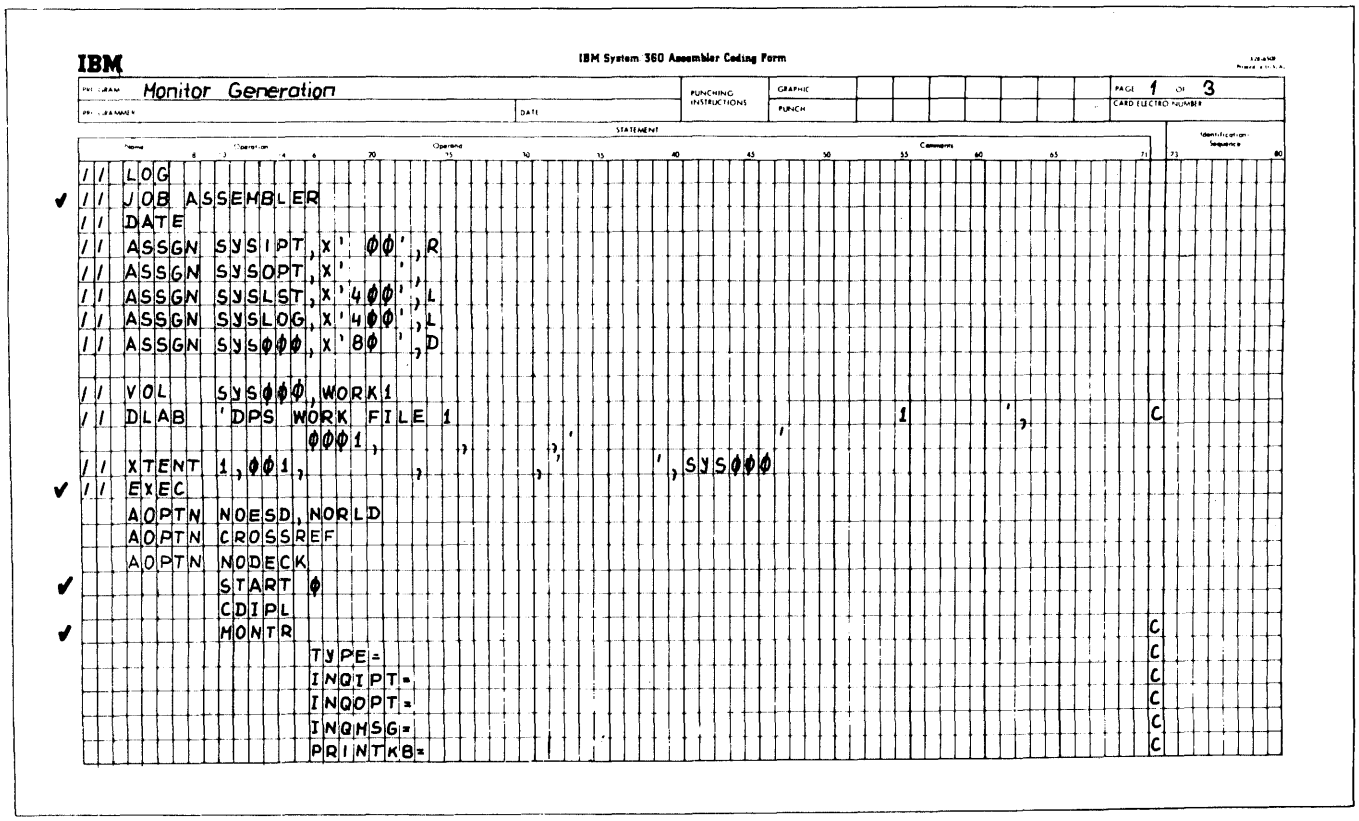
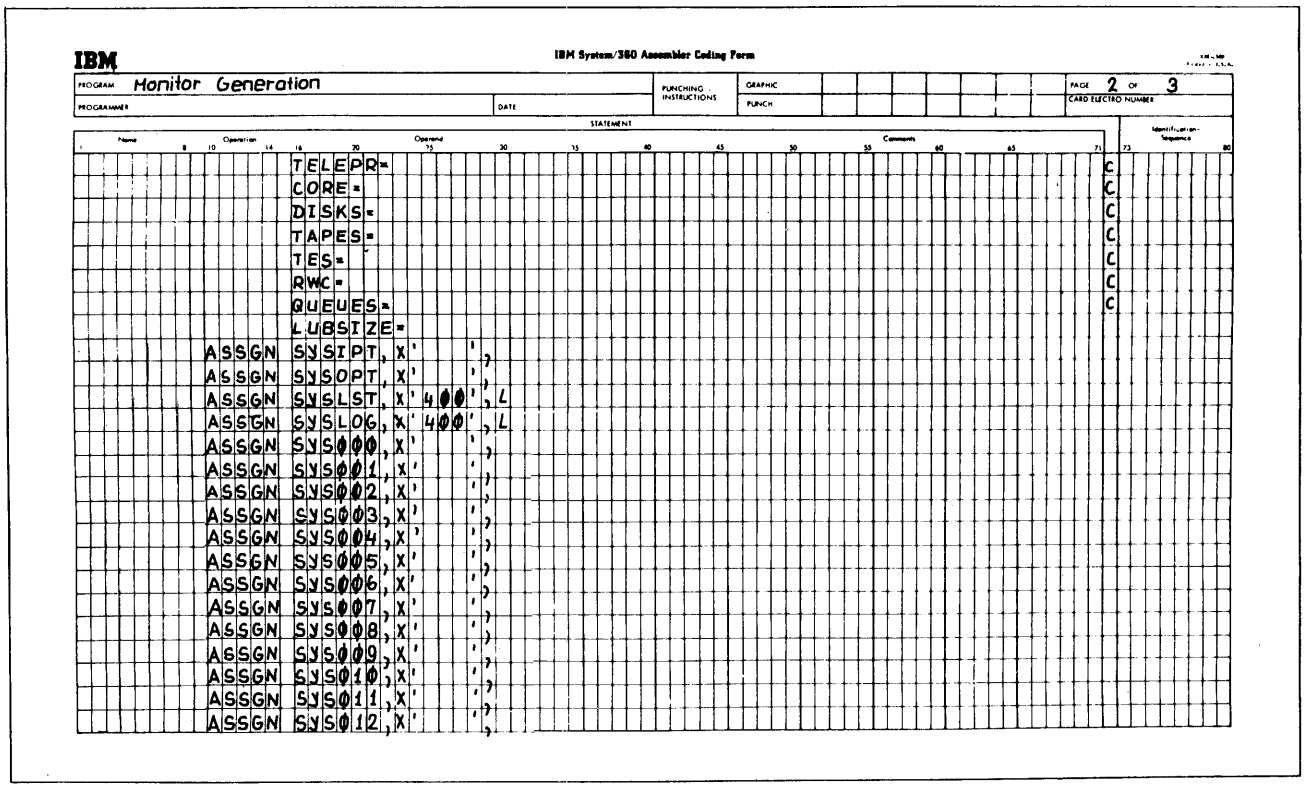


Figure 6. Coding Sheets for Monitor Generation (Part 1 of 2)



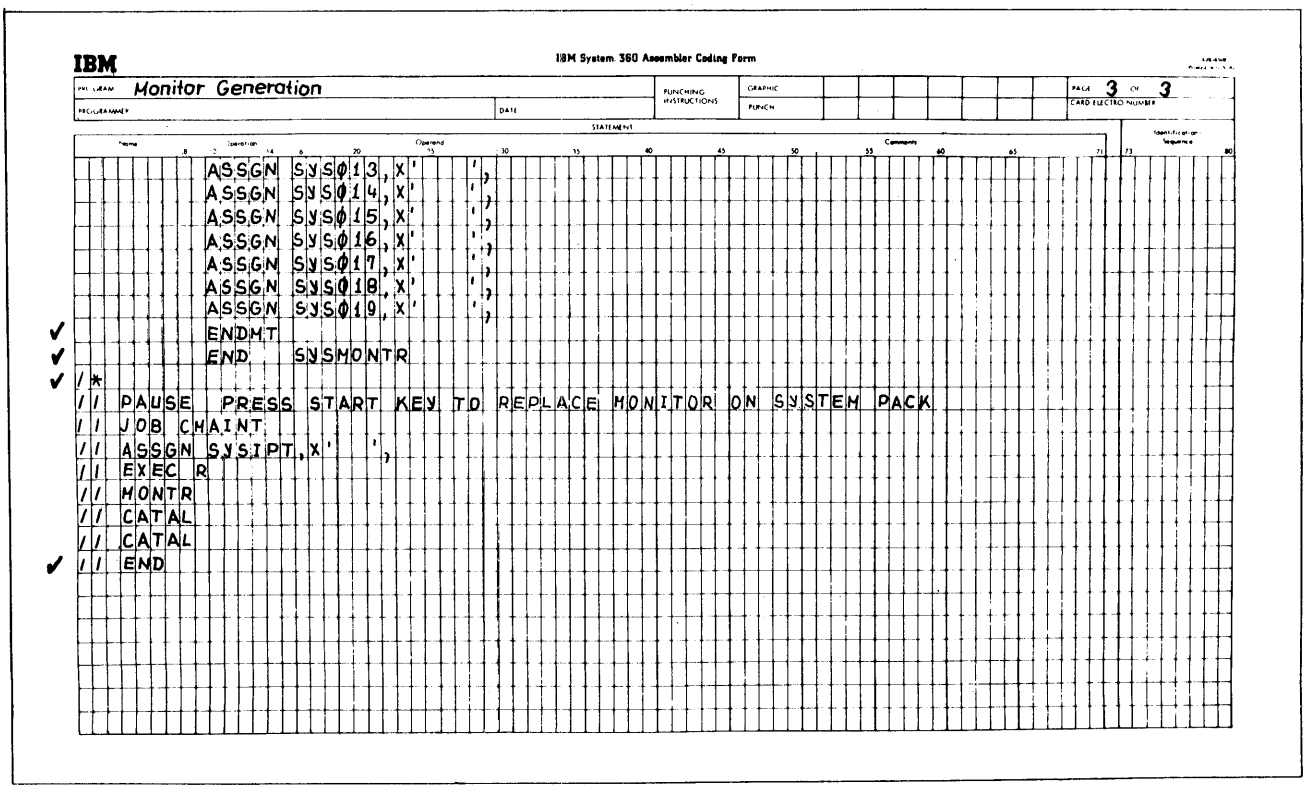
IBM System/360 Assembler Coding Form

PROGRAM: Monitor Generation | PUNCHING INSTRUCTIONS | GRAPHIC | PUNCH | PAGE 2 OF 3 | CARD ELECTRO NUMBER

PROGRAMMER | DATE

STATEMENT

Operation	Operand	Comments
	TELEPR=	C
	CORE=	C
	DISKS=	C
	TAPES=	C
	TES=	C
	RWC=	C
	QUEUES=	C
	LUBSIZE=	C
ASSGN	SYSIPT,X' '	
ASSGN	SYSOPT,X' '	
ASSGN	SYSLST,X'400'	L
ASSGN	SYSLOG,X'400'	L
ASSGN	SYS000,X' '	
ASSGN	SYS001,X' '	
ASSGN	SYS002,X' '	
ASSGN	SYS003,X' '	
ASSGN	SYS004,X' '	
ASSGN	SYS005,X' '	
ASSGN	SYS006,X' '	
ASSGN	SYS007,X' '	
ASSGN	SYS008,X' '	
ASSGN	SYS009,X' '	
ASSGN	SYS010,X' '	
ASSGN	SYS011,X' '	
ASSGN	SYS012,X' '	



IBM System 360 Assembler Coding Form

PROGRAM: Monitor Generation | PUNCHING INSTRUCTIONS | GRAPHIC | PUNCH | PAGE 3 OF 3 | CARD ELECTRO NUMBER

PROGRAMMER | DATE

STATEMENT

Operation	Operand	Comments
ASSGN	SYS013,X' '	
ASSGN	SYS014,X' '	
ASSGN	SYS015,X' '	
ASSGN	SYS016,X' '	
ASSGN	SYS017,X' '	
ASSGN	SYS018,X' '	
ASSGN	SYS019,X' '	
ENDMT		
END	SYSMONTR	
/*		
// PAUSE PRESS START KEY TO REPLACE MONITOR ON SYSTEM PACK		
// JOB CHAINT		
// ASSGN SYSIPT,X' '		
// EXEC R		
// MONTR		
// CATAL		
// CATAL		
// END		

Figure 6. Coding Sheets for Monitor Generation (Part 2 of 2)

DESCRIPTION OF OUTPUT

The internal structure of the generated Monitor depends on the type and the features you specify for the generation. The output obtained from an assembly run may be contained in punched cards, on magnetic tape, or on disk.

