IBM

Guide to MVS/SP
System IPO SYSGEN

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Contents

Course Introduction and Orientation

Orientation to This Text

This introduction to the concepts and procedures required to perform a system generation of an MVS system control program (SCP) focuses on the MVS/SP System Installation Productivity Option (System IPO) method to install or reinstall the MVS SCP.

This text provides a background for system generation and System IPO concepts so that you may use the System IPO material more effectively. It does not provide detailed step-by-step instructions. That level of detail is contained within the documents supplied in the System IPO distribution package.

Additionally, the sample hardware configuration given provides you an opportunity to practice the selection of SYSGEN macro parameters frequently used in MVS installations.

Required Skills

It is assumed that you are preparing to perform your first OS system generation. To successfully complete this task, you should have certain technical skills. These are:

- A basic understanding of MVS structure and logic.

- Experience with OS job control language (JCL), cataloged procedures, and utilities.

These skills and an understanding of the concepts provided by this text, enhance your ability to effectively use System IPO in generating an MVS SCP.

This text is not designed for the OS system programmer with previous SYSGEN experience. Those who have already generated an OS system should consult the appropriate MVS manuals and System IPO documentation directly.

Reference Material

All references cited in this Guide are listed below. Shortened titles are used in this text as indicated.

These publications may be ordered through your IBM representative:

Short Title	Full Title	
SYSGEN Reference	OS/VS2 System Programming Library: System Generation Reference	GC26-3792
Init & Tuning Guide	OS/VS2 MVS System Programming Library: Initialization and Tuning Guide	GC28-1029
Planning Guide	MVS/SP System IPO: General Information and Planning Guide	GC20-1870

The following referenced documents are distributed with System IPO in machine readable format:

Memo to Users
Index of Section Titles
Contents Guide
Installation Guide
System Guide
Service Guide
Operations Guide
Tuning Guide

Orientation to System Generation Task

Installation of MVS includes not only the generation of an MVS system control program (SCP), but also the addition of software such as IBM program products and user-provided routines. These extend the basic MVS system to support the total data processing requirements of a particular installation.

The MVS installation tasks can be divided into five phases, as shown in Figure A. These phases are the same for a first installation of an MVS SCP or for reinstalling an existing MVS SCP. The installation phases begin with initial planning and preparation and end with a fully productive MVS based system.

The phases and tasks for installing an MVS system outlined in Figure A are discussed in detail in the Planning Guide. This text concentrates on system generation (SYSGEN), a task within the second installation phase, Test System Build.

MVS INSTALLATION

INITIAL PLANNING AND PREPARATION

1. DEVELOP AN OVERALL INSTALLATION PLAN.
2. ORDER MVS/SP SYSTEM IPO.
3. REVIEW RELEVANT DOCUMENTATION.

TEST SYSTEM BUILD

4. PREPARE THE DASD VOLUMES REQUIRED FOR THE SYSGEN.
5. SELECT AND CODE SYSGEN MACROS.
6. PERFORM SYSGEN.
7. TEST THE NEWLY GENERATED SCP.

UNIT INSTALLATION AND TEST

8. INSTALL ADDITIONAL FUNCTIONS (E.G., IMS, CICS, USER EXITS)
9. TEST EACH NEW COMPONENT.

STRESS PRODUCTION TEST

10. TEST THE NEW SCP UNDER STRESS CONDITIONS TO REVEAL OPERATIONAL, FUNCTIONAL, OR PERFORMANCE DIFFICULTIES.
11. ESTABLISH AND TEST FALLBACK PROCEDURES.

PRODUCTION STABILIZATION

12. ESTABLISH THE NEW SCP AS THE FULL PRODUCTION SCP.
13. MONITOR PERFORMANCE AND REQUIREMENTS AND TUNE THE SCP AS NEEDED.

Figure A Five phases of MVS SCP Installation

Organization of This Text

The presentation of information is as follows:

- Chapter 1, *MVS System Generation Overview*

  Describes the SYSGEN types, processing sequence, and user-supplied requirements.

- Chapter 2, *Using MVS/SP System IPO*

  Discusses the use of System IPO to generate an MVS SCP. It describes the System IPO contents and the steps to perform a System IPO based SYSGEN.

- Chapter 3, *IOGEN Macros*

  Focuses on the use and coding of the MVS SYSGEN macros required to tailor the System IPO-supplied MVS SCP to your installation. This chapter includes an exercise in selecting and coding SYSGEN macros to describe a sample hardware configuration.

- Chapter 4, *Post-generation Considerations*

  Summarizes activities necessary to maintain the newly generated system and to prepare it for the Unit Installation and Test phase.

Topic review questions and answers are provided at the end of each section. This text also contains a Glossary to aid you in understanding unfamiliar terms.

Chapter 1:

MVS System Generation Overview

System Generation Processing Flow

System generation creates a new system control program (SCP). The MVS SCP as distributed by IBM needs to be customized by each user to support the user's unique hardware configuration and requirements for access methods and SCP options. System generation allows the user to tailor the SCP to meet the system support requirements of a particular installation. System generation is required when MVS is first installed and subsequently, whenever the SCP requires alteration. Usually, alterations are necessary to reflect changes in the hardware configuration.

Figure 1.1 presents an overview of SYSGEN processing. A more detailed discussion of types of SYSGENs, driving systems, user-prepared system macros, and DLIBs follows the figure.
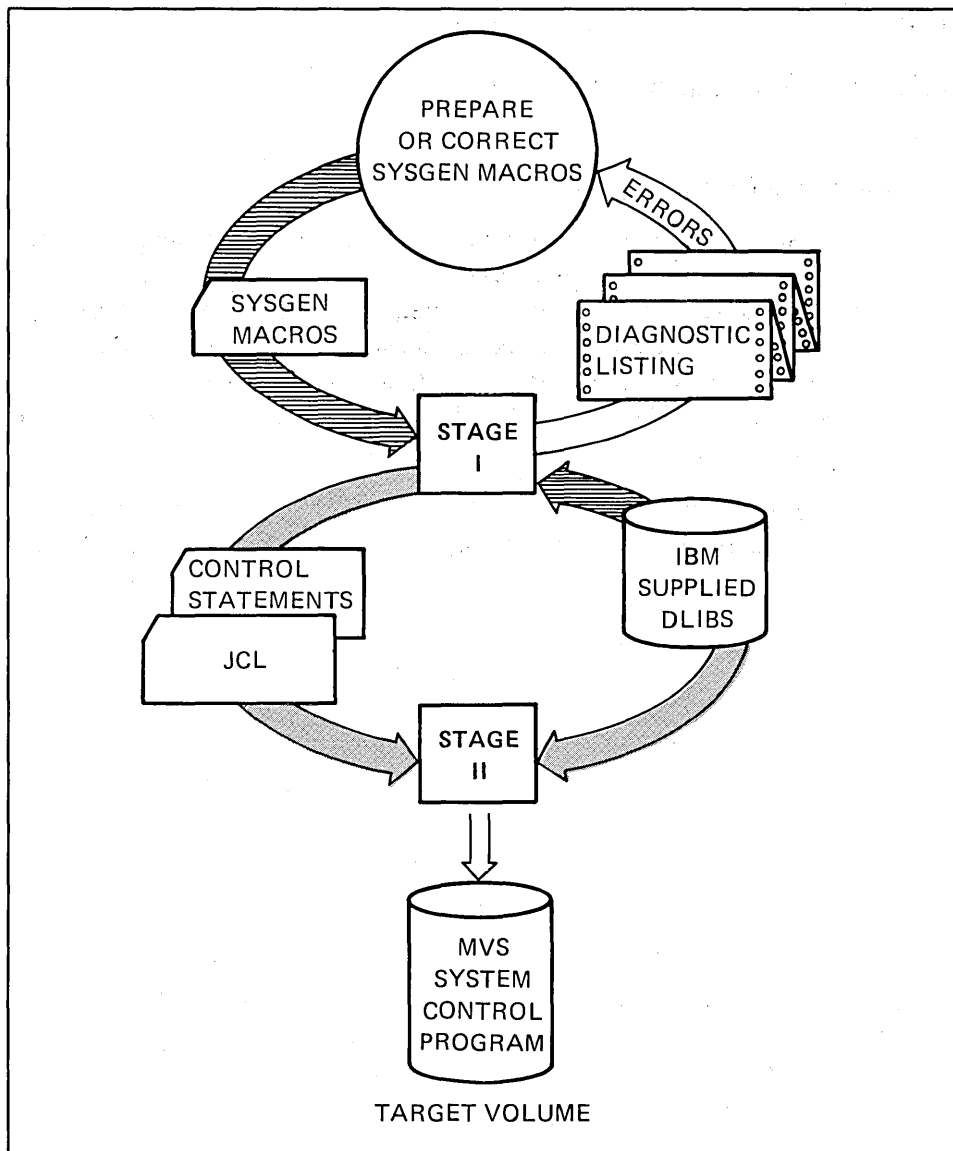
Figure 1.1 System Generation Processing

As shown in Figure 1.1, SYSGEN is a two stage process:

- Stage I Processing ----> Job Stream Produced

    The MVS system software components are distributed on one or more magnetic tape volumes. Once these components have been transferred to a DASD volume, they make up the Distribution Library Data Sets (DLIBs). The DLIBs also contain definitions for special macros used in the SYSGEN process. These macros are grouped in 2 categories. One group of macros is known as Stage I macros. The Stage I macros are prepared by the user as input to Stage I processing. The other macros unique to the SYSGEN process are used in Stage II processing and will be discussed later. Usually, the Stage II SYSGEN macros are 'transparent' to the user. When the phrase 'SYSGEN macro' is used it normally refers to the user-prepared Stage I macros. The same will apply throughout this course.

The user coded Stage I macros describe the system software support requirements to the SYSGEN process. In Stage I of SYSGEN, these macros are assembled and expanded based upon the definitions contained in the DLIBs. The assembly process checks the syntax of individual macros and verifies that all required macros and macro parameters have been specified. If no errors are detected, Stage I processing generates a job stream. The job stream consists of JCL and control statements to invoke the linkage editor and the utility programs. The generated job stream also contains assembly steps to process Stage II macros that are part of the generated Stage I output. The job stream produced by Stage I is executed in Stage II.

The diagnostic listing produced by Stage I documents the Stage I input and indicates whether the assembly was successful. If errors are detected during the Stage I assembly, no job stream is generated. The output listing gives the reason(s) for the failure.

- Stage II Processing ----> System Control Program Generation

Stage II processing consists of executing the job stream produced by the Stage I assembly. The job stream JCL directs the selection of MVS system software components from the DLIBs. During Stage II, the MVS elements are processed and combined to form the new system control program. Some elements from the DLIBs are copied directly from the DLIBs; others are combined by the linkage editor and then placed into the appropriate data sets. Output of the assemblies of the Stage II SYSGEN macros are also link-edited.

The Stage II job stream contains from 5-7 jobs, most of which have multiple steps. During the creation of the new SCP some or all of the following occur:

- System data sets are defined.

- Selected macros are assembled to produce code, control blocks, and tables.

- Selected modules are link-edited to construct members of the system data sets. These modules may have existed on the DLIBs or may result from a previous assembly.

- Selected modules, parameter lists, and macros are copied directly into the system data sets.

Figures 1.2 and 1.3 show samples of assembly, link edit, and copy steps within the generated job stream that is executed by Stage II processing.

```
//          JOB ............,
//             REGION=768K,
//             CLASS=A,MSGCLASS=A,MSGLEVEL=(1,1)
//SG1       EXEC ASMS,OBJ=OBJPDS01,MOD=IEFWMAS1,CLASS=A
//SYSIN DD *
      PRINT ON,NODATA
DEVNAMET CSECT
         SGIFF010                                                         X
               3,3350,X'3050',X'200E',                                    X
               12,3400-4,X'3420',X'8003',                                 X
               18,3800,X'1000',X'080E',                                   X
               •
               •
               •
         END
/*
•
•
•
//SG15      EXEC LINKS,
// PARM='NCAL,LIST,XREF,LET,RENT,SIZE=(512K,100K)',
•
•
•
//AOSB3    DD DISP=SHR,VOLUME=(,RETAIN),DSNAME=SYS1.AOSB3
//AOSA0    DD DISP=SHR,VOLUME=(,RETAIN),DSNAME=SYS1.AOSA0
//SYSLIN DD *
 INCLUDE SYSPUNCH(IEFWMAS1)
 NAME DEVNAMET(R)
 INCLUDE SYSPUNCH(IEFDEVPT)
 NAME IEFDEVPT(R)
 INCLUDF SYSPUNCH(IEFWMSKA)
 NAME DEVMASKT(R)
 INCLUDE SYSPUNCH(IEFEDTTB)
 ENTRY EDTTAB
 NAME IEFEDTTB(R)
 INCLUDE SYSPUNCH(IEFSGOPT)
 INCLUDE SYSPUNCH(IEFYRCDS)
 INCLUDE AOSB3(IEFRPREP)
 INCLUDE AOSB3(IEFXVNSL)
 •
 •
 •
      ORDER IEFAB4A4(P)
      ORDER IEFAB4A6
      ORDER IEFAB4A8
 ALIAS IGC0009I
 ALIAS IEFAB4DC
 ALIAS IEFBB410
 •
 •
 •
 ENTRY IEFBB401
 NAME  IEFW21SD(R)
 INCLUDE AOSB3(IEFAB4E5)
 INCLUDE AOSB3(IEFAB4F6)
 CHANGE IEFBR14(IEFAB4E1)
 INCLUDE AOSB3(IEFAB4FA)
 INCLUDE AOSB3(IEFAB498)
 ENTRY IEFAB4E5
 NAME IEFAB4E5(R)
/*
```