When you generate a card-resident Monitor, the output is normally punched into cards (i.e., a card punching device is assigned to SYSOPT). In addition, it is advisable to make a copy of the output using a file-to-file utility program. This copy can be used as backup in case something happens to the control program card decks. Tape backup is recommended.

When you generate a disk-resident Monitor (TYPE=DKRES, TRANS, or INQRY) the output is automatically written into the relocatable area if this area is present on the system disk pack. You may specify that the output of the Monitor generation also be punched into cards or written onto magnetic tape. (If no relocatable area is present, card or magnetic tape output must be used). If the Monitor is written only into the relocatable area, it must be included immediately in the disk-resident system pack using the CMAINT program.

Card or magnetic tape output is recommended as backup for the disk-resident Monitor in case it is accidentally overwritten. To obtain card output, assign a card punching device to SYSOPT. To obtain magnetic tape output, assign a magnetic tape drive to SYSOPT.

Card-Resident Monitor

A card-resident Monitor generation (TYPE=CDRES) produces the following phases in card-image format:

- Card IPL, which includes the assignments for the symbolic device addresses SYSRES and SYSRDR.
- Card-resident Monitor including the standard nucleus and, if specified, the physical I/O routines for the printer-keyboard and the BSCA routines.
- Job Closing routines including the following routines as specified:
  - print routine for tape error statistics (if TAPES≠0 and TES=YES were specified)
  - print routine for BSCA communication error statistics (if TELEPR=STANDARD or HISPEED was specified)
  - Tape Error Recovery routine (if TAPES≠0 was specified)
  - Tape Error Statistics routine (if TAPES≠0 and TES=YES were specified)
- Card-Resident Job Control program.

Separation of Card Decks: After you generate the card-resident control programs, it is necessary to separate the card IPL and Monitor programs from the Job Closing routines (if any) and the Job Control program. To locate the last card of the Monitor program, perform the following steps:

1. Find the heading CARD FETCH ROUTINE in the Assembler listing produced during generation.
2. Locate the number of the last TXT card of the Card Fetch Routine. This card will be listed on the last line (under the heading CARD FETCH ROUTINE) that has a number printed in the rightmost margin, i.e., in print positions 118-120. This number is the TXT card number.
3. Add one to the TXT card number which you located in step 2.
4. Look in the card deck containing your card-resident control programs and find (in columns 77-79) the number you calculated in step 3. This is the last card of the Monitor. It is an XFR card with the following format:

   Col. 1 = 12-2-9 punch
   Col. 2 = 0-7 punch
   Col. 3 = 12-6 punch
   Col. 4 = 11-9 punch
   Col. 77-79 = number located in step 3

Disk-Resident Monitor

A disk-resident Monitor generation (TYPE=DKRES, TYPE=TRANS, or TYPE=INQRY) produces the following phases:

- Disk-resident Monitor including the standard nucleus and, if specified, the physical I/O routines for the printer-keyboard and BSCA routines.
- A transient dummy phase (only if TYPE=TRANS or TYPE=INQRY) which includes the following subphases as specified:
  - Two subphases for the transient Fetch routine,
  - Three subphases for the transient Tape Error Recovery routine (if TAPE≠0 was specified), and

- Three subphases for transient inquiry routines (if TYPE=INQRY was specified).

- Job Closing routines including the following routines as specified:

  - print routine for tape-error statistics (if TAPES≠0 and TES=YES was specified)

  - print routine for BSCA communication-error statistics (if TELEPR=STANDARD or HISPEED was specified)

  - Tape Error Recovery routines (if TYPE=DISKS and TAPES≠0 were specified)

  - Tape Error Statistics routines (if TES=YES was specified)

EXAMPLES OF MONITOR GENERATION

This section describes in detail the coding required to generate each of the four Monitor types (TYPE=CDRES, TYPE=DKRES, TYPE=TRANS, and TYPE=INQRY).

The specifications on the coding sheets used in the following examples fall into three categories. The first category includes all control statements required to start the assembly run. The second consists of the macro instructions, operands, and specifications required to generate the Monitor. The third category contains all control statements required for the CMAINT run. Superfluous control statements are crossed out on the coding sheets. In the discussion preceding each example, the emphasis is on the second category. The first and third categories are not described in detail. An example is given for each Monitor type (CDRES, DKRES, TRANS, and INQRY). The machine configurations used in the examples do not have any relationship to the type of Monitor to be generated.

EXAMPLE A: GENERATION OF A MONITOR WITH THE OPERAND TYPE=CDRES

Assembly Run

Configuration available for assembly run:

IBM 2020 CPU, Model BC2 (12,288 bytes of main storage)
IBM 2560 Multi-Function Card Machine, Model A1
IBM 1403 Printer
IBM 2311 Disk Storage Drive, Model 12

Permanent assignments in existing Monitor:

SYSIPT -- unassigned
SYSOPT -- unassigned
SYSLST -- 1403 Printer
SYSLOG -- 1403 Printer

Monitor to be Generated

Card-resident Monitor

- for an IBM 2020 CPU, Model D2 (16,384 bytes of main storage)
- for one disk drive
- for no magnetic-tape drives
- without BSCA routines
- without RWC feature
- without scheduler for queuing disk I/O requests
- with a total of eleven LUBs including the following six standard assignments:

  SYSIPT -- 2560 MFCM, Model A1, primary feed
  SYSOPT -- 2560 MFCM, Model A1, secondary feed
  SYSLST -- 1403 Printer
  SYSLOG -- 1403 Printer
  SYS000 -- unassigned
  SYS001 -- unassigned

- For the generation of the IPL program, the following assignments are required:

  SYSRDR -- 2560 MFCM, Model A1 primary feed
  SYSRES -- 2311 Disk Storage Drive, Model 11, Drive 1

  Note: The entry LUBSIZE=5 reserves eleven LUBs in the sequence SYSRES, SYSRDR to SYS004. Only eight of these are filled with a specific content (the so-called standard assignment) by means of eight ASSGN macro instructions.

Required Coding

Figure 7 shows the coding required to generate the above Monitor. The numbered comments below refer to the circled references in the right margin of the coding sheets.

1. Refer to the pertinent sections of the SRL publication IBM System/360 Model 20, Disk Programming System, Control and Service Programs, Form C24-9006.

2. Since the output for a card-resident Monitor generation is normally punched into cards, the Assembler AOPTN statement with the operand NODECK is crossed out.

3. The macro instruction CDIPL is required since the desired assignments do not correspond with the default specifications. 2560P indicates that SYSRDR is assigned the MFCM, primary feed. The second operand is omitted and the default specification for SYSRES (2311 Disk Drive 01, Model 11) is assumed.

4. Since a card-resident Monitor is to be generated, the operand TYPE=CDRES is specified.

5. Inquiry facilities cannot be supported, therefore the operands INQIPT, INQOPT, and INQMSG are ignored by the Assembler and crossed out on the coding sheet.

6. The printer-keyboard is not to be employed as I/O device in this system. Since the default specification is NO, the operand is crossed out and the default specification is automatically assumed.

7. Since no BSCA routines are to be generated, this operand is crossed out and the default specification is automatically assumed.

8. The Monitor to be generated is to support a main-storage capacity of 16,384 bytes. Since this is not identical with the default specification, the operand must be specified.

9. The operand DISKS=1 must be specified in order to override the default specification.

10. The operand TAPES=0 must be specified in order to override the default specification.

11. The operand TES is ignored when tapes are not supported, therefore it is crossed out.

12. The operand RWC is crossed out, because the desired value corresponds with the default specification.

13. The operand QUEUES=NO must be specified to override the default specification.

14. The operand LUBSIZE=5 is specified since the desired specification differs from the default specification.

15. The ASSGN macro instructions for SYSIPT and SYSOPT are specified since their required assignment is not identical with the default specification.

16. The ASSGN macro instructions for SYSLST and SYSLOG are crossed out because the default specifications are identical with the required assignments.

17. These ASSGN macro instructions are used to unassign the devices.

18. The remaining ASSGN macro instructions are superfluous since no further assignments are required.

19. The card-resident Monitor to be generated is not to replace the existing Monitor through a CMAINT run, and consequently these control statements are not required. Therefore, they are crossed out on the coding sheet.

Output:

The output of the assembly run is a card deck consisting of:

- Card IPL including ASSGN cards for SYSRDR and SYSRES

- Monitor containing

  Permanent Link Data Area (Communication Region, LUBs, and PUBs)
  Physical IOCS (Scheduler, Disk Error Recovery routine, and Disk Start I/O routine)
  Fetch routine
  Monitor I/O Area

- Job Control program.

Note: Since tape I/O and BSCA support are not desired, the Job Closing routines are not included.