Figure 1.2 Example Assembly and Link Edit Steps in SYSGEN Job Stream

```
//LPA13   EXEC PGM=IEBCOPY,REGION=512K,COND=(8,LT)
//SYSUT3 DD DSN=&SYSUT3,SPACE=(1700,(10,5)),UNIT=SYSDA
//SYSUT4 DD DSN=&SYSUT4,SPACE=(460,(30,24)),UNIT=SYSDA
//SYSPRINT DD SPACE=(3630,(500,100),RLSE),
//      DCB=(RECFM=FB,LRECL=121,BLKSIZE=121),SYSOUT=A
//.LPALIB DD DISP=OLD,DSN=SYS1.LPALIB,UNIT=3350,
//          VOL=(,RETAIN,SER=IPORES)
//ALPALIB DD DISP=SHR,VOLUME=(,RETAIN),DSNAME=SYS1.ALPALIB
//ACMDLIB DD DISP=SHR,VOLUME=(,RETAIN),DSNAME=SYS1.ACMDLIB
//AOSA0 DD DISP=SHR,VOLUME=(,RETAIN),DSNAME=SYS1.AOSA0
//AOSB0 DD DISP=SHR,VOLUME=(,RETAIN),DSNAME=SYS1.AOSB0
//AOSB3 DD DISP=SHR,VOLUME=(,RETAIN),DSNAME=SYS1.AOSB3
//AOSCA DD DISP=SHR,VOLUME=(,RETAIN),DSNAME=SYS1.AOSCA
•
•
•
//SYSIN DD *
         COPY   OUTDD=LPALIB,INDD=AOSCA
         SELECT   MEMBER=(IGE0000I,IGE0100I)
         SELECT   MEMBER=(IGE0000G)
         •
         •
         •
         COPY   INDD=ALPALIB,OUTDD=LPALIB
/*
```

Figure 1.3 Example Copy Step in SYSGEN Job Stream

The new SCP is constructed on a DASD volume referred to during Stage II processing as the *target volume*.

Upon successful Stage II execution, system generation is complete. The newly generated SCP should be tested to ensure that basic functions are operating properly. Following validation of the new SCP, it can be enhanced with additional functions such as IMS, CICS, or ACF/VTAM.

Types of System Generation

The two-stage SYSGEN processing flow applies to all types of SYSGEN. The two types of SYSGEN discussed in this text are:

- Full SYSGEN which creates an entirely new system control program.

- I/O Device Generation (IOGEN) which modifies an existing system control program.

A third type of SYSGEN, Eligible Device Table generation, is used to build device allocation tables. Normally, this follows the installation of the MVS SCP and, therefore, is not discussed in this Guide.

The type of generation, full or IOGEN, is identified on the GENERATE macro in the Stage I input.

Full SYSGEN:

A full system generation is normally required as part of the conversion to a new SCP. Although the first time MVS user would expect to do a full SYSGEN, the MVS/SP System IPO package removes this requirement.

During full SYSGEN, the MVS system data sets are created. To prepare for the first full system generation, the user must:

- Create the DLIB data sets.

- Prepare the target volume - initialize the volume and allocate the system data sets. (The user can direct SYSGEN processing to allocate the data sets or can allocate the new system's data sets himself prior to Stage II processing.)

- Review all system generation macros and select appropriate macros and macro parameter values.

In a full SYSGEN, Stage II processing fills in the newly allocated system data sets with the appropriate MVS system tables, code, macros, and parameter lists.

IOGEN:

I/O device generation alters an existing SCP and so assumes that a full SYSGEN has previously been done. IOGEN mainly affects the part of the MVS system concerned with I/O device support. Therefore, IOGEN processing affects a subset of the MVS system data sets.

To prepare for an IOGEN the user must:

- Make the DLIBs available (assumes that DLIBs have already been built).

- Review I/O configuration macros and code those describing the new hardware configuration. Usually, the Stage I input from the previous system generation is retained and changes for the new IOGEN are made either to the previous input or to a copy of it. Only those macros eligible for change at IOGEN time take effect.

- Copy the existing SCP data sets onto a DASD volume (the target volume).

Stage II processing updates the appropriate system data sets to include the changes described by the SYSGEN macros.

Driving System Requirements for a System Generation

System generation is performed under the control of an existing SCP and is executed like any other job. The controlling system is referred to as the 'driving system' or, simply, the driver.

Non-System IPO users must use an existing *MVS system* to drive the generation of the new MVS SCP. This requirement exists because the MVS version of VSAM is required to create MVS page data sets and the Master Catalog. These users, then, must perform a full SYSGEN using an existing MVS system, either one at another location (IBM or user) or the MVS Starter system.

The MVS Starter system should not be confused with MVS/SP System IPO. The two have different objectives in MVS installation. While both include an operational MVS SCP and current level MVS DLIB components, the SCP supplied with System IPO is a current level MVS SCP.

The MVS SCP in the Starter system, on the other hand, is not at a current level. It is intended only to provide an operating system under which a *full* MVS SYSGEN can be performed. The MVS/SP System IPO package is designed to *avoid a full SYSGEN.* The System IPO SCP can be used directly or modified by IOGEN processing.

The MVS/SP System IPO package includes prebuilt and fully usable MVS page data sets and a Master Catalog. Therefore, System IPO extends the eligible driving systems to include OS/VS1.

User-Coded SYSGEN Macros

The installation's needs for system software support and options are defined by SYSGEN macro instructions. These Stage I macros control the tailoring of the MVS control program to support a specific data processing environment.

The GENERATE macro is required and is always the last macro in the input stream. Other Stage I macros describe:

- Hardware configuration
- System Control Program options
- Access methods
- User-provided routines to be included in system data sets

As shown in Figure 1.4, all of the above macro types are eligible for specification for a full SYSGEN.
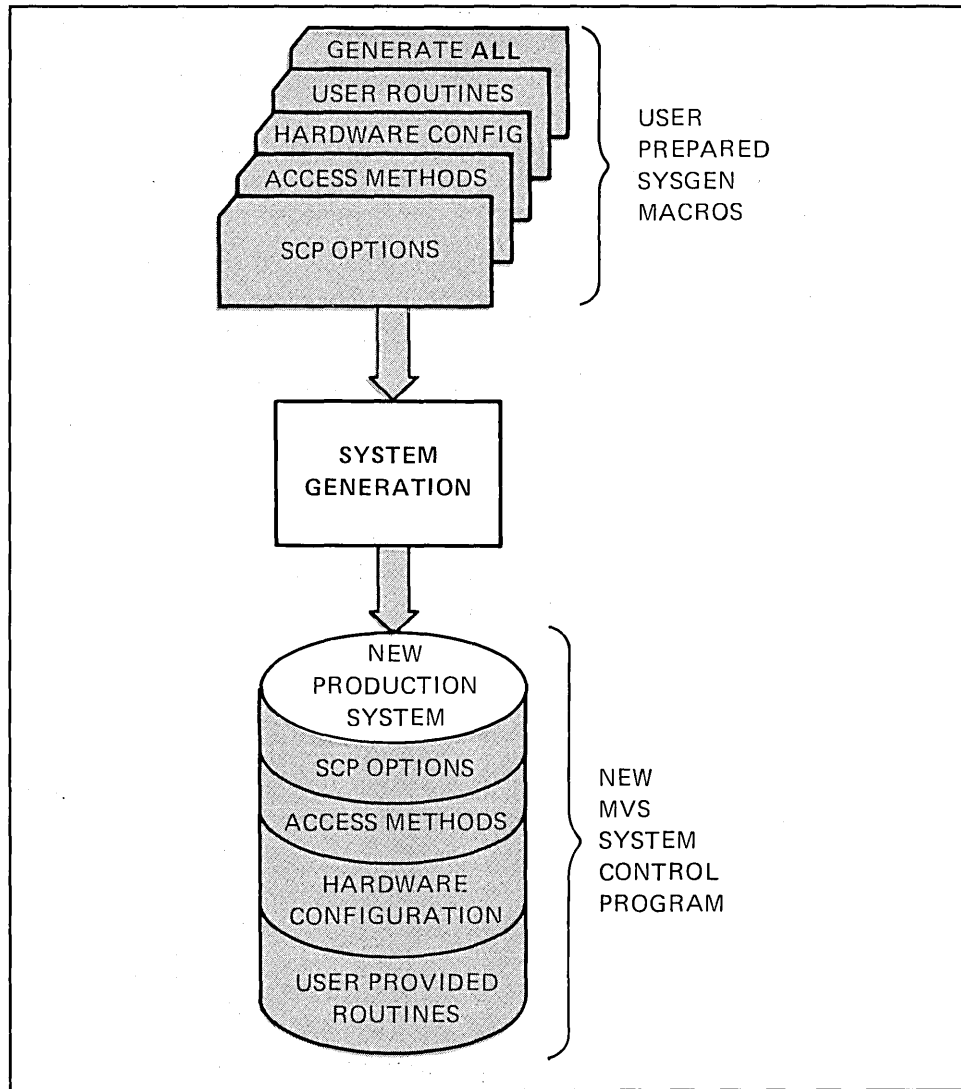
Figure 1.4 Eligible SYSGEN Macro Types for Full SYSGEN

Figure 1.5 shows the subset of SYSGEN macros that may be coded for an IOGEN. In addition to the required GENERATE macro, the hardware configuration macros and most SCP options may be specified. Access methods cannot be changed or added during IOGEN. User-provided code may be added following the IOGEN.
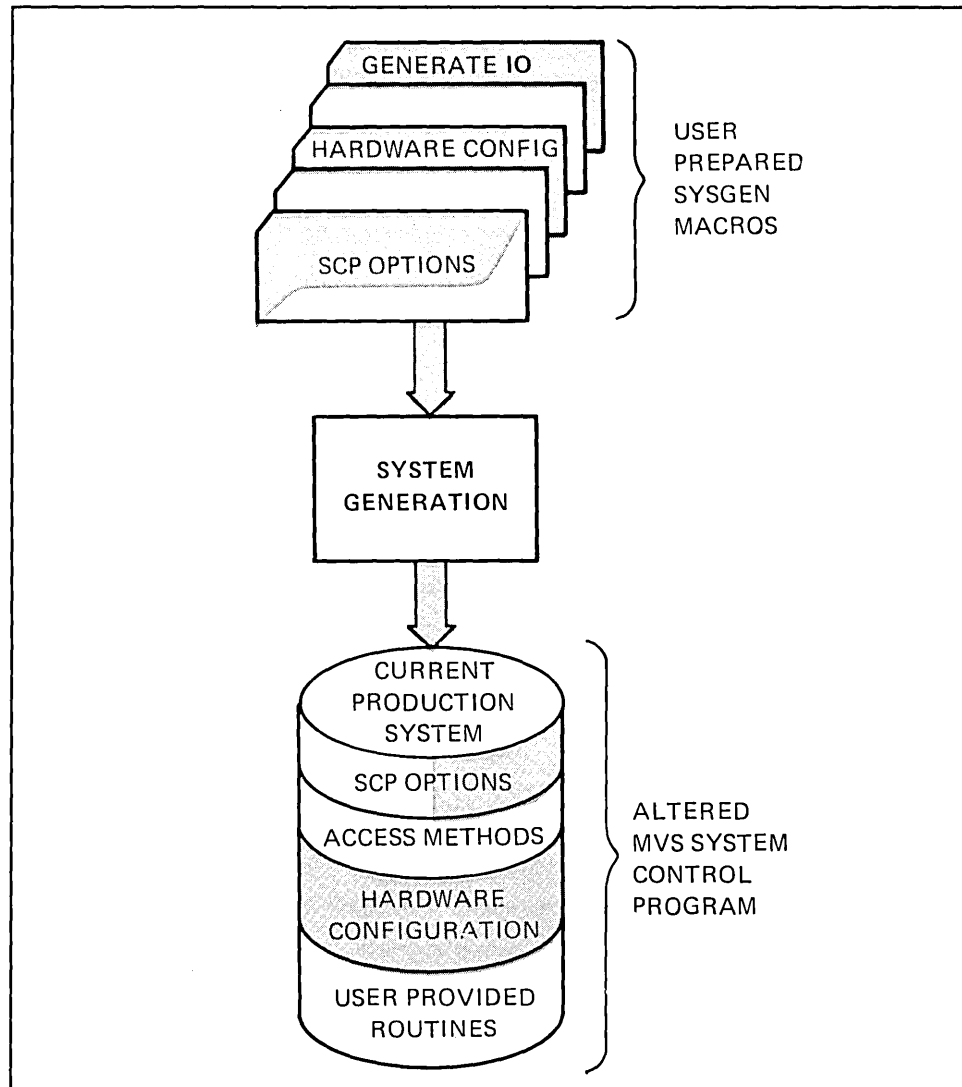
Figure 1.5 Eligible SYSGEN Macro Types for IOGEN

Since System IPO enables the installation of MVS by way of an IOGEN, System IPO users need to be concerned only with those macros that are candidates for change within an I/O device generation. As indicated in Figure 1.6, the SYSGEN macros alter the pregenerated MVS SCP (on volume IPORES) provided by System IPO.
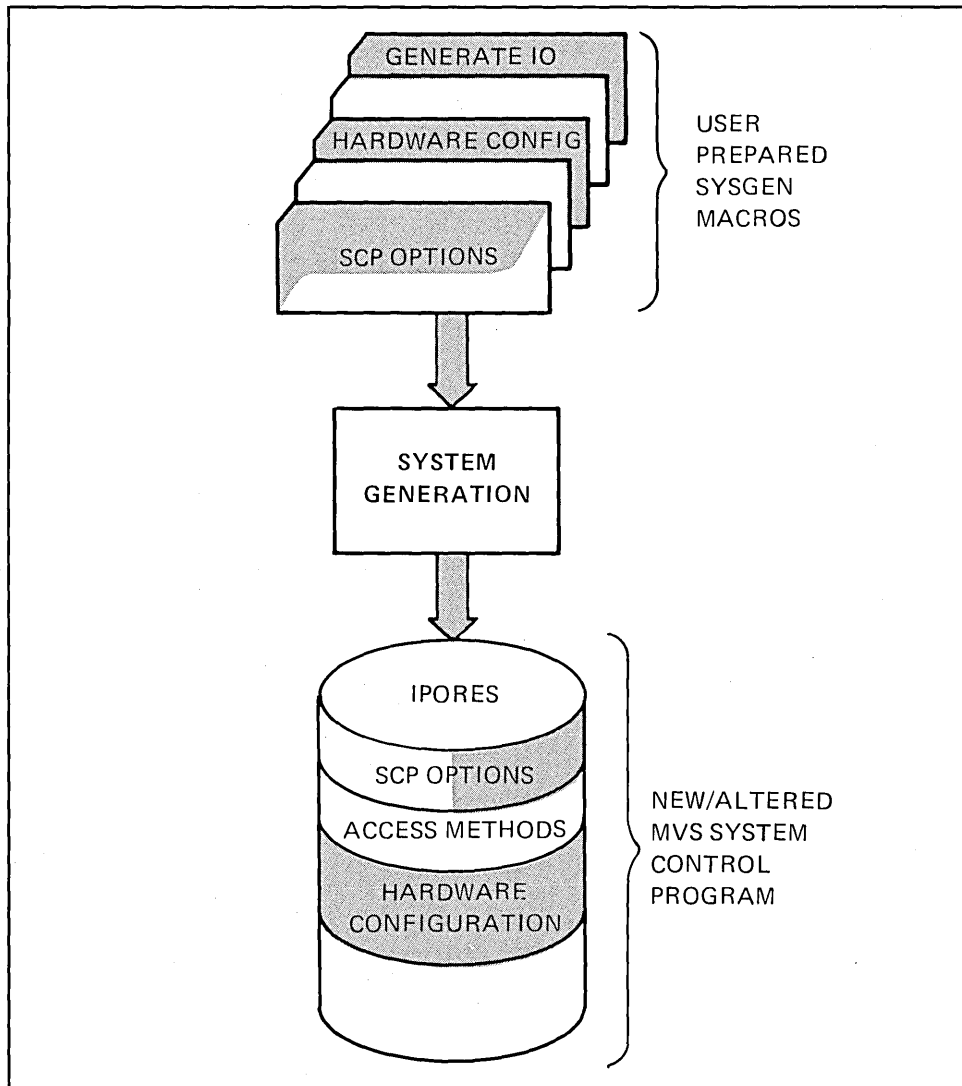
Figure 1.6 Eligible SYSGEN Macro Types for System IPO–Based IOGEN

Distribution Libraries (DLIBs)

The Distribution Library data sets contain all the elements needed to build your MVS SCP: modules, data management and supervisor macros, parameter lists, cataloged procedures.

The data sets comprising the MVS DLIBs are listed in Figure 1.7 below.

MVS DISTRIBUTION LIBRARY DATA SETS			
SYS1.ACMDLIB	SYS1.AOSCA	SYS1.AOST3	SYS1.AOS21
SYS1.AGENLIB	SYS1.AOSCD	SYS1.AOST4	SYS1.AOS24
SYS1.AHELP	SYS1.AOSCE	SYS1.AOSU0	SYS1.AOS26
SYS1.ALINKLIB	SYS1.AOSC2	SYS1.AOS00	SYS1.AOS29
SYS1.ALPALIB	SYS1.AOSC5	SYS1.AOS03	SYS1.AOS32
SYS1.AMACLIB	SYS1.AOSC6	SYS1.AOS04	SYS1.APARMLIB
SYS1.AMODGEN	SYS1.AOSD0	SYS1.AOS05	SYS1.APROCLIB
SYS1.AOSA0	SYS1.AOSD7	SYS1.AOS06	SYS1.ASAMPLIB
SYS1.AOSA1	SYS1.AOSD8	SYS1.AOS07	SYS1.ATCAMMAC
SYS1.AOSBN	SYS1.AOSG0	SYS1.AOS11	SYS1.ATSOMAC
SYS1.AOSB0	SYS1.AOSH1	SYS1.AOS12	SYS1.AUADS
SYS1.AOSB3	SYS1.AOSH3	SYS1.AOS20	SYS1.HASPSRC

Figure 1.7 MVS DLIB Data Sets

The SCP data sets are constructed from the DLIBs during Stage II processing. They are constructed by copying or assembling/link-editing elements from the DLIBs, as shown in Figure 1.8.

```
                              DLIBs

                          SYS1.AOSC5
                          IGC0008H


                          SYS1.AOS20
                          IGC058
```

```
//STP4    EXEC  PGM=IEBCOPY                    //NUC23    EXEC  LINKS,..........
.                                              //AOS20    DD    DISP=SHR,DSNAME=SYS1.AOS20..
.                                              .
.                                              .
//LPALIB DD   DSNAME=SYS1.LPALIB,DISP=OLD,.....  .
//AOSC5  DD   DSNAME=SYS1.AOSC5,DISP=SHR,.....   .
.                                              //SYSLIN DD  *
.                                                  INCLUDE   AOS20(IGC058)
.                                              .
.                                              .
//SYSIN DD  *                                     INCLUDE   SYSLMOD(IEANUC01)
COPY OUTDD=LPALIB,INDD=AOSC5                       NAME   IEANUC01(R)
SELECT MEMBER=IGC0008H                         /*
/*
```

```
                         NEW MVS SCP
                          DATA SETS


                        SYS1.NUCLEUS



                        SYS1.LPALIB
```

Figure 1.8 Building the System Data Sets

The primary MVS data sets are shown in Figure 1.9. A more complete listing can be found in the *SYSGEN Reference* manual section entitled "Selecting and Defining the System Data Sets".

DATA SET NAME	CONTENTS
SYS1.NUCLEUS*	Resident portion of the control program (IEANUC0x), Nucleus Initialization Program modules (NIP), and a pointer to the master catalog (in SYSCATLG). Brought into real storage by Initial Program Load (IPL), NIP initializes the control program components, the operating environment, and the contents of real storage. It then passes control to the other SCP components.
SYS1.LINKLIB*	User modules and IBM system routines, assembler language processor, linkage editor, utility programs, and service aids.
SYS1.LPALIB*	Modules loaded into the Pageable Link Pack Area (PLPA), including SVC routines, data management access methods, and some I/O error routines.
SYS1.PARMLIB	IBM-supplied and installation-created lists of system parameter values. Some of these are used at IPL time; others are invoked during the running of the SCP.
SYS1.PROCLIB	IBM and user-supplied cataloged procedures.
SYS1.MACLIB	Macro definitions for supervisor and data management macro instructions.
SYS1.SVCLIB	The Online Test Executive Program (OLTEP), appendages and user-written routines.
MASTER CATALOG	A directory of the device type and volume serial number of the system data sets, VSAM user catalogs, and control volumes (CVOL's).
SYS1.LOGREC*	Statistical data on machine failures and certain software errors.
SYS1.DCMLIB*	Program function key (PFK) definitions for display consoles.
* IOGEN processing updates these system data sets	

Figure 1.9 Required System Control Program Data Sets

Summary

System generation is the process that creates or alters a system control program. Two types of SYSGEN are discussed in this text; full and IOGEN. A full system generation creates an entirely new SCP, while an IOGEN alters an existing one to conform to an altered input/output configuration.

The SYSGEN process takes place in two stages. Stage I processing produces a job stream that is executed in Stage II. Execution of the job stream processes MVS component elements from the DLIBs and creates or updates, depending on the type of generation, the MVS SCP contained in system libraries.

Chapter 1 Review

The following review points are arranged in the presentation sequence of the text. Use a separate sheet of paper to record your answers, then compare them to those in the Answers section immediately following the test. The relevant section topic is listed at the end of each answer, so you can re-read sections if you missed any questions.

Answer the following as True or False:

1. Stage I and Stage II processing occurs for both full SYSGEN and IOGEN.

2. The user must code the job stream that is executed in Stage II processing.

3. System data sets are created or updated during Stage I processing.

4. Full SYSGEN creates a totally new SCP; IOGEN alters an existing SCP.

5. Driving systems are required only for users converting to MVS for the first time.

6. User coded SYSGEN macros are input to full SYSGEN processing, but are not needed for an IOGEN.

7. The elements of the MVS SCP reside in DLIB data sets.

Answers to Chapter 1 Review

1. **True.** Stage I and Stage II processing are required for both types of SYSGENs. (System Generation Processing Flow)

2. **False.** The job stream that is executed in Stage II is produced by Stage I processing. (System Generation Processing Flow)

3. **False.** System data sets are created or altered during Stage II processing. (System Generation Processing Flow)

4. **True.** The MVS system control program is housed in system data sets. These data sets are created during full SYSGEN processing. IOGEN processing simply updates a subset of the data sets. (Types of System Generation)

5. **False.** All full SYSGENs and IOGENs are performed under the control of an existing SCP. The SCP that controls the SYSGEN is called the driving system. (Driving System Requirements for a System Generation)

6. **False.** User coded SYSGEN macros are required for both full SYSGEN and IOGEN. (User-Prepared System Macro Instructions)

7. **True.** DLIB data sets are used as the source for system control elements by the SYSGEN process. (Distribution Libraries)

Chapter 2:

Using MVS/SP System IPO

Introduction to MVS/SP System IPO

The IBM System Installation Productivity Option (System IPO) is a package designed to facilitate the installation of an MVS system control program. System IPO can be used to reinstall MVS as well as to install it for the first time. Current MVS users may find it helpful to use System IPO as an aid in installing new functions. For example, MVS users who are planning to add MVS/System Product can accomplish the installation of MVS/SP, together with its associated software features and maintenance, by using MVS/SP System IPO.

The MVS/SP System IPO is available as an integrated base plus optional features, or as a segmented base plus optional features.

Integrated Base

The MVS/SP System IPO integrated base contains the following items:

- A machine readable System IPO library which consists of documentation and productivity aids.

- Integrated distribution libraries (DLIBs) which include:

  - MVS Release 3.8 SCP
  - Processor Support 2
  - MVS/System Product - JES2
  - Resource Measurement Facility (RMF)
  - Sequential Access Method Extended (SAM-E)
  - Data Facility Device Support (DFDS)

- A pre-generated system built from the integrated DLIBs.

Segmented Base

For those customers who are licensed for MVS/SP but cannot or choose not to use the MVS/SP System IPO integrated base, a segmented base is available. It differs from the integrated base in that RMF, SAM-E, and DFDS have not been integrated into the DLIBs but are available as separate segments (features). Also, a pre-generated system is not provided with the segmented base; therefore, a full SYSGEN is required to build an MVS/SP system and an MVS system is required as a driving system.

How System IPO is Built

The system control program of System IPO was prepared and used by an IBM internal location. The System IPO documents refer to this system as the 'Model Installation' or MI. In building the system, the System IPO group has performed a *full* SYSGEN using the current level of the MVS DLIBs. Preventive maintenance available at the time of the system build process has therefore been incorporated into the system. Upon completion of the Test System Build phase, other software features are added to support the batch and online workload of the Model Installation. The resulting system is used at the Model Installation as a floor system in a real production environment.

As a result of the System IPO build and validation process, MVS/SP System IPO offers the following advantages:

- Pregenerated current level of MVS.

- Preinstalled supplemental functions and maintenance.

- Validated system code (SCP, added functions and service).

System IPO Contents

Documentation

The documentation associated with System IPO addresses the whole range of activities required for MVS installation or reinstallation: planning, installation, operation, and tuning. All of these System IPO documents are distributed in machine readable format as part of the System IPQ package. Included in this machine readable documentation is a copy of *MVS/SP System IPO General Information and Planning Guide* which is orderable separately as manual number GC20-1870.

Figure 2.1 describes the System IPO documents that are used as either primary sources or reference material for accomplishing the IOGEN task. A complete list of the System IPO documents can be found in the *MVS/SP System IPO General Information and Planning Guide* and in the *Memo to Users*. A preprinted copy of the *Memo to Users* is provided with the machine readable materials.

DOCUMENT NAME	CONTENTS
Memo to Users	Sample JCL to print System IPO documents, a general description of the contents of the System IPO distribution tapes, and a summary of the System IPO documents and where each fits in the installation process.
Contents Guide	Details of the physical characteristics of the System IPO and system data sets, and a description of the Model Installation I/O configuration.
Installation Guide	Step-by-step instructions on executing the IOGEN and preparing the new system for validation testing and additions.
System Guide	Information on customizing the new system for your installation as well as guidance in the use of SMP4 in an MVS Release 3.8 environment.
Service Guide	Information on maintenance (PTF's) installed on or excluded from the System IPO system.
Operations Guide	Information on system operational considerations for both the system programmer and operator.