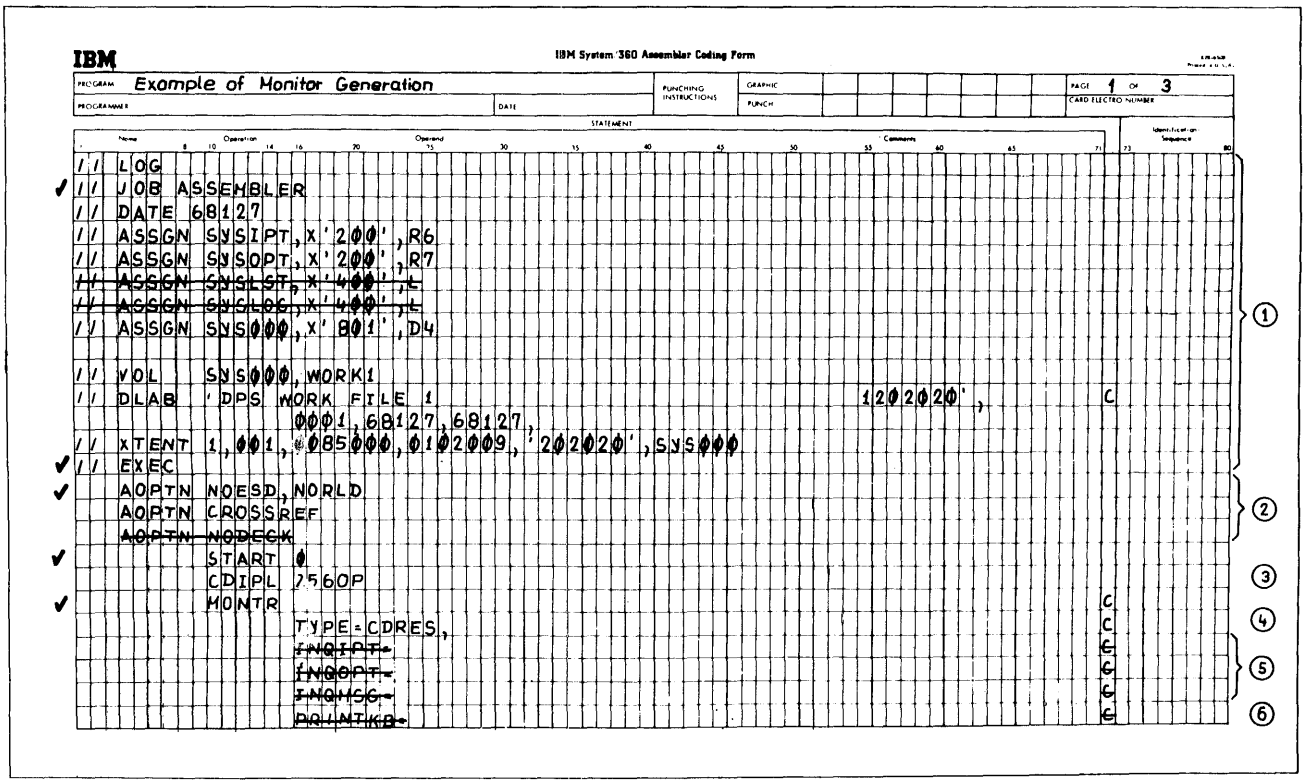


Figure 7. Monitor Generation, Example A (Part 1 of 2)

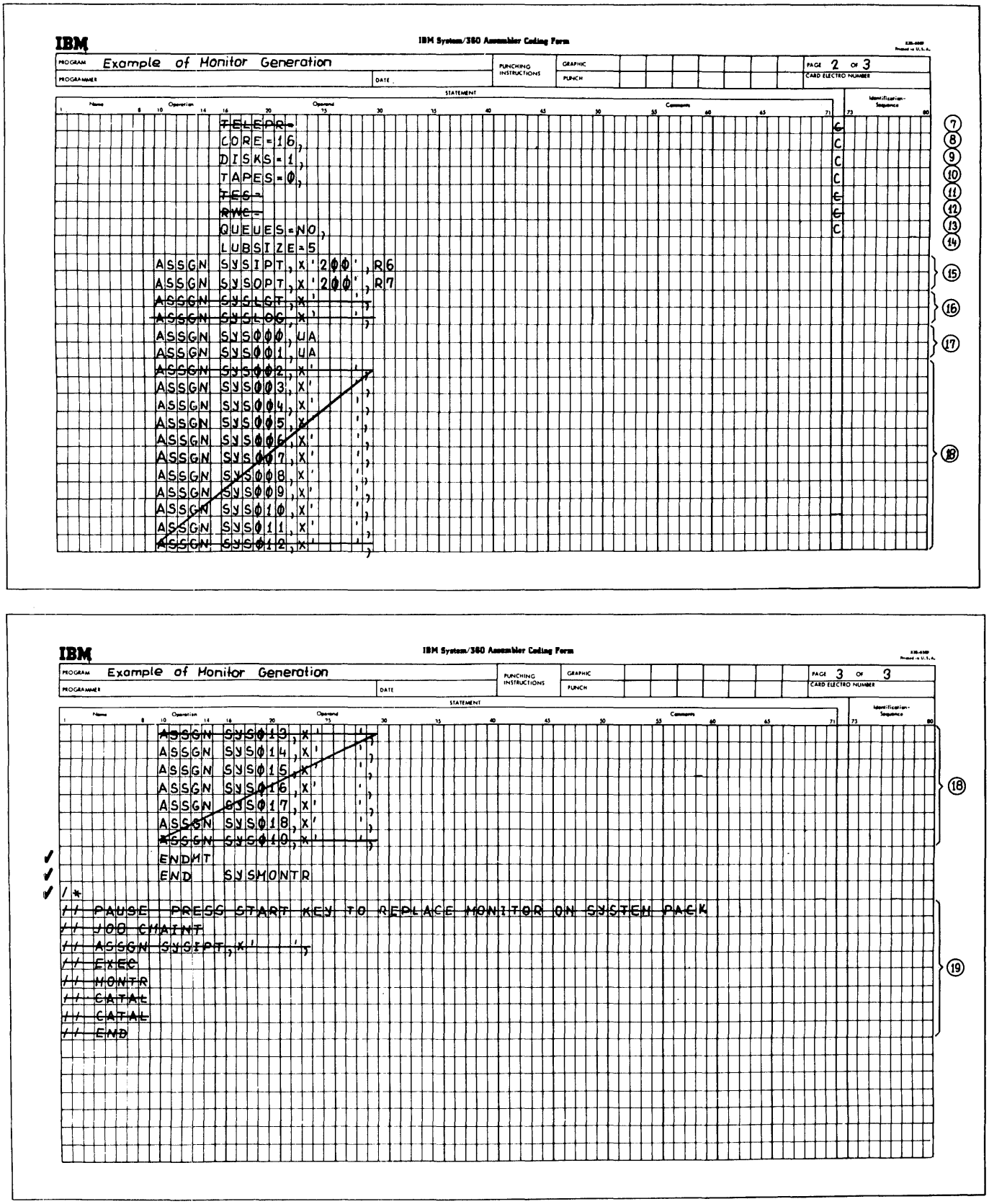


Figure 7. Monitor Generation, Example A (Part 2 of 2)

EXAMPLE B: GENERATION OF A MONITOR WITH THE OPERAND TYPE=DKRES

Assembly Run

Configuration available for assembly run:

IBM 2020 CPU, Model D4 (16,324 bytes of main storage)
IBM 2560 MFCM, Model A2
IBM 2311 Disk Storage Drive, Model 12
IBM 2203 Printer, Model A2

Permanent assignments in existing Monitor:

SYSIPT -- 2560 MFCM, Model A2
SYSOPT -- unassigned
SYSLST -- 2203 Printer, Model A2
SYSLOG -- unassigned

Monitor to be Generated

Disk-resident Monitor

- without BSCA routines
- for main-storage capacity of 12,288 bytes
- for two disk drives
- for two tape drives
- with tape error statistics
- for printer-keyboard used as I/O device
- without RWC feature
- with queuing of disk and tape I/O requests
- with output written into the relocatable area alone
- to replace the existing Monitor immediately through CMAINT run
- with a total of sixteen LUBs including the following eight standard assignments:

  SYSIPT -- 2311 Disk Storage Drive, Model 11, Drive 1
  SYSOPT -- 2311 Disk Storage Drive, Model 11, Drive 2
  SYSLST -- 2203 Printer, Model A2
  SYSLOG -- 2203 Printer, Model A2
  SYS000 -- 2311 Disk Storage Drive, Model 11, Drive 1
  SYS001 -- 2311 Disk Storage Drive, Model 11, Drive 2
  SYS002 -- 2415 Tape Unit, addressed by 80, 7-track, 556 BPI
  SYS003 -- 2415 Tape Unit, addressed by 81, 7-track, 556 BPI

Required Coding

Figure 8 shows the coding required to generate the above Monitor. The numbered comments below refer to the circled references in the right margin of the coding sheets.

1. Refer to the pertinent sections of the SRL publication IBM System/360 Model 20, Disk Programming System, Control and Service Programs, Form C24-9006.
2. Since the output is written into the relocatable area only, the operand NODECK must be added to the AOPTN statement.
3. Since a disk-resident Monitor is to be generated, the macro instruction CDIPL is crossed out.
4. A disk-resident Monitor is to be generated with no transient phases and with no inquiry facilities. Since the default specification TYPE=DKRES corresponds to this type of Monitor, the operand is crossed out and the default specification is automatically assumed.
5. The Monitor to be generated does not support inquiry facilities, hence these three operands are ignored by the Assembler and are crossed out.
6. The printer-keyboard is to be employed as I/O device in this system. Since this requirement is not identical with the default specification, the operand is specified.
7. Since BSCA is not required, this operand is crossed out and the default specification is automatically assumed.
8. The default specifications are identical with the required specifications. Therefore the operands are crossed out and the default specifications are automatically assumed.
9. The operand TAPES=2 is specified because the default specification differs from the required specification.
10. Tapes are to be supported and tape error statistics are required. Since the default specification is TES=YES, the operand is crossed out.
11. The operand LUBSIZE=10 is specified since the desired specification differs from the default specification.
12. These assignments for SYSIPT and SYSOPT are made because the required assignments differ from the default specifi-

cations. Assignments for SYSLST and SYSLOG are not required because the printer attached is automatically assigned.

13. Both ASSGN macro instructions are crossed out because the default specifications are identical with the required assignments.

14. SYS002 and SYS003 are assigned the two drives of the 2415 Tape Unit with the addresses 80 and 81.

15. The remaining ASSGN macro instructions are superfluous since no further assignments are required.

16. These control statements are included behind the Assembler input deck since the generated Monitor is to replace the existing Monitor through a CMAINT run immediately after generation. Since the relocatable area contains the generated Monitor, the control statement EXEC R is required, but the // ASSGN SYSIPT control statement is not required. Only one CATAL control statement is required since only one additional Monitor phase is generated.

Output:

The result of the assembly and CMAINT runs is a disk-resident system including the following new phases

- First Monitor phase containing:

  Permanent Link Data Area (Communication Region, LUBs, and PUBs)
  Physical IOCS (Scheduler, Disk Error Recovery routine, and Disk and Tape Start I/O routines)
  Physical IOCS for printer-keyboard
  Fetch routine
  Monitor I/O Area

- Job Closing routines consisting of

  phase for Tape Error Statistics printout and

  subphase for Tape Error Recovery and Tape Error Statistics routines.