Figure 2.1 System IPO Documentation for IOGEN

Productivity Aids

Operational JCL procedures for both IOGEN and post-gen activities are standard features of the System IPO package. Additionally, sample routines are provided to illustrate the system interface protocol and processing possible with selected, commonly used MVS functions and facilities. Some examples of the System IPO aids are:

- JCL for the IOGEN, catalog manipulation, and maintenance activity
- Batch utility procedure to modify the provided JCL to match installation requirements
- TSO CLISTs and drivers to test user written TSO exit routines
- Sample System Management Facilities (SMF) user exits
- Operational TSO and JES2

Every aspect of the System IPO can be viewed as an aid to user productivity either through completed tasks or through the insights to be gained from the documented experiences of the System IPO developers as they built, tested, tuned and used the extended MVS system.

Distribution Libraries

The DLIBs from which the System IPO provided SCP was generated are included in the System IPO package. As of MVS release 3.8, the MVS components are packaged for delivery to users as a collection of Selectable Units (SUs). To get the MVS components into their respective distribution library data sets, the components must be processed by SMP (release 4 or higher). This SMP processing has already been done by the System IPO group as they prepared for the full SYSGEN. The DLIBs that come with System IPO (IPODLB) are in the proper format for use in a SYSGEN.

Pre-generated System

The pre-generated system, built from the System IPO DLIBs, provides a system residence volume. An optional catalog volume (IPOCAT) contains the MVS master catalog and also initialized page data sets. The MVS master catalog and page data sets are needed to IPL the newly generated MVS system. Therefore, the catalog volume is required for non-MVS driving systems. If System IPO is being used to *reinstall* MVS, then the existing MVS driving system already has a master catalog and page data sets. Use of IPOCAT by MVS users is therefore optional.

The pre-generated system (IPORES + IPOCAT) is directly usable. Once these volumes have been loaded from the distribution tapes, the pre-generated system can be IPLed directly and used without an IOGEN. In order to do this, however, the user's hardware must sufficiently match the I/O configuration represented in System IPO to allow productive system operation. Most System IPO users will perform an IOGEN against the IPORES volume.

3350 Driver System Feature

First time MVS users may choose to utilize the 3350 Driver System Feature available with release 3.8G of the MVS/SP System IPO. The Driver Feature contains a system residence volume, IPODVR, the catalog volume, IPOCAT, and a stand along restore program that can be used to restore IPODVR and IPOCAT to 3350 volumes. These two volumes form an MVS/SP System that can then be used to complete the normal System IPO installation. Note that this driver system was built from the MVS/SP System IPO integrated base, and therefore includes the same functions incorporated in the integrated base.

Users of this feature should consult the Planning Guide for the minimum hardware requirements of the driver system. A preprinted MVS/SP System IPO Driver System Memo to Users included with the driver feature contains detailed information for installing and using the driver.

Orderable Features

Optional features may be ordered with the MVS/SP System IPO for both the integrated base and the segmented base systems. In all cases, the optional features include not only distribution materials but also installation and usage aids. Figure 2.2 lists the orderable features available as of release 3.8G and the associated documentation. Any IOGEN considerations that are relevant to a particular orderable feature are highlighted in the System IPO Guide that is associated with that feature.

ORDERABLE FEATURE:	SYSTEM IPO DOCUMENTATION SUPPORT:
IMS/VS with DB Feature only	IMS/VS DB Installation & System Guides
IMS/VS with DB/DC Feature	IMS/VS DB/DC Installation & System Guides
DB/DC Data Dictionary	DB/DC Data Dictionary Installation & System Guides
CICS/OS/VS	CICS/OS/VS Installation & System Guide
ACF/NCP/VS	Communications and Interactive Guide
ACF/VTAM	Communications and Interactive Guide

Figure 2.2 System IPO Orderable Features

Using System IPO for I/O Generation

The steps to implement an IOGEN using MVS/SP System IPO are shown in Figure 2.3. The following overviews these activities and does not substitute for the System IPO documentation.

```
PREPARING FOR IOGEN

    o  REVIEW DOCUMENTATION
    o  PREPARE THE TARGET VOLUME (IPORES)
    o  PREPARE THE DRIVING SYSTEM
    o  VERIFY OR MODIFY SYSTEM IPO JCL
    o  PREPARE THE DISTRIBUTION LIBRARY VOLUME (IPODLB)
    o  PREPARE THE SYSGEN MACROS

    PERFORMING THE IOGEN

    o  EXECUTE STAGE I
    o  EXECUTE STAGE II
    o  UDPATE SMP CONTROL DATA SET

    PREPARING FOR IPL

    o  SELECT INITIALIZATION PARAMETERS
    o  ESTABLISH SYSTEM CATALOG AND PAGE DATA SETS
    o  REVIEW SYSTEM IPO JES2 PROC

    TESTING THE NEW SCP

    o  RUN THE INSTALLATION VERIFICATION PROCEDURES (IVP)
```

Figure 2.3 IPO Based IOGEN Steps

Preparing for IOGEN

Review the Documentation

The *Installation Guide* and the *SYSGEN Reference* manual are the primary references for the IOGEN task. The *Installation Guide* provides step-by-step guidance in performing the IOGEN and in establishing an environment in which to IPL the new system. Read all relevant sections within the *Installation Guide* before beginning the IOGEN process. Flowcharts at the back of the *Installation Guide* give a step-by-step view of the install process for both MVS and OS/VS1 driving systems.

Prepare the Target Volume (IPORES)

The DASD volume that will contain the new MVS SCP must be initialized and loaded. The *Installation Guide* contains sample JCL to invoke the IEHDASDR utility program for initialization. The distribution tapes containing the IPORES data sets are identified in the *Memo to Users*. During the execution of the System IPO provided procedure to load IPORES, all the MVS system data sets (except those designated to be on IPOCAT) are copied from the appropriate distribution tapes. In addition to the system data sets, IPORES also contains System IPO data sets identified by the IPO1. prefix. These contain System IPO developed job streams and other aids for installing, servicing, and extending the MVS system.

Table 2.4 lists the IPORES data sets.

```
                    ┌─────────────────────────────┐
                    │           IPORES            │
                    └─────────────────────────────┘

                    SYS1.BRODCAST    SYS1.PARMLIB
                    SYS1.CMDLIB      SYS1.PPOPTION
                    SYS1.DCMLIB      SYS1.PROCLIB
                    SYS1.DUMP00      SYS1.SAMPLIB
                    SYS1.DUMP01      SYS1.SMPCDS
                    SYS1.DUMP02      SYS1.SMPCRQ
                    SYS1.HELP        SYS1.SMPLOG
                    SYS1.IMAGELIB    SYS1.SMPMTS
                    SYS1.LINKLIB     SYS1.SMPSCDS
                    SYS1.LOGREC      SYS1.SMPSTS
                    SYS1.LPALIB      SYS1.SVCLIB
                    SYS1.MACLIB      SYS1.TELCMLIB
                    SYS1.NUCLEUS     SYS1.UADS
                    SYS1.OBJPDS01    SYS1.VTAMLIB
                    SYS1.OBJPDS02    SYS1.VTAMLST
                    SYS1.OBJPDS03    SYS1.VTAMOBJ

                             IPO1.CMDPROC
                             IPO1.COMPLIB
                             IPO1.GENLIB
                             IPO1.HELP
                             IPO1.INSTLIB
                             IPO1.IVPLIB
                             IPO1.JCLLIB
                             IPO1.LINKLIB
                             IPO1.OPERLIB
                             IPO1.PARMLIB
                             IPO1.PPROCLIB
                             IPO1.PROCLIB
                             IPO1.SAMPLIB
                             IPO1.SPARMLIB
                             IPO1.SPROCLIB
                             IPO1.STAGE2
```
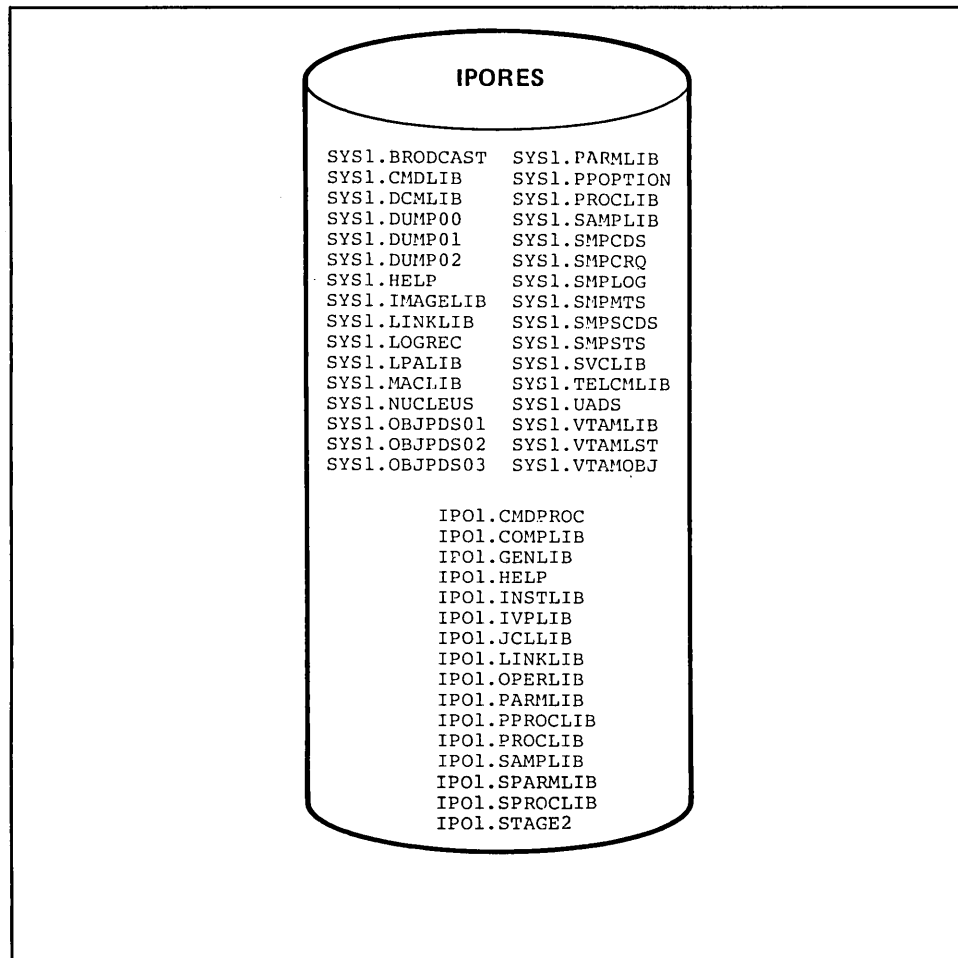
Figure 2.4 SYS1. and IPO1. Data Sets on IPORES

Prepare the Driving System

System IPO allows only MVS and OS/VS1 system control programs to drive the generation process. The SCP requirement exists because OS/VS compiler, utility and linkage editor facilities are used in IOGEN preparation and execution.

Add System IPO Utility Procedures

System IPO provides utility procedures designed to ease activities such as altering the System IPO-supplied JCL, starting System IPO jobs, and printing System IPO data set members. These procedures must be added to the driving system's SYS1.PROCLIB (or equivalent library).

Verify or Modify System IPO JCL

System IPO developed JCL and control statements are provided to assist both IOGEN and post-generation activities. The predefined JCL procedures exist as members of System IPO libraries. Any particular installation may need to alter fields within the supplied JCL. Coding conventions used in the JCL are employed consistently throughout all System IPO libraries to facilitate global changes as well as modifications to a specific library. Examples of fields that may require change are:

- Job accounting

- Device type

- Job class

First time MVS users are strongly recommended to use System IPO naming conventions, as provided, for the System IPO volumes and IPO1. data sets. Changing the IPO1. high level qualifier and renaming IPORES, IPOCAT, and so forth, may result in conflicts at IPL and when using System IPO installation aids during or after IOGEN.

MVS driving systems can use the Time Sharing Option (TSO) editing facility to make appropriate JCL changes. Driving systems without an on-line capability to make such changes can use the System IPO-provided batch JCL tailoring aid-IPOUPDTE. Because of the interrelationships between the System IPO components (data sets, master catalog, installation procedures), it is important to develop a comprehensive approach to altering System IPO-supplied JCL. All users, TSO as well as batch, should consult the *Installation Guide* topic detailing how IPOUPDTE relates to System IPO before altering the supplied JCL statements.

Prepare the DLIB Volume (IPODLB)

The MVS distribution libraries in the System IPO package are already in the proper format for use. All that is required for their preparation is to copy them from the System IPO distribution tape onto a DASD volume. The procedures to initialize and load the DLIB volume are supplied with System IPO.

Before loading IPODLB, the DLIB data sets must be cataloged so that they can be located during IOGEN processing without requiring volume serial or unit type information on the SYSGEN JCL statements. The cataloging process depends on the existence of VSAM in the driving system as described in the following paragraphs.

VSAM DLIB Cataloging Procedures

If VSAM is available in the driver system, then a VSAM user catalog can be created on the DLIB volume. Use of a VSAM user catalog means that the new DLIB data sets can be cataloged and accessed through the driving system without disturbing any existing catalog entries for DLIB data sets created for previous SYSGENs.

The VSAM based catalog procedure creates a VSAM user catalog on IPODLB and places a pointer to that catalog in the VSAM master catalog. The procedure then creates entries within the user catalog for each DLIB data set.

Because VSAM allows multiple versions of DLIB data sets to be cataloged on the driving system, System IPO includes a JOBCAT card in the SYSGEN JCL. The JOBCAT card is in the form of a JCL comment card so that it will not impact non-VSAM users. After the DLIB data set entries have been cataloged, the procedure removes the '*' from the JOBCAT JCL statement so that it will be activated. This allows the correct DLIB data sets to be located during IOGEN processing.