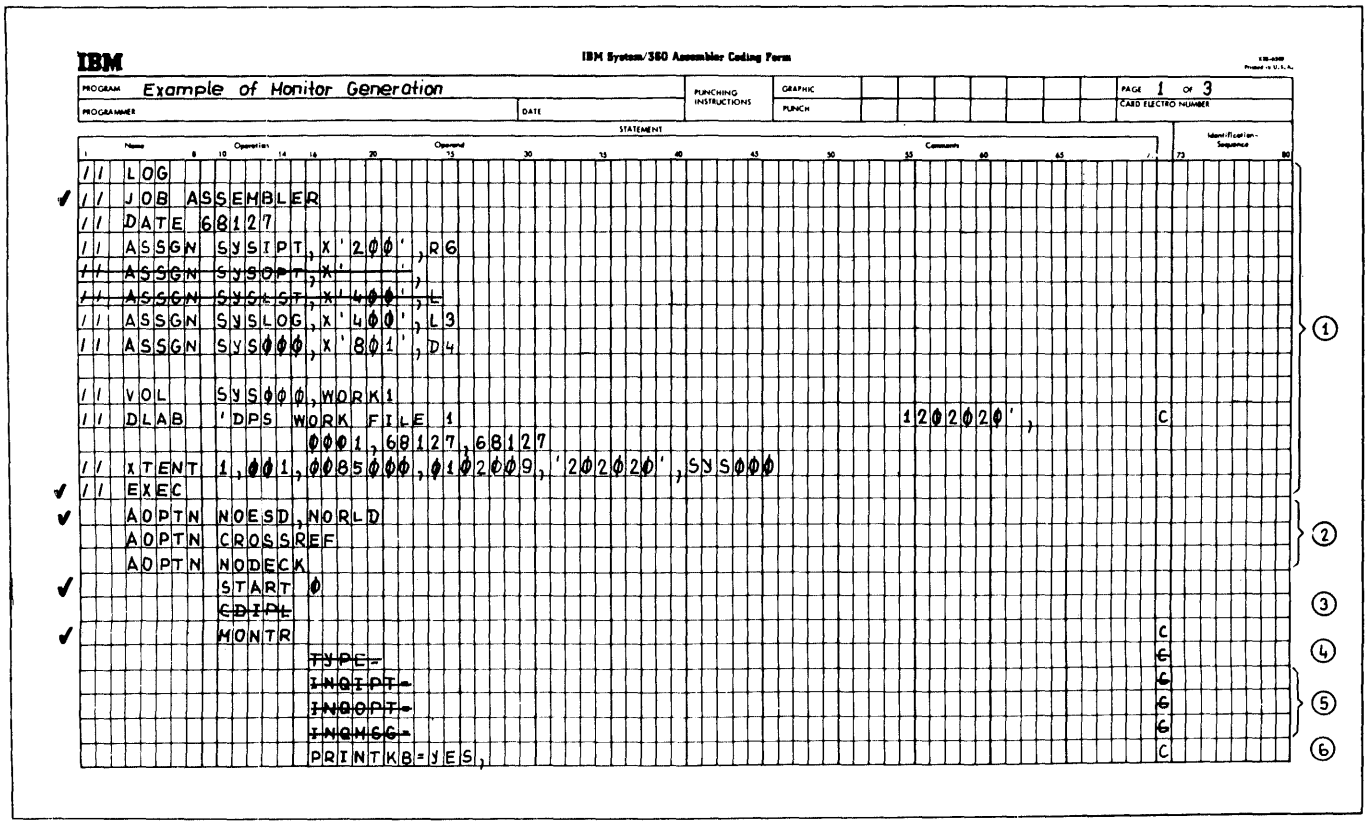


Figure 8. Monitor Generation, Example B (Part 1 of 2)

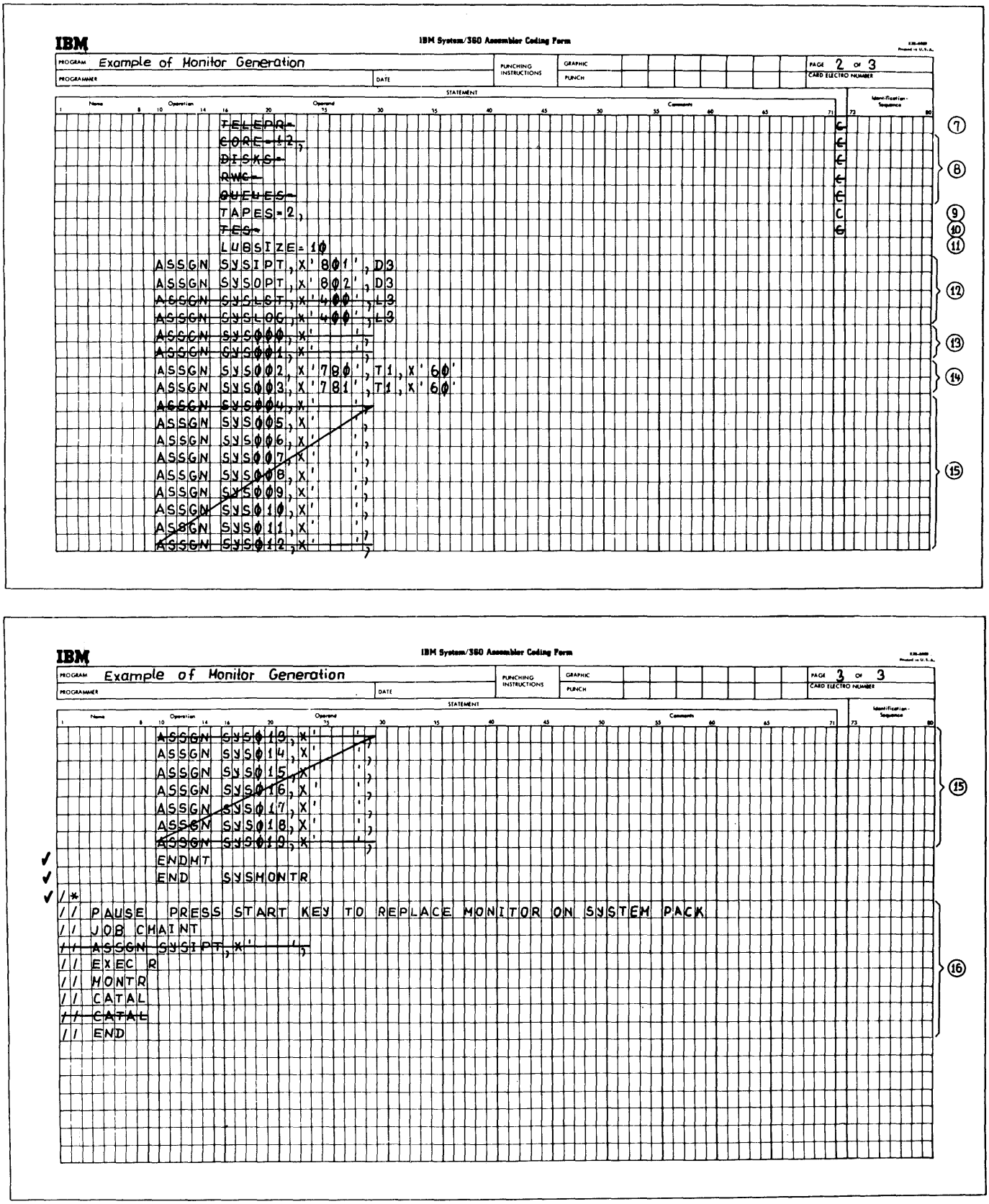


Figure 8. Monitor Generation, Example B (Part 2 of 2)

EXAMPLE C: GENERATION OF A MONITOR WITH THE OPERAND TYPE=TRANS

Assembly Run

Configuration available for assembly run:

IBM 2020 CPU, Model D5 (16,384 bytes of main storage)
IBM 2311 Disk Storage Drive, Model 11
IBM 1403 Printer, Model 7
IBM 1442 Card Punch, Model 5
IBM 2501 Card Reader, Model A2

Permanent assignments in existing Monitor:

SYSIPT -- 2501 Card Reader, Model A2
SYSOPT -- 1442 Card Punch, Model 5
SYSLST -- 1403 Printer, Model 7
SYSLOG -- 1403 Printer, Model 7
SYS000 -- 2311 Disk Storage Drive, Model 11, Drive 1

Monitor to be Generated

Disk-resident Monitor

- with transient routines
- for main-storage capacity of 12,288 bytes
- for two disk drives
- for six tape drives
- with tape error statistics
- with output in punched cards and no cross-reference list on the Assembler listing of the generation
- without printer-keyboard routines
- without BSCA routines
- with RWC feature
- without queuing of disk and tape I/O requests
- with a total of twenty-six LUBs including the following eleven standard assignments:

  SYSIPT -- 2520 Card Read Punch, Model A1
  SYSOPT -- 2520 Card Read Punch, Model A1
  SYSLST -- 1403 Printer, Model 7
  SYSLOG -- 1403 Printer, Model 7
  SYS000 -- 2311 Disk Storage Drive, Model 11, Drive 1
  SYS001 -- 2311 Disk Storage Drive, Model 11, Drive 2
  SYS002 -- 2415 Tape Unit, 9-track, 1600 BPI, addresses hexadecimal 80 to 85
  SYS007

Required Coding

Figure 9 shows the coding required to generate the above Monitor. The numbered comments below refer to the circled references in the right margin of the coding sheets.

1. Refer to the pertinent sections of the SRL publication IBM System/360 Model 20 Disk Programming System, Control and Service Programs, Form C24-9006.

2. Since no cross-reference list is desired and the output is to be punched into cards, the Assembler AOPTN statements with the operands NODECK and CROSSREF are crossed out.

3. Since a disk-resident Monitor is to be generated, the Macro instruction CDIPL is not required and is therefore crossed out.

4. Since a disk-resident Monitor with transient routines is to be generated, the operand TYPE=TRANS is specified.

5. Inquiry facilities cannot be supported by this Monitor. For this reason the operands INQIPT, INQOPT, and INQMSG are ignored by the Assembler and are therefore crossed out.

6. Since the printer-keyboard is not to be supported, and since the default specification for this operand is NO, the operand is crossed out.

7. Since BSCA routines are not required, this operand is crossed out and the default specification is automatically assumed.

8. The default specification of each of these five operands is identical with the required specification. Therefore all five operands are crossed out and the default specifications are automatically assumed.

9. The operands RWC=YES and QUEUES=NO must be specified to override the default specifications.

10. The ASSGN macro instructions for SYSIPT and SYSOPT are specified since their required assignments are not identical with the default specifications.

11. These four ASSGN macro instructions are crossed out since their default specifications are identical with the required assignments.

12. SYS002 through SYS007 must be assigned as shown in order to insert the physical addresses for magnetic tape drives into the six physical unit blocks (PUBs) which will be reserved in the Monitor by the default specification TAPES=6.

13. The remaining ASSGN macro instructions are superfluous since no further assignments are required.

14. Since the output of the assembly run is to be a card deck, these control statements are automatically generated and included in the output deck. Therefore they are crossed out on the coding sheet. However, a // END statement must be placed behind the Monitor deck before it is used as input to the CMAINT run.

Output:

The output of the assembly run is a card deck consisting of the following phases

- First Monitor phase containing:

  Permanent Link Data Area (Communication Region, LUBs, and PUBs)
  Physical IOCS (Scheduler, Disk Error Recovery routine, and Disk and Tape Start I/O routines)
  Core-resident Fetch routine
  Transient Area

- Transient dummy phase with

  subphases for transient Fetch routine and transient Tape Error Recovery routine

- Job-closing routines consisting of

  phase for Tape Error Statistics printout and

  subphase for Tape Error Statistics routine.

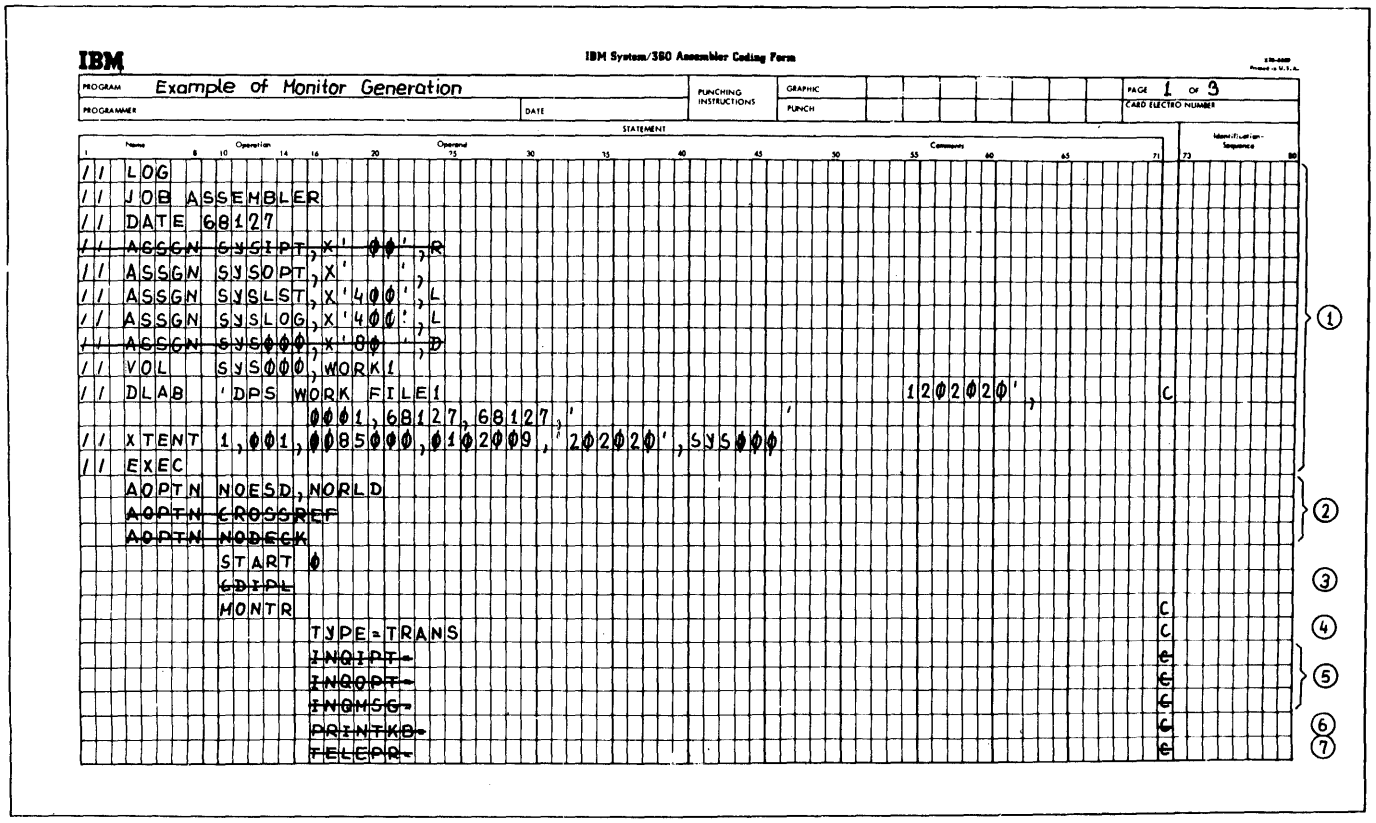
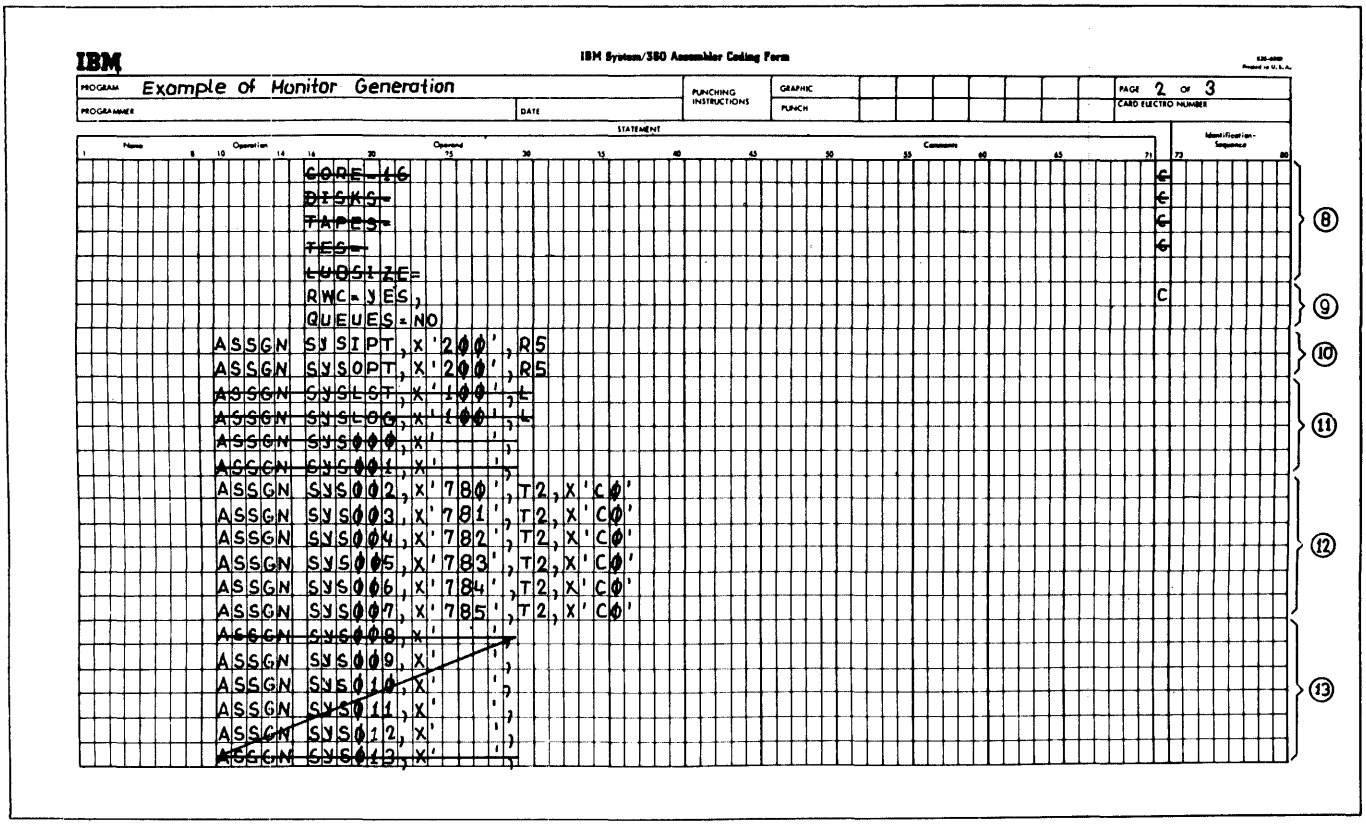


Figure 9. Monitor Generation, Example C (Part 1 of 2)



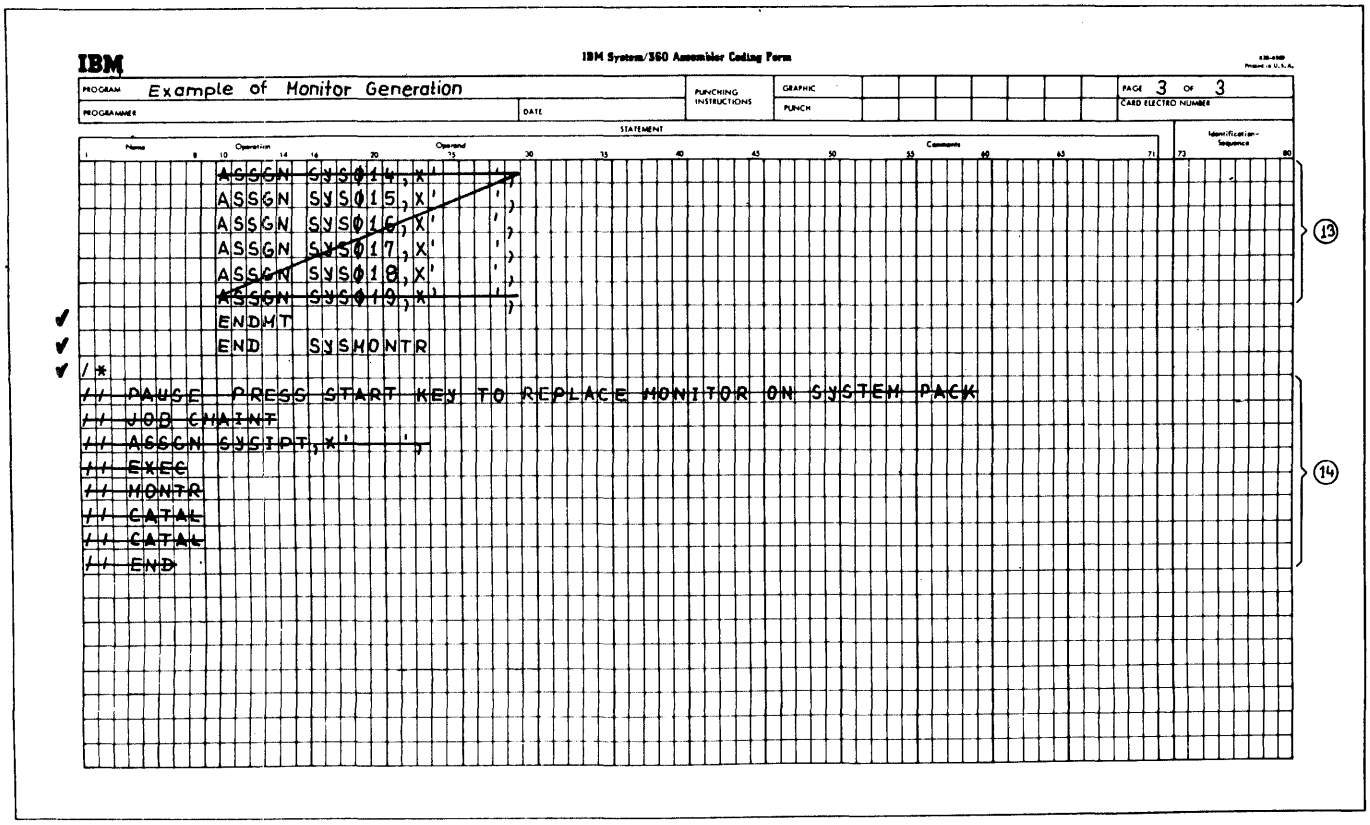


Figure 9. Monitor Generation, Example C (Part 2 of 2)

EXAMPLE D: GENERATION OF A MONITOR WITH THE OPERAND TYPE=INQRY

Assembly Run

Configuration available for assembly run:

IBM 2020 CPU, Model E5 (32,768 bytes of main storage)
IBM 2501 Card Reader, Model A2
IBM 1403 Printer, Model 7
Two IBM 2311 Disk Storage Drives, Model 11

Permanent Assignments in existing Monitor:

SYSIPT -- 2501 Card Reader, Model A2
SYSLST -- 1403 Printer, Model 7
SYSLOG -- 1403 Printer, Model 7
SYS000 -- 2311 Disk Storage Drive, Model 11, Drive 1
SYS001 -- 2311 Disk Storage Drive, Model 11, Drive 2

Monitor to be Generated

Disk-resident Monitor

- with inquiry support
- with transient routines
- with standard-speed BSCA transmission
- for main-storage capacity of 32,768 bytes
- with inquiry input area of 20 bytes
- with inquiry output area of 80 bytes
- with inquiry message
- for four disk drives
- for no tape drives
- with RWC feature
- with queuing of disk I/O requests
- with output written into the relocatable area alone
- to replace the existing Monitor immediately using the CMAINT program
- with a total of sixteen LUBs including the following five standard assignments:

  SYSIPT -- 2501 Card Reader, Model A2
  SYSLST -- 1403 Printer, Model 7
  SYSLOG -- 1403 Printer, Model 7
  SYS000 -- 2311 Disk Storage Drive, Model 11, Drive 1
  SYS001 -- 2311 Disk Storage Drive, Model 11, Drive 2
  SYS002 -- 2311 Disk Storage Drive, Model 11, Drive 3
  SYS003 -- 2311 Disk Storage Drive, Model 11, Drive 4

Required Coding

Figure 10 shows the coding required to generate the above Monitor. The numbered comments below refer to the circled references in the right margin of the sheets.