Non-VSAM DLIB Cataloging

If VSAM is not used at your installation, the System IPO DLIB data sets will be cataloged in the OS/VS1 system catalog. System IPO assumes that DLIB data set entries already exist in your system catalog as a result of previous SYSGEN activity for your current SCP. Without the option to create a VSAM user catalog, existing DLIB data set catalog entries must be deleted from the driver's system catalog so that the new ones can be entered. Therefore, System IPO provides a job that, first, uncatalogs existing entries, and then catalogs the new ones. If an installation is to perform a subsequent SYSGEN for the current SCP, the old DLIBs must be recataloged in the driving system following the System IPO IOGEN.

Prepare SYSGEN Macros

System IPO includes precoded SYSGEN macros that should considerably lessen your research and coding efforts. System IPO objectives in selecting macros and macro parameter values are threefold:

- To minimize the need to do a full SYSGEN

- To include options that are commonly used in MVS installations

- To select values based upon experiences gained in a real production environment

As a result, all macros or parameters requiring a complete SYSGEN have been provided for. Such options have been either provided in the pregenerated System IPO SCP or made available through System IPO post-IOGEN procedures. All data management and teleprocessing access methods have been included; all CPU types (Uniprocessors, Attached processors, and Multiprocessors) are supported; all required system data sets have been set up.

Precoded macros exist in two System IPO data sets named STAGE1A and STAGE1B. These two concatenated data sets form the macro input to Stage I of IOGEN processing. STAGE1A contains macros that do not need to be recoded. Therefore, most of your macro preparation will focus on the STAGE1B macros.

STAGE1B contains macros describing:

- SCP and subsystem options

- I/O configuration

- User SVC requirements

Changes to the macros describing SCP options should be carefully evaluated. While some parameters associated with these macros may be freely changed during IOGEN, others can be changed only during a full SYSGEN.

Some SYSGEN SCP option values are contained within system initialization members of SYS1.PARMLIB. Since SYS1.PARMLIB is not updated by IOGEN processing, there is no need to respecify these values. Changes to System IPO-provided values should be made by updating SYS1.PARMLIB (on IPORES) directly.

The *Installation Guide* gives a full description of the values and options specified in the System IPO and the reasons for the selections. The *Installation Guide* also identifies parameter values that can be changed at IOGEN and those that should be updated directly in SYS1.PARMLIB.

The precoded STAGE1B macros describing hardware and user SVC requirements are based on the Model Installation. These should be replaced as necessary to define your environment. The precoded macros can serve as a guide for your parameter selection and coding.

Figure 2.5 lists the macros appearing in data sets STAGE1A and STAGE1B. A more complete discussion of the macros can be found in the following chapter.

IPO STAGE1A MACROS	
DATAMGT DATASET	
IPO STAGE1B MACROS	
CHANNEL	IODEVICE
CONSOLE	SCHEDULR
CTRLPROG	SVCTABLE
EDIT	TSO
GENERATE	UNITNAME

Figure 2.5 Precoded STAGE1A and STAGE1B SYSGEN Macros

Performing the IOGEN

Execute Stage I

There are three System IPO jobs to be executed in performing the IOGEN. The first job, IOGEN1, is an important preliminary job that deletes aliases of display console modules. The aliases reflect the System IPO console configuration and *must* be deleted prior to IOGEN to avoid conflict with aliases that will be generated to support your console configuration.

The next procedure, IOGEN2, performs the Stage I assembly using as inputs the concatenated STAGE1A and STAGE1B data sets and the DLIB data sets on IPODLB. The Stage I job stream output will be directed to IPO1.STAGE2, a data set on IPORES.

Whether or not the job stream is produced, the Stage I output listing should be carefully reviewed. In addition to errors, the Stage I assembly may detect conditions that are documented by 'warning' messages in the diagnostic listing. The warning messages indicate conditions that *may* cause problems in the new system. For example, some SYSGEN macros and macro parameters are assigned default values if they are not explicitly coded. While these values may be satisfactory for some installations, they may cause operational problems in others. Since the Stage I assembler has no way to determine whether a default was taken intentionally or whether the macro or parameter was simply overlooked, warning messages alert users to review the defaulted values.

When it has been determined that the user coded macros are complete and correct, you may begin Stage II processing.

Execute Stage II

The third System IPO IOGEN processing step executes the job stream in IPO1.STAGE2. The processing that occurs in Stage II is documented in the *SYSGEN Reference* manual under the topic "Stage II Execution: Processing the Job Stream for an I/O Device Generation." The final job in Stage II processing lists the directories of system data sets altered by IOGEN processing (SYS1.IMAGELIB, SYS1.DCMLIB, SYS1.LINKLIB, SYS1.LPALIB and SYS1.NUCLEUS). It is expected that this job will not be executed until Stage II has completed successfully. Therefore, the JCL for this job specifies 'TYPRUN=HOLD'; you will need to release the job to obtain the listing.

Stage II output includes a listing documenting the steps executed by the assembler, the linkage editor, and the utility programs. Check this listing to be sure that the Stage II jobs terminated successfully. You should also consult the *Installation Guide* for any error conditions that are to be considered as normal occurrences. Should it be necessary to resubmit the Stage II job stream, consult the *Installation Guide* and the *SYSGEN Reference* manual for restart instructions.

Upon successful completion of Stage II, the pregenerated MVS SCP on IPORES has been modified according to Stage I macro input. The IOGEN is completed and you are almost ready to IPL the new MVS SCP on IPORES.

Update the SMP Control Data Set

The SMP Control Data Set (SYS1.SMPCDS or SMPCDS) is a primary SMP data set used to manage changes to an MVS system. The SMPCDS contains entries describing the MVS elements (macros, modules, and source code) in the SCP and how these elements were processed during system generation to construct the new or altered SCP. Therefore, the SMPCDS must be updated following an IOGEN to correctly reflect the new SCP structure.

SMP processing is further discussed in this text in Chapter IV: Servicing a System IPO Based System.

System IPO includes a JCL procedure for updating the SMPCDS. The update procedure (IOGEN3), uses the Stage II job stream in IPO1.STAGE2. The job stream is not re-executed but is searched for information needed by SMP.

Preparing for IPL of the New SCP

The following points summarize items to be addressed before IPLing the new SCP:

- CATALOG CONSIDERATIONS

    Existing MVS installations using System IPO to reinstall the MVS SCP may use their existing MVS master catalog to IPL and test the new SCP. If so, the IPORES system catalog pointer in SYS1.NUCLEUS (member SYSCATLG) must be changed to reflect the volume serial number and device type of the existing catalog. Failure to do this causes the system to expect the master catalog to reside on the IPOCAT volume. A System IPO provided procedure can be run to make the change.

    Alternative procedures for MVS users to establish a master catalog are detailed in the *Installation Guide*. MVS users may choose to restore and use the IPOCAT volume in the manner provided for first time MVS users.

    First time MVS users must use the catalog on the IPOCAT volume. *Installation Guide* instructions should be followed to initialize and restore IPOCAT from the distribution tape.

- PAGE DATA SETS

    As with the master catalog, MVS users may use their existing page data sets. If so, the page data set specification in SYS1.PARMLIB on IPORES must be changed to specify the driving system's page data sets.

    Non-MVS drivers use the page data sets on IPOCAT.

- JES2 PROCEDURES

    An operational Job Entry Subsystem/2 (JES2) is included in System IPO. It is important to consult both the *Installation Guide* and the *Operations Guide* to fully understand the JES2 environment defined in the System IPO based system before using it directly or adapting it to your installation.

- SYSTEM IPO INITIALIZATION PARAMETERS

    The System IPO-supplied SYS1.PARMLIB initialization parameters should be reviewed to understand the system environment to be established at IPL. Should you need more information than is in the *Installation Guide,* you may obtain a listing of the SYS1.PARMLIB members (on IPORES) and consult the *Tuning Guide* and the *Init & Tuning Guide* manual for details.

Once these considerations have been reviewed, you are ready to IPL and test the newly generated system control program.

Testing the New SCP

After the new system control program has been IPLed, the Installation Verification Procedure (IVP) should be run. The IVP jobs perform a check of basic system functions and provide basic documentation of the system. The System IPO IVP:

- Verifies that Assembler VS and its associated SYS1.PROCLIB members have been properly installed.

- Verifies that checkpoint is working in the installed system.

- Lists selected SYS1. and IPO1. libraries.

- Lists the IPORES VTOC.

- Forces an 806-4 ABEND.

- Executes selected Utilities.

When the IVP programs have executed successfully, the system is ready to be expanded by the addition of supplemental software products to service the installation's total data processing workload.

Summary

The purpose of MVS/SP System IPO is to enhance the productivity of users of IBM systems as they plan and implement the installation or reinstallation of the MVS system control program. System IPO eases this task by providing a pregenerated and validated MVS SCP along with documentation and productivity aids. In most cases, only an IOGEN is required to adapt the System IPO supplied SCP to your installation. The resulting system can then be tested, tuned, and expanded to achieve a total production system.

Although this chapter focuses on the use of System IPO to perform system generation, System IPO facilitates the entire range of activities associated with a conversion to or reinstallation of MVS. Some of the benefits provided by System IPO are listed in the following figure.
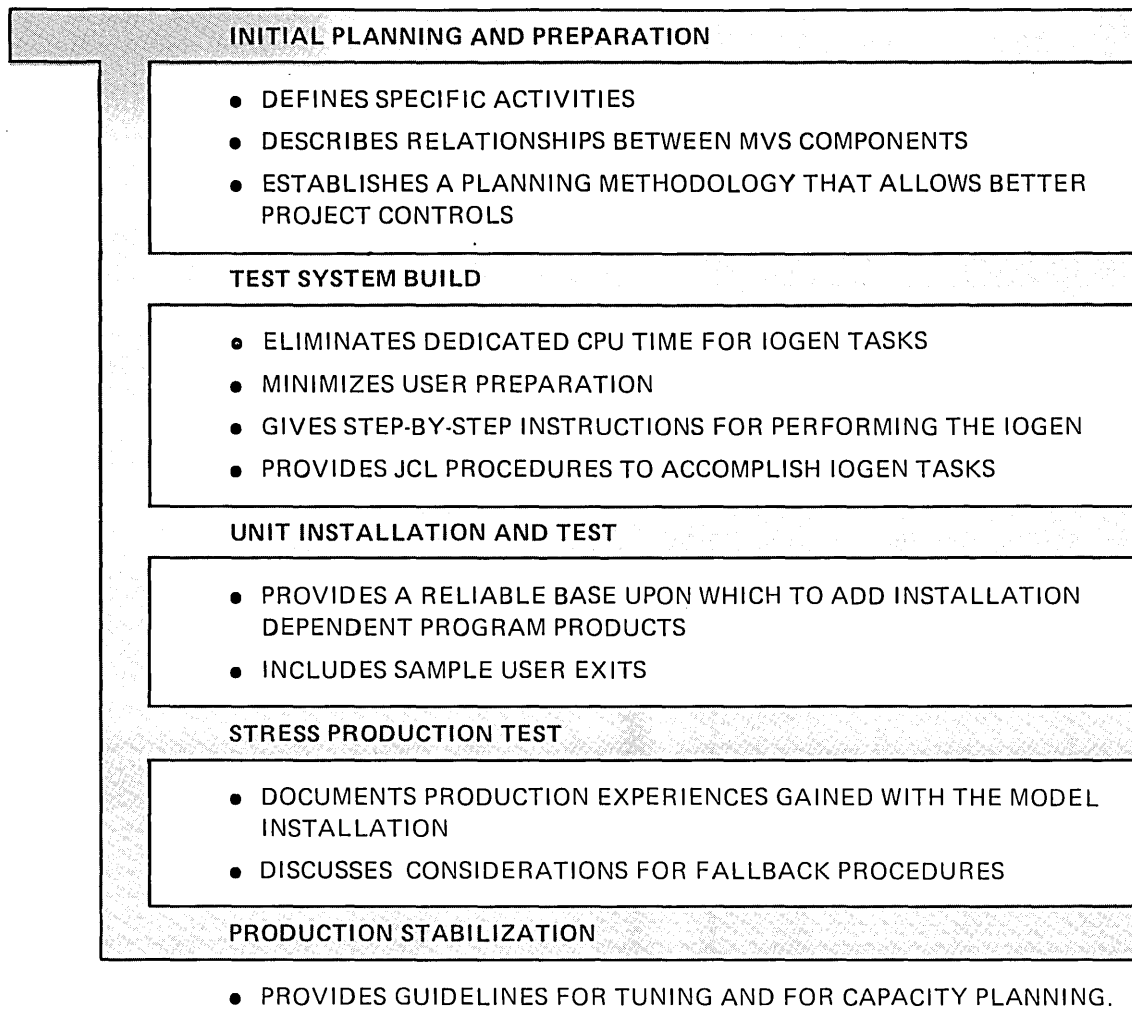
INITIAL PLANNING AND PREPARATION

- DEFINES SPECIFIC ACTIVITIES
- DESCRIBES RELATIONSHIPS BETWEEN MVS COMPONENTS
- ESTABLISHES A PLANNING METHODOLOGY THAT ALLOWS BETTER PROJECT CONTROLS

TEST SYSTEM BUILD

- ELIMINATES DEDICATED CPU TIME FOR IOGEN TASKS
- MINIMIZES USER PREPARATION
- GIVES STEP-BY-STEP INSTRUCTIONS FOR PERFORMING THE IOGEN
- PROVIDES JCL PROCEDURES TO ACCOMPLISH IOGEN TASKS

UNIT INSTALLATION AND TEST

- PROVIDES A RELIABLE BASE UPON WHICH TO ADD INSTALLATION DEPENDENT PROGRAM PRODUCTS
- INCLUDES SAMPLE USER EXITS

STRESS PRODUCTION TEST

- DOCUMENTS PRODUCTION EXPERIENCES GAINED WITH THE MODEL INSTALLATION
- DISCUSSES CONSIDERATIONS FOR FALLBACK PROCEDURES

PRODUCTION STABILIZATION

- PROVIDES GUIDELINES FOR TUNING AND FOR CAPACITY PLANNING.