1. Refer to the pertinent sections of the SRL publication IBM System/360 Model 20, Disk Programming System, Control and Service Programs, Form C24-9006.

2. Since more than one disk drive is available for the assembly run, the AWORK 2 Assembler option is added. Since the output is written into the relocatable area only, the AOPTN statement with the operand NODECK is not crossed out. No cross-reference list is desired so the AOPTN statement with the operand CROSSREF is crossed out.

3. Since a disk-resident Monitor is to be generated, the macro instruction CDIPL is not required and, therefore, is crossed out.

4. Since the disk-resident Monitor to be generated is to support inquiry facilities, the operand TYPE=INQRY is specified.

5. Since the Monitor to be generated supports inquiry facilities, the size of the inquiry input area must be indicated. However, since the default specification is identical with the required specification, INQIPT is crossed out and the default specification is automatically assumed.

6. Since the Monitor to be generated supports inquiry facilities, the length of INQOPT must be stated. Since the desired length differs from the default specification, the operand is specified as shown.

7. Since inquiry calls are desired and since the default specification of this operand is identical with this requirement, this operand is crossed out.

8. Since the printer-keyboard is automatically supported when inquiry facilities are specified, this operand is crossed out.

9. This operand is specified since the generated Monitor is to support standard BSCA transmission.

10. The operand CORE=32 is specified to override the default specifications.

11. The operand DISKS=4 is specified to override the default specification.

12. The operand TAPES=0 is specified in order to override the default specification.

13. Since tapes are not to be supported, the operand TES is ignored and therefore crossed out on the coding sheet.

14. The operand RWC=YES is specified to override the default specification.

15. The operand QUEUES is crossed out because the required specification is identical with the default specification.

16. The operand LUBSIZE=10 is specified since the desired specification differs from the default specification.

17. These ASSGN macro instructions are crossed out since their default specifications are identical with the required specifications.

18. The remaining ASSGN macro instructions are superfluous since no further assignments are required.

19. The Monitor and its phases are to replace the existing Monitor by a CMAINT job immediately following the assembly job.

    The control statement EXEC R is required since the relocatable area contains the generated Monitor.

    Two CATAL control statements are required (refer to Figure 4) since two additional Monitor phases are generated.

Output:

The result of the assembly and CMAINT run is a disk-resident system supporting inquiry facilities and BSCA transmission and including the following new phases:

- First Monitor phase containing:

  Permanent Link Data Area (Communication Region, LUBs, and PUBs)
  Physical IOCS (Scheduler, Disk Error Recovery routine, and Disk Start I/O routines)
  Physical IOCS for printer-keyboard
  Inquiry Attention Routine
  Core-resident Fetch routine
  Transient Area
  Inquiry Input Area
  Inquiry Output Area -- adjacent to Monitor

- Common halt routine and additional BSCA interrupt handling routine

- Transient dummy phase with

  two subphases for transient Fetch routine,
  three subphases for transient inquiry routines

- Job Closing routines consisting of:

  phase for printout of BSCA communications error statistics

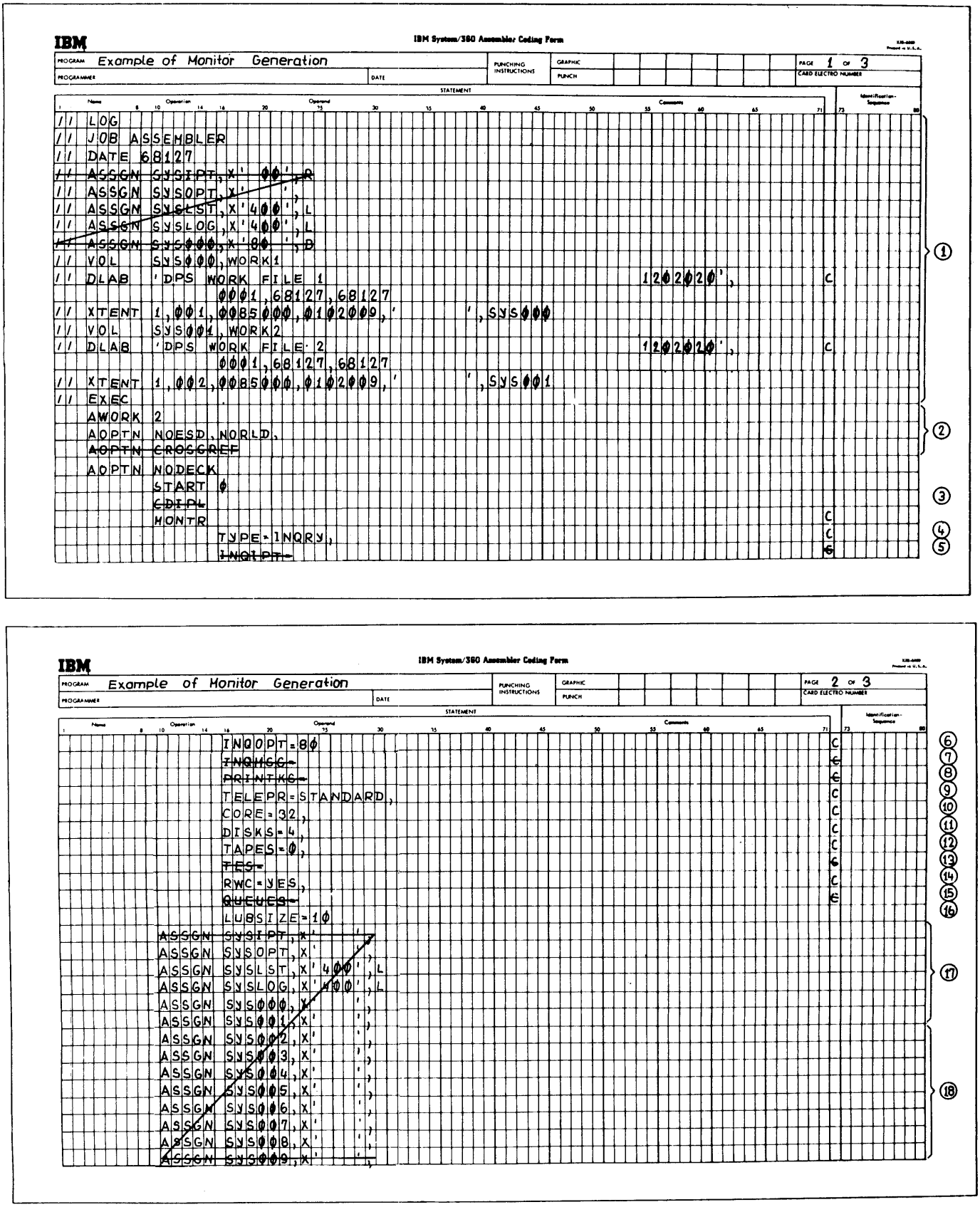


Figure 10. Monitor Generation, Example D (Part 1 of 2)

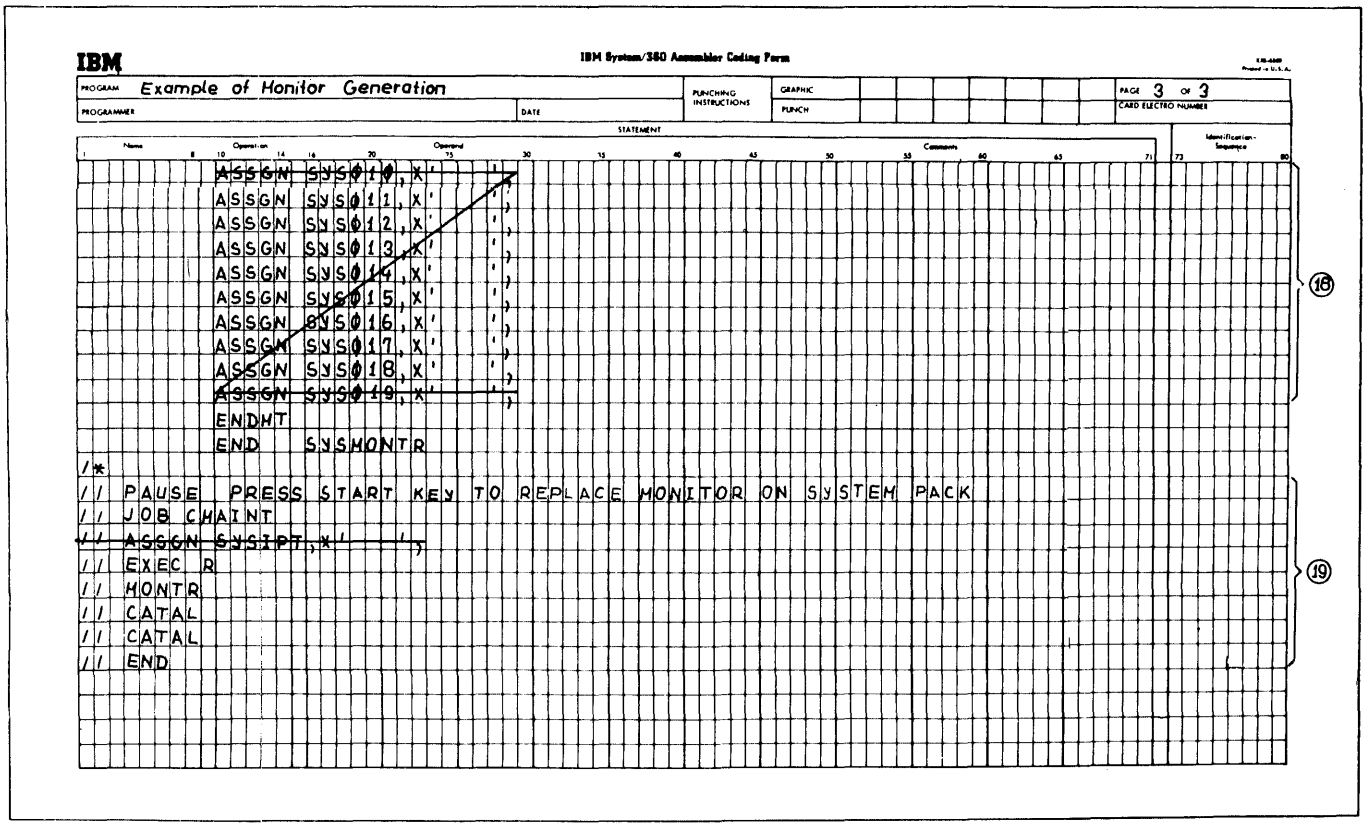


Figure 10. Monitor Generation, Example D (Part 2 of 2)

OPERATING PROCEDURES FOR MONITOR GENERATION

Perform the following steps to generate a Monitor:

1. Place the card deck containing the job control cards for the assembly in the hopper of the card-reading device assigned to SYSRDR and the required Monitor specification cards in the hopper of the card-reading device assigned to SYSIPT.

2. If the Monitor to be generated is a disk-resident Monitor and is to be included immediately on the system disk pack, you must ensure that the control statements for the CMAINT run are supplied to SYSRDR. Therefore, if (1) the output of the generation is to be in the relocatable area alone or on tape, or (2) the output is to be a card deck but SYSIPT is not assigned the same device as SYSRDR, insert all control statements required for the CMAINT job behind the card deck in SYSRDR. (Include a // PAUSE statement if an interruption between the assembly and the CMAINT run is desired).

3. Mount the system disk pack containing the required programs and macro definitions on the disk drive assigned to SYSRES and start the drive.

4. Mount the work pack (if used) on the disk drive assigned to SYS000 or SYS001 and start the drive.

5a. If tape output is desired and the tape is not already mounted and/or positioned from a previous run, mount a tape reel on the tape drive assigned to SYSOPT and/or press LOAD REWIND and START on the drive.

b. If card instead of tape output is desired, place approximately 300 blank cards in the hopper of the punching device assigned to SYSOPT and press START on that device. (The minimum sized Monitor requires approximately 60 cards; the maximum requires 300 cards.)

6. Press START on the CPU.

7. If the output of the generation run is a card deck, add a // END card to this card deck.

8. To include the newly generated Monitor on the system disk pack, a CMAINT run must follow the assembly run. If preparations for the CMAINT run have not already been made in step 2 above, you must ensure that the control statements required for the CMAINT run are supplied to SYSRDR and that the output of the generation run is supplied on SYSIPT.

   Note, that if the assembly output is to be in cards or on tape, this output must be supplied as input on the device assigned to SYSIPT.

   If SYSIPT is assigned the same card reading device as SYSRDR, you need only place the assembly output deck in the hopper of this device.

The // DATE card must be included in the input deck for the CMAINT run if it is the first job. The // ASSGN SYSIPT card is only required if the input for the CMAINT program is read from tape or from a card-reading device other than that assigned to the symbolic device address SYSRDR.

Note: If an error is detected during the replacement run, the CMAINT intermediate Monitor is written onto the system pack instead of the newly generated Monitor. For a description of this Monitor, refer to the section Examples of Monitor Generation.

Figure 11 illustrates the procedure required for generating a Monitor and making a CMAINT replacement run to include the new Monitor on the system disk pack.

Storage Requirements. The relocatable area must be at least seven tracks in length for the generation of a disk-resident Monitor (i.e., one of the types DKRES, TRANS, or INQRY).

You must ensure that the core-image library is large enough to contain the transient and Job Closing routines of the generated Monitor. A DKRES type Monitor requires up to one track (10 sectors) of the core-image library for the Job Closing routines. The transient and Job Closing routines of a TRANS type Monitor require up to three tracks (30 sectors) of the core-image library. An INQRY type Monitor requires up to 14 tracks (140 sectors) of the core-image library for these routines. If the core-image library is too small, you can enlarge it by using the AORGZ program before the new Monitor is included on the system pack. The Assembler program requires at least 18 cylinders for the work area when generating a Monitor.

One Disk Drive Available

There are no general restrictions for Monitor generation using only one IBM 2311 Disk Storage Drive, Model 12. The Assembler program requires up to 18 cylinders for the work area when generating a Monitor. If the system libraries have been extended by user-written programs and/or macro definitions, the system boundaries may have to be reduced. After saving some of the programs and/or macro definitions (i.e., after creating backup with the aid of the CSERV and/or MSERV programs), they may be deleted with the aid of the CMAINT and MMAINT programs. With the aid of the AORGZ program, the boundaries can then be redefined to a value providing sufficient space for the Assembler work area. After generation of the Monitor, the deleted programs and/or macro definitions can again be included in the system libraries.

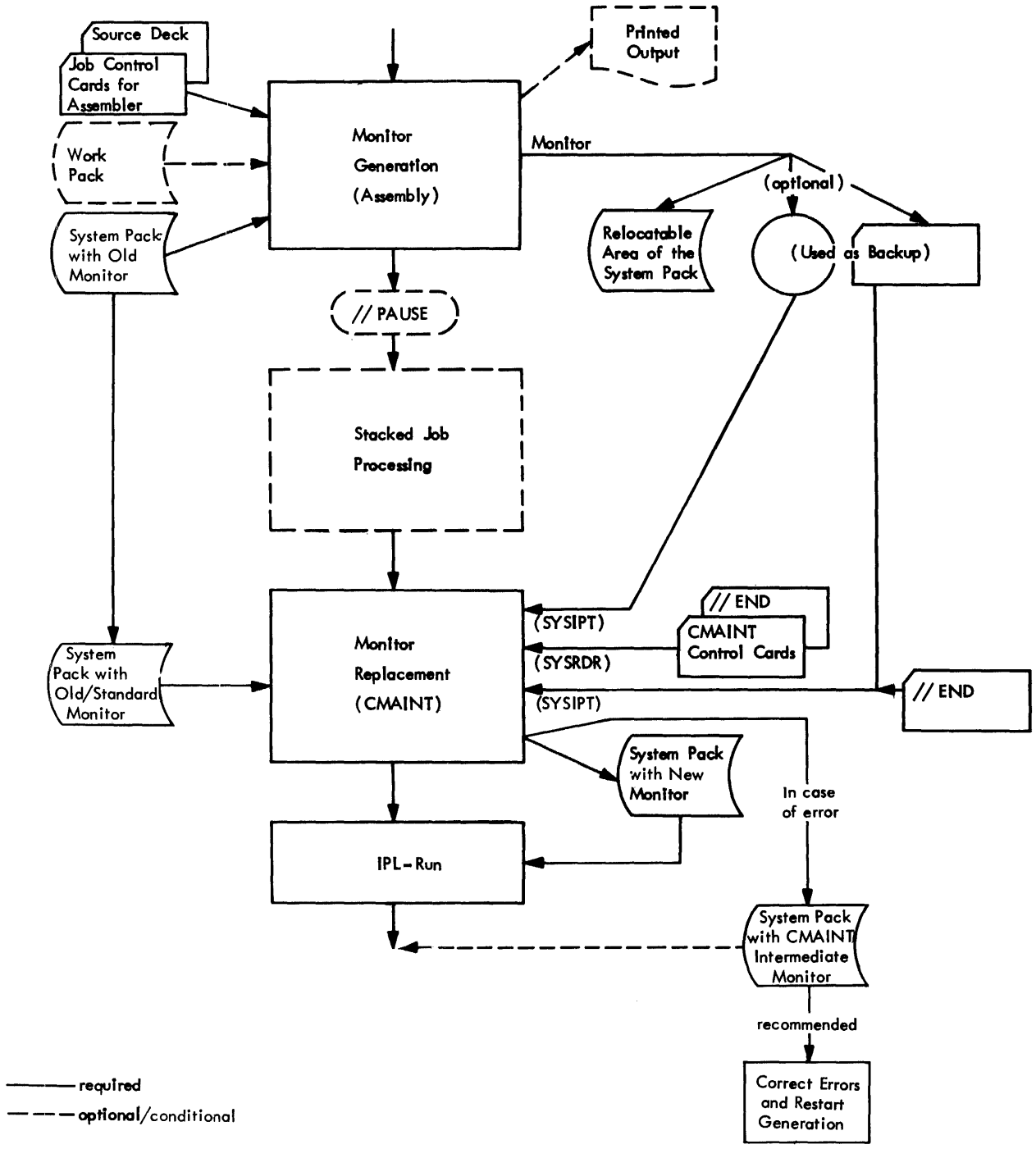


Figure 11. Generating a Disk-Resident Monitor and Including It on the System Pack

This Appendix lists the IBM-supplied DPS programs and their phase names. Refer to this list when you are using the CMAINT and CSERV programs. The heading Operand gives the correct operands to use in the // PUNCH or // DELET statement required for punching out (CSERV program) or deleting (CMAINT program) all of the phases of one program. When the program consists of one phase only, this operand is the same as the phase name.

Program Name	Phase Names	Operands
Lib. Allocation Organization program	AORGZ, AORGZ1	AORGZ.ALL
Assembler program	ASSEMB, ASSEMC, ASSEMD, ASSEME, ASSEMF, ASSEMG, ASSEMH, ASSEMI, ASSEMJ, ASSEMK, ASSEML, ASSEMM, ASSEMN, ASSEMO, ASSEMP, ASSEMQ, ASSEMR, ASSEMS, ASSEMT, ASSEMU, ASSEMV, ASSEMW	ASSEM.ALL
Alternate Track Assignment program	ATASGN	ATASGN
Backup and Restore program	BACKUP, BACKUR, BACKUS, BACKUT, BACKUU, BACKU1 BACKU2, BACKU3, BACKU4, BACKU5, BACKU6, BACKU7 BACKU8, BACKU9	BACKU.ALL
Card-to-Disk Utility	CARDSK, CARD01, CARD02, CARD03	CARD.ALL
Card-to-Tape Utility	CARTAP, CART01, CART02, CART03, CART04, CART05	CART.ALL
Both Card Utilities		CAR.ALL
Clear Disk Utility	CLRDSK	CLRDSK
Core-Image Maintenance program	CMAINT, CMAIN1, CMAIN2, CMAIN3, CMAIN4, $$$CMA (do not delete any of these phases)	CMAIN.ALL
Copy System Disk program	COPSYS	COPSYS
Core-Image Service program	CSERV, CSERV1, CSERV2, CSERV3, CSERV4	CSERV.ALL
Disk Dump Utility	DDUMP	DDUMP
Directory Service program	DSERV	DSERV
Disk-to-Card Utility	DSKCAR, DSKC01, DSKC02, DSKC03	DSKC.ALL
Disk-to-Disk Utility	DSKDSK, DSKD01, DSKD02, DSKD03	DSKD.ALL
Disk-to-Printer Utility	DSKPRT, DSKP01, DSKP02, DSKP03	DSKP.ALL
Disk-to-Tape Utility	DSKTAP, DSKT01, DSKT02, DSKT03	DSKT.ALL
All Disk-to-File Utilities		DSK.ALL
Initialize Tape Utility	INITTP	INITTP
Initialize Disk Utility	INTDSK, INTDS2, INTDS3	INT.ALL
Load System Disk program	LDSYS	LDSYS