Figure 2.6 System IPO Benefits

Chapter 2 Review

The following review points are arranged in the sequence of presentation within the the text. Use a separate sheet of paper to record your answers. When you have completed recording your answers, compare them to those on the following page.

Answer the following as True or False.

1. The Model Installation represents a hypothetical MVS installation.

2. The System IPO based system cannot be used without performing an IOGEN against IPORES.

3. All System IPO documents must be read thoroughly by the person who is to do the IOGEN.

4. An IOGEN using System IPO requires a driving system, DLIBs, and coded Stage I macros.

5. The predefined JCL supplied by System IPO should not be changed.

6. SYSGEN macros in both STAGE1A and STAGE1B are used as input to the Stage I assembly.

7. The SMP control data set must be updated following successful completion of Stage II processing.

8. As soon as Stage II processing has completed, you can IPL the IPORES volume.

Answers to Chapter 2 Review

1. **False.** The Model Installation is a real production system used by an IBM internal location. The System IPO-supplied SCP is validated at this location. (How System IPO Is Built)

2. **False.** The System IPO based system (IPORES + IPOCAT) can be used directly if the System IPO hardware configuration sufficiently matches the user's configuration. (System IPO Contents)

3. **False.** The *Installation Guide* is the primary System IPO document for the IOGEN task. Other documents can be consulted on an as-needed basis. (Preparing for IOGEN)

4. **True.** The SYSGEN process and input requirements are the same whether using System IPO or not. System IPO makes it easier for the user to prepare for and implement the SCP generation. (Preparing for IOGEN)

5. **False.** The System IPO-supplied JCL should be changed as necessary to reflect installation unique information and standards. However, users should understand the relationships of the the System IPO components before altering the JCL. (Preparing for IOGEN)

6. **True.** The two data sets are concatenated to provide Stage I input. (Preparing for IOGEN)

7. **True.** The update should occur as soon as possible following the IOGEN. (Performing the IOGEN)

8. **False.** Before IPLing the new SCP, the master catalog and page data sets must be established. Also, JES2 procedures and SYS1.PARMLIB initialization members should be reviewed and modified as needed. (Preparing for IPL of the New SCP)

)

Chapter 3:

IOGEN Macros

Every system generation requires SYSGEN macro input. System IPO enables users to limit their preparation to a subset of the SYSGEN macros. Figure 3.1 shows all the MVS SYSGEN macros that can be specified for either a full SYSGEN or IOGEN. The JES macro is the only macro that requires a full SYSGEN. While all others may be coded for an IOGEN, some parameters associated with the three shaded macros cannot be changed during IOGEN .

MACRO INSTRUCTION:	DEFINES OR DESCRIBES
AFFINITY	Assignment of specified problem programs to run on a particular CPU
CHANNEL	Channel number and characteristics
CKPTREST	ABEND codes eligible/not eligible for automatic restart
CONSOLE	Master and Secondary Console Options
CTRLPROG	System control program options
DATAMGT	Access methods and Graphic programming services
DATASET	System data sets
EDIT	Physical characteristics & attributes of data sets used with TSO
GENERATE	System generation processing options
IODEVICE	Input/Output devices
JES	JES 3 initialization information
SCHEDULR	Job scheduler and master scheduler options
SVCTABLE	Number & characteristics of user provided SVC's
TSO	TSO options
UNITNAME	Names of groups of I/O devices for use in JCL 'UNIT' parameter; also, VIO eligibility

Figure 3.1 SYSGEN macros (shading indicates that some parameters require a full SYSGEN)

Figure 3.2 describes the handling of SYSGEN macros by System IPO.

PRECODED		NOT CODED
With Reasonable Values	**Based on Model Installation**	
CTRLPROG DATAMGT DATASET EDIT GENERATE SCHEDULR TSO	CHANNEL CONSOLE IODEVICE SVCTABLE UNITNAME	AFFINITY CKPTREST JES

Figure 3.2 IPO SYSGEN Macros (Shading indicates that some parameters require a full SYSGEN)

The AFFINITY, CKPTREST, and JES macros are not precoded. Values for the AFFINITY and CKPTREST macros are unique for each installation. If required by the installation, the CKPTREST macro can be added during your preparation for the IOGEN. The AFFINITY macro updates an MVS data area called the Program Properties Table (PPT). You may code the AFFINITY macro for the IOGEN and thereby cause the reassembly and update of the PPT. Alternatively, you may use a System IPO supplied post-IOGEN procedure to update the PPT with the desired information.

Even though the JES macro was not coded in System IPO, JES3 System IPO users are still able to avoid a full SYSGEN. A System IPO post-generation procedure can be used to achieve the effect of the JES macro.

The SYSGEN macros precoded with reasonable values probably do not need to be recoded. These represent the System IPO STAGE1A macros and macros of the 'SCP and subsystem options' category in STAGE1B.

The macros shown as precoded based upon the Model Installation should be replaced as appropriate with macros describing your own installation's requirements. This chapter focuses on these SYSGEN macros:

- CHANNEL

- CONSOLE

- IODEVICE

- SVCTABLE

- UNITNAME

In addition, considerations for IOGEN processing options as specified by the GENERATE macro are summarized.

The *SYSGEN Reference* manual contains detailed explanations and coding instructions for all system generation macro instructions. The *Installation Guide* explains the System IPO developers' rationale for macro and macro parameter selection in the System IPO based system.

I/O Configuration Macros

CHANNEL IODEVICE CONSOLE UNITNAME

The I/O configuration macros describe the input and output devices attached to your MVS system and are required for both types of SYSGENs. These macros describe the device type, optional features, and, in some cases, how the device is to be used within your installation. One or more of each macro must be coded as input to Stage I of IOGEN processing.

The hardware I/O interface requires a device to be attached to a CPU by means of a channel and a control unit. The CPU, channel, control unit, and device are required links to complete a path for data transfer. In order to supervise communication between work in process on the CPU and I/O devices, the MVS SCP must have information about the components of the data transfer path. The information conveyed by the I/O configuration macros is placed into system control blocks and tables for use by SCP routines.

Although CPUs and device control units are very important parts of the I/O configuration, they are not directly defined by I/O configuration macros. Certain parameters have CPU type (uniprocessor/multiprocessor) or control unit implications. However, there is no I/O macro that explicitly defines the CPU type or model; nor is this kind of information defined for device control units.

CHANNEL Macro

Each channel in the configuration must be defined. Only two parameters are associated with the CHANNEL macro. They are ADDRESS and TYPE and are specified as described in Figure 3.3. Multiple channels of the same type can be defined with one CHANNEL macro.

PARAMETER	PURPOSE	VALID PARAMETER VALUES
ADDRESS	Specifies channel address	1 hexadecimal character 0-F for each channel
TYPE	Specifies the channel type	BLKMPXR - block multiplexor channel
		HISPEEDMPXR - 2870 channel frame with one or more subselector channels
		MULTIPLEXOR - byte multiplexor channel
		SELECTOR - selector channel integrated with a CPU or 2860 channel

Figure 3.3 CHANNEL Macro Parameters

IODEVICE Macro

Each uniquely addressable input/output device in the configuration must be defined by an IODEVICE macro. The macro describes the unit type, model, and special features for each device. A single IODEVICE macro can specify several devices if they have contiguous addresses and are of the same type.

Figure 3.4 below summarizes frequently used IODEVICE parameters.

PARAMETER	PURPOSE	VALID PARAMETER VALUES
ADDRESS	Defines the address of a device or telecommunications line	A 3-digit hexadecimal device address from 000-FFE or (address,n) where 'n' indicates the number of contiguous addresses starting at 'address'
UNIT	Specifies the device type	The generic device type (e.g., 3350, 3277, 3705) or the type of binary synchronous configuration (e.g., BSC1, BSC3)
MODEL	Specifies the device model number	Device dependent
OPTCHAN	Indicates the alternate channel or subchannel through which the device may be accessed	1- or 2-digit hexadecimal number indicating the alternate channel or subchannel, respectively, through which the device specified in the macro may be addressed
FEATURE	Specifies the optional features associated with a device	ALTCTRL - The device can be accessed through a second control unit
		SHARED - The disk device is used by more than one CPU system. (Does not apply to 2 CPUs in multiprocessor (MP) mode)
		SHAREDUP - The disk device is attached to an MP system that may be reconfigured to run as 2 uniprocessors. When reconfigured, the 2 CPUs will share the device.
		SHARABLE - The tape device is used by more than one CPU system.

Figure 3.4 IODEVICE Macro Parameters

Sample Configurations

In addition to describing physical characteristics of I/O devices, the CHANNEL and IODEVICE macros also describe the paths available for data transfer between the device and a CPU. The following figures illustrate typical device attachment configurations. The DASD device shown in the examples represents a string of 8 disk spindles (The term 'string' is generally used to describe a group of 2-8 DASD or tape devices). Most examples feature disk devices; however, except where noted, the examples apply to tape devices as well.

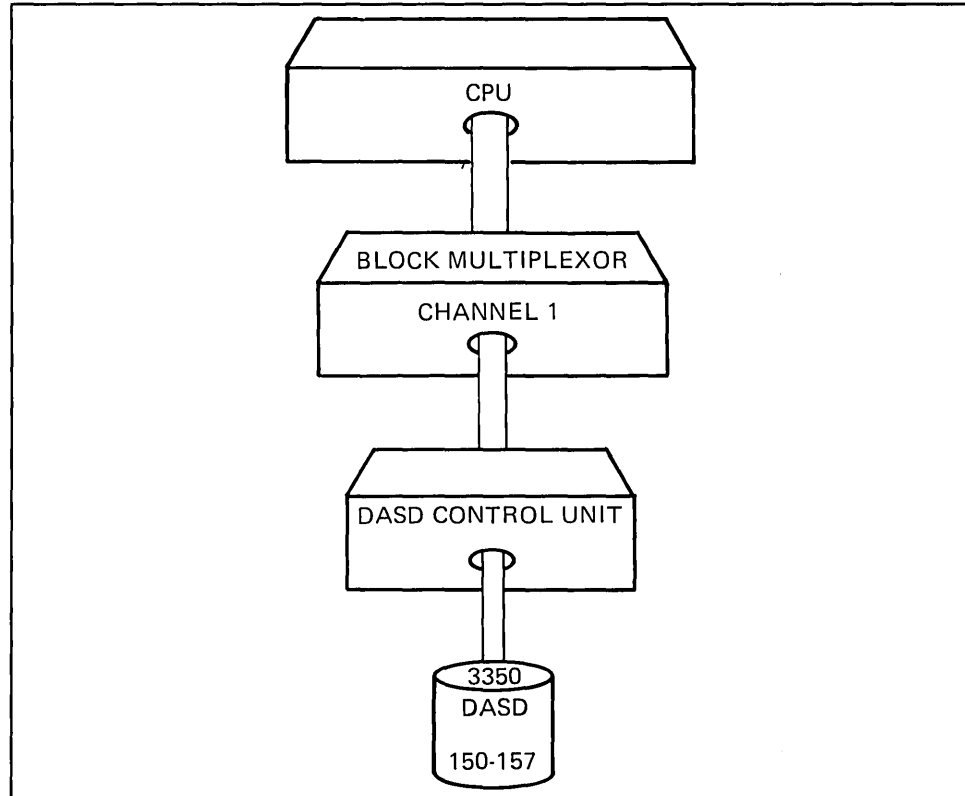## Standard Device Attachment

Figure 3.5 Standard Device Attachment

The CHANNEL and IODEVICE macros that describe this configuration are as follows:

```
CHANNEL    ADDRESS=1,TYPE=BLKMPXR
IODEVICE   ADDRESS=(150,8),UNIT=3350
```