Program Name	Phase Names	Operands
Linkage Editor program	LNKEDT, LNKED2, LNKED3, LNKED4, LNKED5	LNKE.ALL
Macro Maintenance program	MMAINA, MMAINB, MMAINC, MMAINT, MMAIN1, MMAIN2, MMAIN3, MMAIN4, MMAIN5, MMAIN6, MMAIN8, MMAIN9	MMAIN.ALL
Macro Service program	MSERV, MSERVX, MSERV1, MSERV2, MSERV3, MSERV5 MSERV6	MSER.ALL
Physical and Logical Unit Tables Service program	PSERV	PSERV
Report Program Generator	RPG#AB, RPG#AD, RPG#AE, RPG#AF, RPG#AG, RPG#AK, RPG#AM, RPG#AZ, RPG#BA, RPG#BD, RPG#BG, RPG#BK, RPG#CC, RPG#CF, RPG#CI, RPG#CM, RPG#CN, RPG#CP, RPG#CR, RPG#CS, RPG#CT, RPG#CU, RPG#CX, RPG#DB, RPG#DC, RPG#DE, RPG#DG, RPG#DI, RPG#DS, RPG#EB, RPG#EE, RPG#EH, RPG#EI, RPG#EL, RPG#EM, RPG#EP, RPG#ES, RPG#EW, RPG#EY, RPG#FB, RPG#FE, RPG#FH, RPG#FL, RPG#FP, RPG#FS, RPG#FW, RPG#FY, RPG#GB, RPG#GE, RPG#GF, RPG#GG, RPG#GH, RPG#GI, RPG#GK, RPG#GL, RPG#GM, RPG#GN, RPG#GR, RPG#HF, RPG#HG, RPG#HP, RPG#HR, RPG#IB, RPG#IC, RPG#IF, RPG#IG, RPG#IH, RPG#II, RPG#IK, RPG#IL, RPG#IN, RPG#IO, RPG#IP, RPG#IR, RPG#IU, RPG#IW, RPG#KF, RPG#KK, RPG#KP, RPG#KU, RPG#LB, RPG#LF, RPG#LK, RPG#LP, RPG#LU, RPG#ME, RPG#MI, RPG#MO, RPG#NA, RPG#OA, RPG#OC, RPG#OD, RPG#OE, RPG#WB, RPG#WC, RPG#WD, RPG#WE, RPG#WF, RPG#WG, RPG#WH, RPG#WI, RPG#WK, RPG#WL, RPG#WM, RPG#WN, RPG#ZA, RPG#ZB	RPG.ALL
DPS Disk Sort/Merge program	SORT, SORT02, SORT04, SORT06, SORT08, SORT10, SORT12, SORT14, SORT16, SORT18, SORT20, SORT22, SORT24, SORT26, SORT28, SORT30, SORT32, SORT34, SORT36, SORT38, SORT40, SORT42, SORT44	SORT.ALL
Job Control program	SYSEND, SYSEOJ	SYSE.ALL
DPS Tape-to-Card Utility	TAPCAR, TAPC01, TAPC02, TAPC03, TAPC04, TAPC05	TAPC.ALL
DPS Tape-to-Disk Utility	TAPDSK, TAPD01, TAPD02, TAPD03, TAPD04, TAPD05	TAPD.ALL
DPS Tape-to-Printer Utility	TAPPRT, TAPP01, TAPP02, TAPP03, TAPP04, TAPP05, TAPP06	TAPP.ALL
DPS Tape Sort/Merge program	TAPSRT, TAPS01, TAPS02, TAPS03, TAPS04, TAPS05, TAPS06, TAPS07, TAPS08, TAPS09, TAPS10, TAPS11, TAPS12, TAPS13	TAPS.ALL
DPS Tape-to-Tape Utility	TAPTAP, TAPT01, TAPT02, TAPT03, TAPT04, TAPT05	TAPT.ALL
All Tape-to-File Utilities		TAP.ALL

The following is a list of all macro definitions contained in the macro library of the IBM-supplied DPS system. If you wish, you may use the MMAINT program to delete any macro definitions you do not require, (e.g., if your system does not include an IBM 2152 Printer-Keyboard, delete the pertinent macro definitions).

Names	IOCS and Generative Macro Definitions
ASSGN	Monitor Generation Macro
ATENT	Printer Keyboard Macro Definition
CDIPL	Monitor Generation Macro
CLOSE	Imperative Macro
CNTRL	Imperative Macro
CNVRT	Imperative Macro
COMRG	Monitor Macro
CRDPR	Imperative Macro
DSENG	Imperative Macro 1419/1259
DSITB	Imperative Macro BSCA
DTFBG	Printer-Keyboard Support
DTFBN	BSCA Support
DTFBT	BSCA Support
DTFBU	BSCA Support
DTFBV	BSCA Support
DTFBW	BSCA Support
DTFBX	BSCA Support
DTFBY	BSCA Support
DTFCF	BSCA Support
DTFCG	BSCA Support
DTFDA	Disk IOCS
DTFDC	Disk IOCS, Label Processing
DTFDF	Disk IOCS, Label Processing
DTFDO	Disk IOCS, Label Processing
DTFDR	Disk IOCS, Label Processing
DTFEN	Disk IOCS, Label Processing
DTFIA	Disk IOCS, Indexed-Sequential
DTFID	Disk IOCS, Indexed-Sequential
DTFIR	Disk IOCS, Indexed-Sequential
DTFIS	Disk IOCS, Indexed-Sequential
DTFIT	Disk IOCS, Indexed-Sequential
DTFLC	Printer-Keyboard IOCS
DTFLD	Printer-Keyboard IOCS
DTFMM	Version/Modification for DPS
DTFMT	Tape IOCS
DTFMU	Tape IOCS
DTFMV	Tape IOCS
DTFMW	Tape IOCS
DTFMX	Tape IOCS
DTFMY	Tape IOCS
DTFM1	Version/Modification for 1419/1259
DTFM2	Version/Modification for Printer-Keyboard Support
DTFNA	Tape IOCS
DTFNB	Tape IOCS
DTFNC	Tape IOCS
DTFND	Tape IOCS
DTFNE	Tape IOCS
DTFNF	Tape IOCS
DTFPA	1419/1259 Macro Definitions
DTFPC	1419/1259 Macro Definitions
DTFPD	1419/1259 Macro Definitions
DTFPE	1419/1259 Macro Definitions
DTFPK	Printer-Keyboard Macro Definitions
DTFPL	Printer-Keyboard Macro Definitions
DTFPM	Printer-Keyboard Macro Definitions
DTFPN	Printer-Keyboard Macro Definitions
DTFPO	Printer-Keyboard Macro Definitions
DTFPQ	Printer-Keyboard Macro Definitions
DTFPR	Printer Keyboard Macro Definitions
DTFSC	Disk IOCS, Sequential
DTFSD	Disk IOCS, Sequential
DTFSE	Disk IOCS, Sequential
DTFSF	Disk IOCS, Sequential
DTFSG	Disk IOCS, Sequential
DTFSH	Disk IOCS, Sequential
DTFSI	Disk IOCS, Sequential
DTFSJ	Disk IOCS, Sequential
DTFSK	Disk IOCS, Sequential
DTFSL	Disk IOCS, Sequential
DTFSN	Card IOCS
DTFSR	Card IOCS
DTFST	Card IOCS
DTFSU	Card IOCS
DTFSV	Card IOCS
DTFSW	Card IOCS
DTFSX	Card IOCS
DTFSY	Card IOCS
DTFSZ	Card IOCS
DTFTC	Tape IOCS, Label Processing
DTFTL	Tape IOCS, Label Processing
DTFTO	Tape IOCS, Label Processing
DTFYR	Disk IOCS
DTFYW	Disk IOCS
ENDFL	Imperative Macro
ENDMT	Monitor Generation Macro
ENITB	Imperative Macro BSCA
EOJ	Monitor Macro
EOM	Imperative Macro
ESETL	Imperative Macro
FEOV	Imperative Macro
FETCH	Monitor Macro
GET	Monitor Macro
IQIPT	Printer-Keyboard Support
LBRET	Imperative Macro
LOM	Imperative Macro
MACR0	Imperative Macro
MAINT	Monitor Generation Macro
MCIPL	Monitor Generation Macro
MDERP	Monitor Generation Macro
MFET	Monitor Generation Macro
MINQ	Monitor Generation Macro
MJOB1	Monitor Generation Macro
MJOB2	Monitor Generation Macro
MJOB3	Monitor Generation Macro
MJOB4	Monitor Generation Macro
MJOB5	Monitor Generation Macro
MJOB6	Monitor Generation Macro
MONTR	Monitor Generation Macro
MPPK	Monitor Generation Macro
MRIN	Monitor Generation Macro
MROUT	Monitor Generation Macro
MSCED	Monitor Generation Macro

MSC00	Monitor Generation Macro
MSC10	Monitor Generation Macro
MSC11	Monitor Generation Macro
MTRAN	Monitor Generation Macro
MVCOM	Monitor Macro
OPEN	Imperative Macro
PRTOV	Imperative Macro
PUT	Imperative Macro
READ	Imperative Macro
RELSE	Imperative Macro
RETRN	Printer Keyboard Macro Definition
SETFL	Imperative Macro
SETL	Imperative Macro
TRUNC	Imperative Macro
WAITB	Imperative Macro
WAITC	Imperative Macro
WAITF	Imperative Macro
WRITE	Imperative Macro

Index

(Where more than one reference is given, major reference appears first.)

READER'S COMMENT FORM

IBM System/360 Model 20
Disk Programming System
System Generation and Maintenance

Form C33-6006-2

- How did you use this publication?

  As a reference source ..... ☐
  As a classroom text ..... ☐
  As a self-study text ..... ☐

- Based on your own experience, rate this publication . . .

	Very Good	Good	Fair	Poor	Very Poor
As a reference source:	.....	.....	.....	.....	.....
As a text:	.....	.....	.....	.....	.....

- What is your occupation? .....

- We would appreciate your other comments; please give specific page and line references where appropriate. If you wish a reply, be sure to include your name and address.

- Thank you for your cooperation. No postage necessary if mailed in the U.S.A.

YOUR COMMENTS, PLEASE . . .

This SRL manual is part of a library that serves as a reference source for systems analysts, programmers and operators of IBM systems. Your answers to the questions on the back of this form, together with your comments, will help us produce better publications for your use. Each reply will be carefully reviewed by the persons responsible for writing and publishing this material. All comments and suggestions become the property of IBM.

Please note: Requests for copies of publications and for assistance in utilizing your IBM system should be directed to your IBM representative or to the IBM sales office serving your locality.

Fold Fold

FIRST CLASS
PERMIT NO. 1359
WHITE PLAINS, N. Y.

BUSINESS REPLY MAIL

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY . . .

IBM Corporation
112 East Post Road
White Plains, N. Y. 10601

Attention: Department 813 BP

Fold Fold

CUT ALONG THIS LINE

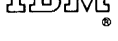
IBM System/360 Printed in U.S.A. C33-6006-2

IBM

International Business Machines Corporation
Data Processing Division
112 East Post Road, White Plains, N.Y. 10601
[U.S.A. Only]

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
[International]

IBM System/360 Printed in U.S.A. C33-6006-2



International Business Machines Corporation
Data Processing Division
112 East Post Road, White Plains, N.Y. 10601
[USA Only]

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
[International]