The IODEVICE macro defines eight 3350 devices at addresses 150 through 157. Each device in the string has only one path for access by the CPU.
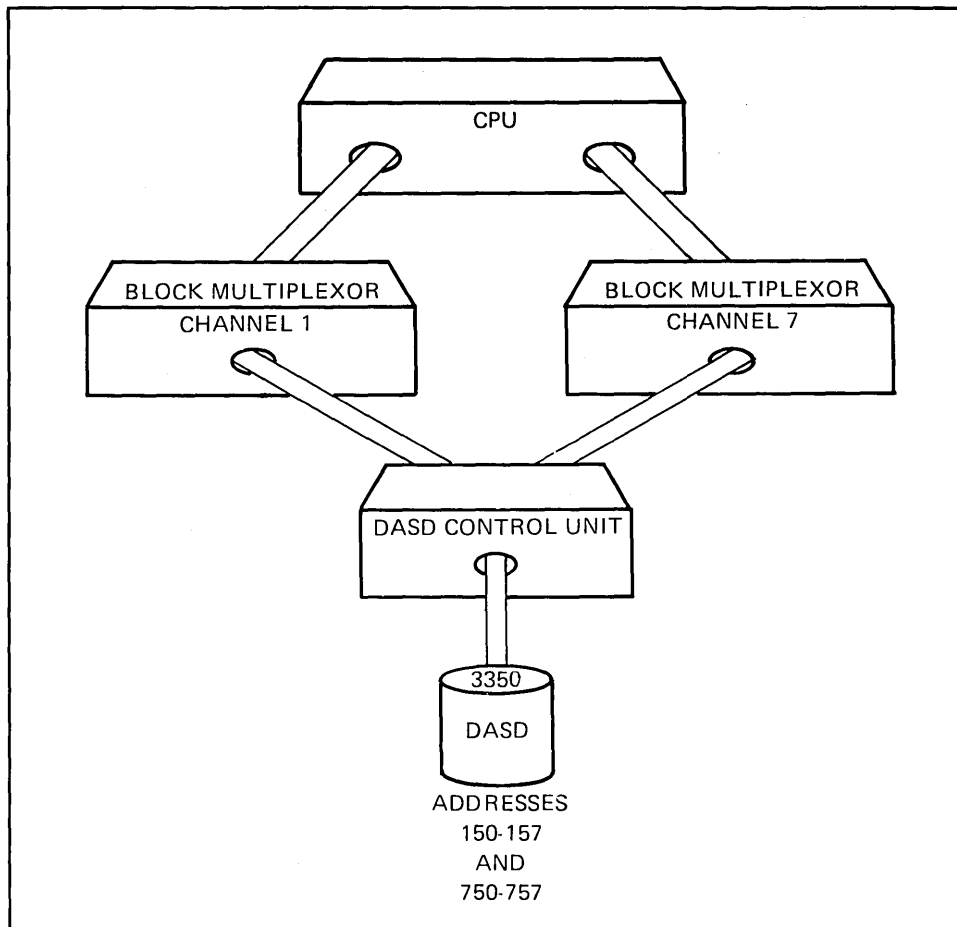
Figure 3.6 Alternate Channel

Alternate Channel

This configuration shows that the control unit for the string of 3350 devices is attached to more than one channel. This allows the devices attached to the control unit to be accessed through channel 1 or channel 7. There are now two paths to these devices.

The coded CHANNEL and IODEVICE macros that specify this configuration are:

```
CHANNEL     ADDRESS=(1,7),TYPE=BLKMPXR
IODEVICE    ADDRESS=(150,8),UNIT=3350,OPTCHAN=7
```

The addition of the OPTCHAN parameter identifies the alternate channel through which the devices can be accessed. Even though the devices can be addressed as either 150-157 or 750-757, there must be only one IODEVICE macro for the physical device(s). The system generates the control information to recognize address 750, for example, as the alternate address for 150. You cannot assign other devices to addresses represented by the OPTCHAN parameter.

Only one optional channel or subchannel can be specified for a device. The alternate channel address must be greater than the primary address.

For every channel defined in the configuration, a device must be defined specifying that channel as its primary channel address. Using the example in Figure 3.6, no other device is shown as attached to channel 7. A nonexistent device could be defined simply to satisfy this requirement. The IODEVICE macro for this situation could be coded to include the OFFLINE parameter:

```
IODEVICE  ADDRESS=720,UNIT=3350,OFFLINE=YES
```

The OFFLINE parameter specifies whether the device is to be considered online or offline at system initialization. The IODEVICE macro as coded causes the device to be marked as offline.

Alternate Control Unit

In Figure 3.7, the string of 3350 DASD devices is attached to more than one control unit. Even though there is just one channel per control unit, the devices can still be accessed along two channel paths.
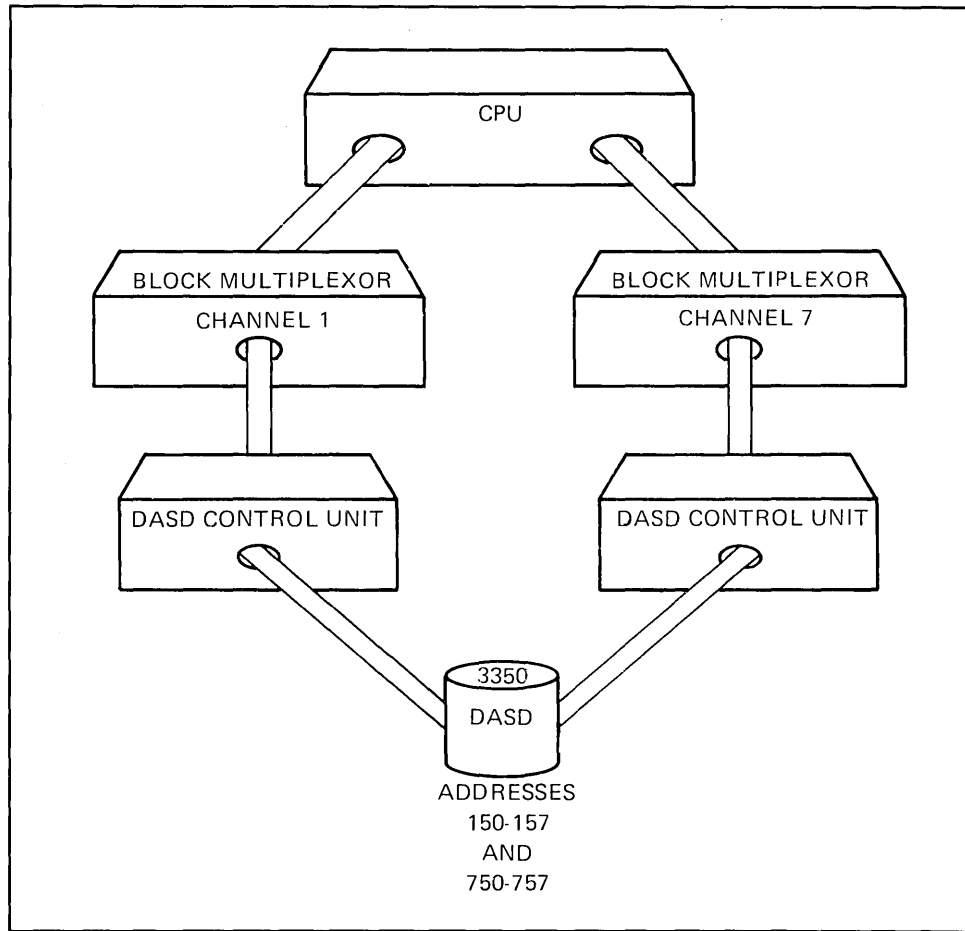

Figure 3.7   Alternate Control Unit

The coded macro specifications for this configuration are:

```
CHANNEL    ADDRESS=(1,7),TYPE=BLKMPXR
IODEVICE   ADDRESS=(150,8),UNIT=3350,OPTCHAN=7,FEATURE=ALTCTRL
```

The existence of the second control unit through which devices can be accessed is described by specifying ALTCTRL on the FEATURE parameter.

Sharing Devices Between Two Systems

Sharing DASD

Disk devices that can be accessed by two or more separate CPU systems are defined to the SCP as being shared. These devices should be so defined in the SCP for each system that uses them. Figure 3.8 illustrates a shared DASD configuration.
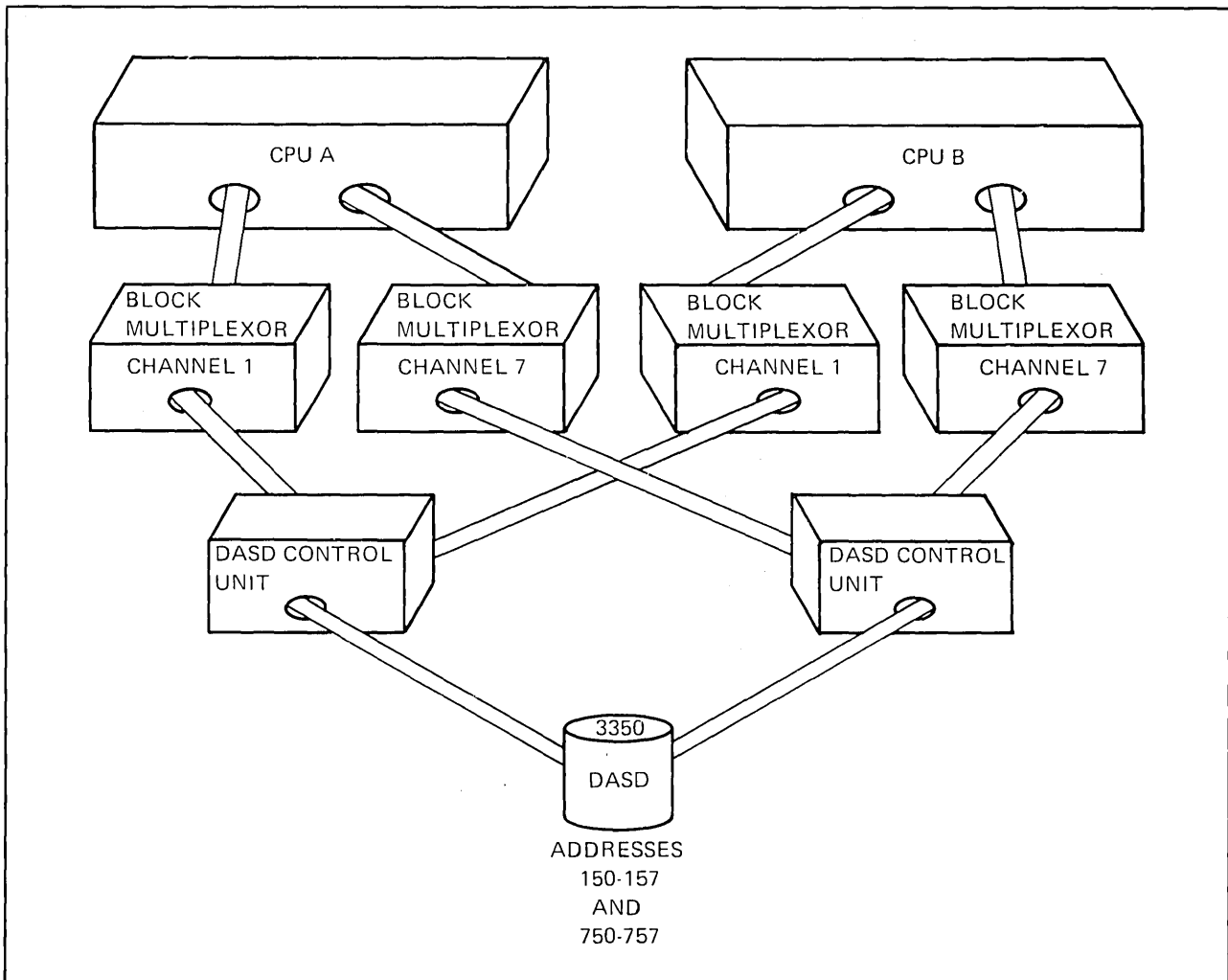
Figure 3.8 Sharing DASD Between Separate CPU Systems

The coded macro specifications for this example are:

```
CHANNEL    ADDRESS=(1,7),TYPE=BLKMPXR
IODEVICE   ADDRESS=(150,8),UNIT=3350,FEATURE=(ALTCTRL,SHARED)
```

The FEATURE parameter of the IODEVICE macro has been updated to include the SHARED option.

Sharing Tape

3420 tape units can be shared by multiple systems also. If, for example, the disk devices in Figure 3.8 were replaced by 3420 Model 8 tape drives, the IODEVICE macro defining them would be coded as follows:

```
IODEVICE   ADDRESS=(150,8),UNIT=3420,MODEL=8,OPTCHAN=7,          X
           FEATURE=(ALTCTRL,SHARABLE)
```

Sharing of tape units is described by the SHARABLE option on the FEATURE parameter. When SHARABLE is coded, the OFFLINE=YES is forced if not explicitly coded.

Multiprocessor Configuration

The MVS SCP can be used as the control program for a tightly coupled multiprocessor (MP) environment. In this environment, even though there are two CPUs, there is one system control program loaded to service both processors. In an MP environment, the tape and DASD devices may be symmetric or asymmetric. Devices are considered to be symmetric if they are attached to both processors; asymmetric, if attached to ony one.

Whatever the tape/DASD attachment, it is important to remember that in MP mode, only one SCP operates the two CPUs. Therefore, devices accessed by the MP system CPUs are defined as if all devices were supported by a single processor. At system initialization, the initialization routines determine what paths to devices exist for each half (each CPU) of the MP complex.

The previous examples describing the standard device attachment, and the use of OPTCHAN and ALTCTRL apply to MP as well as UP systems.

It is possible to reconfigure an MP system to operate the two processors as two UPs. When reconfigured to UP mode, each processor will have a copy of the SCP just as though it were a totally separate CPU. Since the I/O devices are no longer managed by a single SCP, the IODEVICE macros must indicate how devices are to be used when the MP processors are in UP mode. Disk devices that are to be shared by both CPUs when reconfigured are described as SHAREDUP. The SHARABLE parameter describing 3420 tape unit sharing between separate CPUs applies also to reconfigurable MP systems.
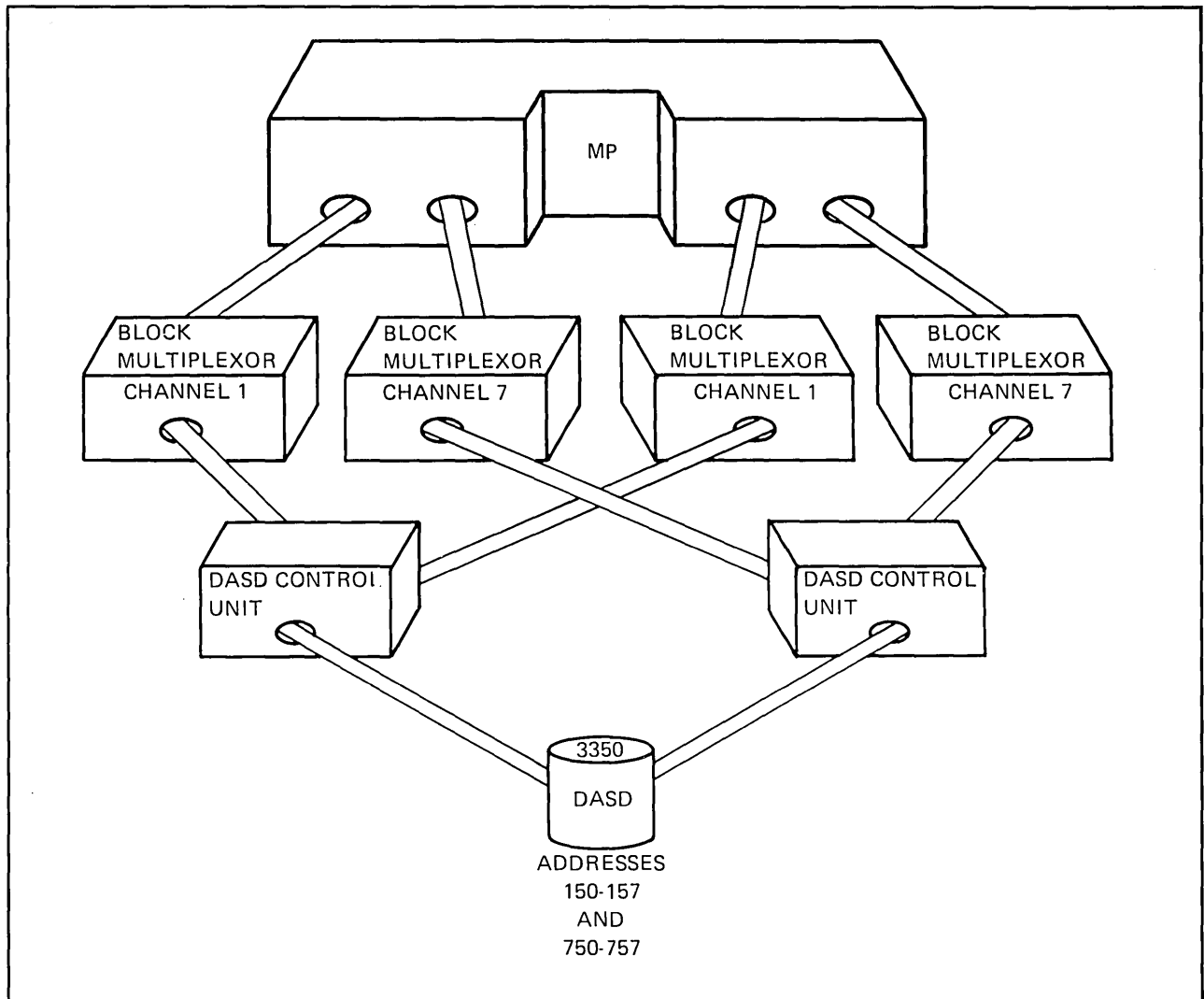
Figure 3.9 Multiprocessor Configuration

Figure 3.9 illustrates DASD attached to an MP system. Assuming that these devices are to be shared when the MP is reconfigured for UP operation, the coded macro specifications for this configuration are:

```
CHANNEL    ADDRESS=(1,7),TYPE=BLKMPXR
IODEVICE   ADDRESS=(150,8),UNIT=3350,OPTCHAN=7,FEATURE=(ALTCTRL,SHAREDUP)
```

Shared DASD devices in this environment are defined as SHAREDUP. The SHAREDUP applies only to MP systems. If the MP system is reconfigured as two UPs, the SCP support for shared DASD will be in effect. When running as an MP system this support is not invoked.

Coding Exercise

Figure 3.10 combines configurations discussed previously into one sample installation. The two CPUs are separate uniprocessors. All channels are block multiplexors. Other information about the sample configuration follows:

DEVICE	QUANTITY	MODEL	PRIMARY ADDRESS	ALTERNATE ADDRESS	ATTACHED TO CPU
3350	8	N/A	240-247	840-847	CPU A
3330	8	11	820-827	NONE	CPUs A and B
3420	16	6	300-30F	900-90F	CPU B

On a separate piece of paper code the CHANNEL and IODEVICE macros and their parameters that describe the sample configuration. When you are finished, compare your answers to those listed on the page following the sample configuration.
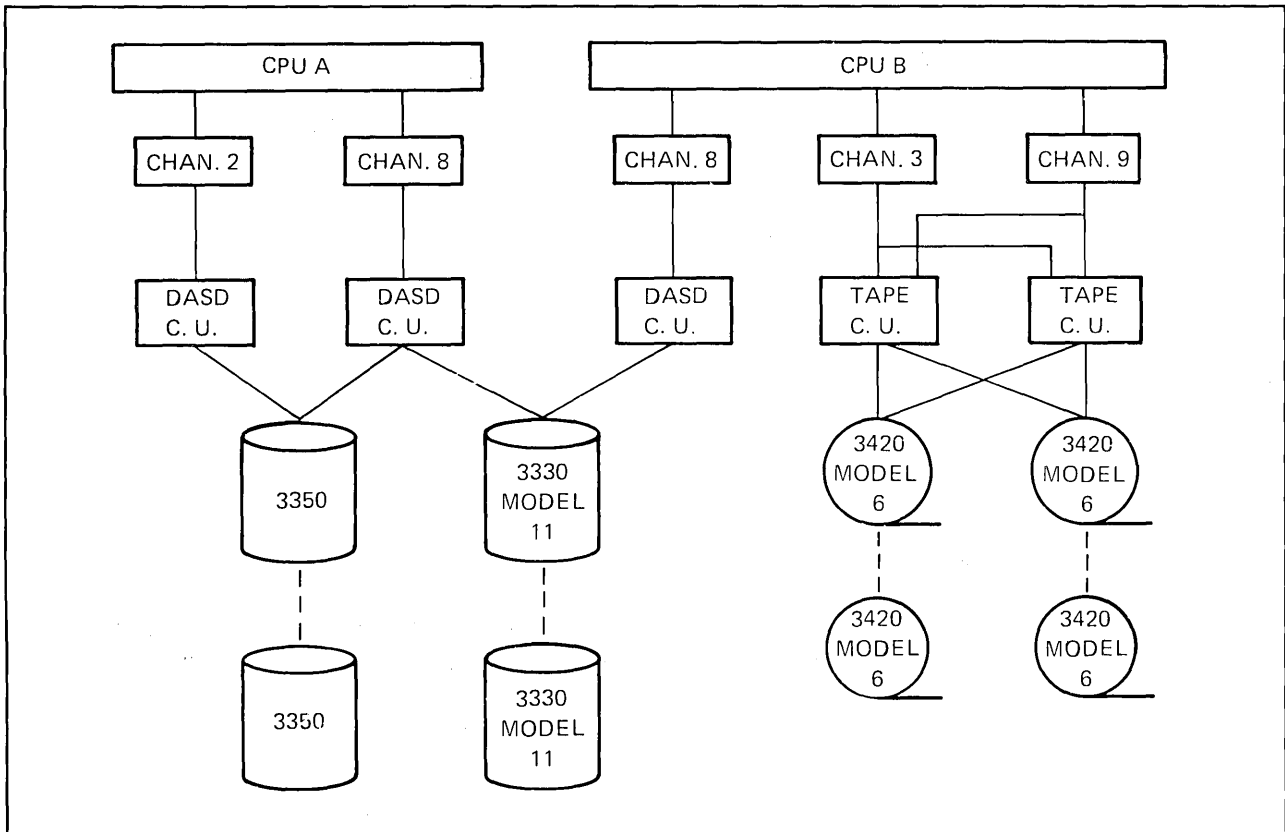
Figure 3.10 Coding Exercise Configuration

Answers to Coding Exercise

Macros describing the CPU A configuration in Figure 3.10 are as follows:

```
CHANNEL    ADDRESS=(2,8),TYPE=BLKMPXR

IODEVICE   ADDRESS=(240,8),UNIT=3350,OPTCHAN=8,FEATURE=ALTCTRL

IODEVICE   ADDRESS=(820,8),UNIT=3330,MODEL=11,FEATURE=SHARED
```

Macros describing the CPU B configuration in Figure 3.10 are as follows:

```
CHANNEL    ADDRESS=(3,8,9),TYPE=BLKMPXR

IODEVICE   ADDRESS=(820,8),UNIT=3330,MODEL=11,FEATURE=SHARED

IODEVICE   ADDRESS=(300,16),UNIT=3420,MODEL=6,OPTCHAN=9,          X
           FEATURE=ALTCTRL
```

UNITNAME Macro

The UNITNAME macro defines groups of I/O devices and assigns a name by which each group can be referenced by the UNIT parameter in JCL. The assigned name is an esoteric or descriptive name such as SYSDA, WORK, or TAPE rather than a generic name such as 3330 or 3420. Any device type other than teleprocessing equipment can be included in a UNIT-NAME group and different types can be combined in the same group. Use of the UNIT-NAME macro allows you to direct specific workloads to specific devices.

The UNITNAME macro also specifies whether or not Virtual I/O (VIO) will be considered to satisfy allocation requests when the group name is referenced in JCL.

The UNITNAME parameters are summarized below:

PARAMETER	PURPOSE	VALID PARAMETER VALUES
NAME	Assigns esoteric name to a group of devices	Up to 8 characters of alphamerics and #,@,$,/,-
UNIT	Specifies the unit addresses of devices that will be recognized by the assigned name	3 hexadecimal digits ranging from 000-FFE or (address,n) where 'n' indicates the number of contiguous addresses beginning at 'address'
VIO	Indicates VIO eligibility	YES or NO

Figure 3.11   UNITNAME Macro Parameters

The effects of the following UNITNAME macros are illustrated in Figure 3.12.

```
UNITNAME    NAME=SYSDA,UNIT=(150,200,208,320,400)
UNITNAME    NAME=TSOWRK,UNIT=(208,320)
```
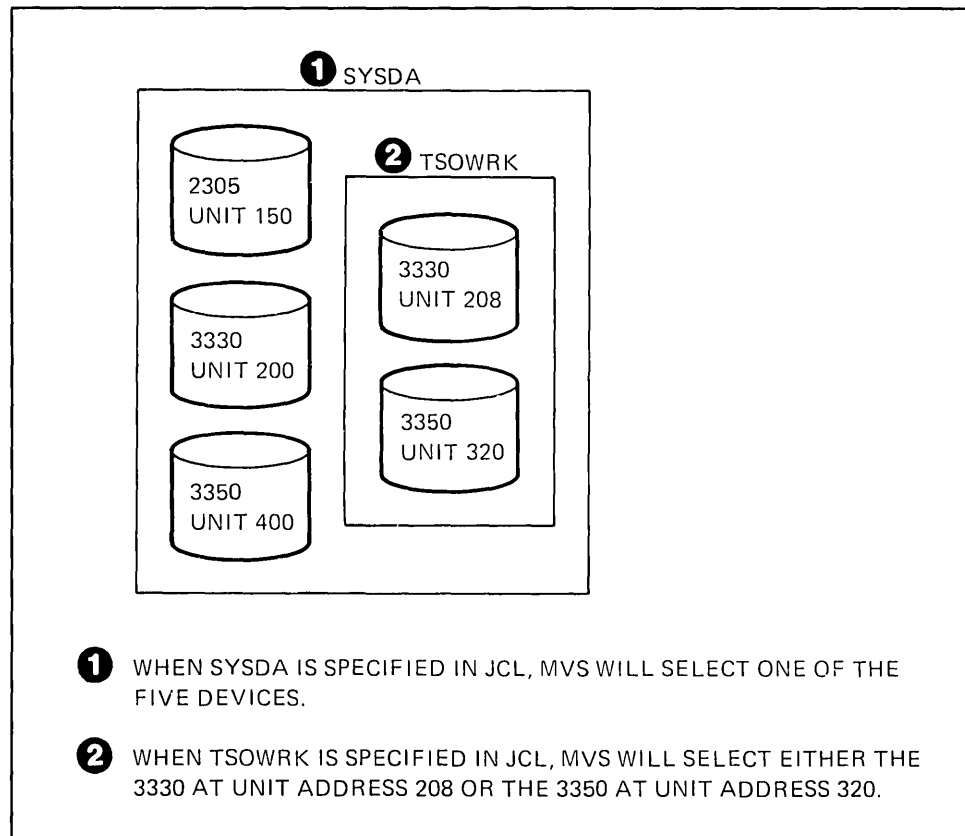
Figure 3.12 Effects of the UNITNAME Macro

The UNITNAME macros have set up two logical groups of disk devices. Reference to SYSDA in JCL will refer to all the disk devices. Reference to TSOWRK includes only devices at addresses 208 and 320.

If the VIO facility is to be used for eligible data sets when the UNIT parameter specifies TSOWRK, for example, the UNITNAME macro is coded as follows:

```
UNITNAME    NAME=TSOWRK,UNIT=(208,320),VIO=YES
```

UNITNAME macros must be coded to assign certain group names referenced by MVS and System IPO supplied cataloged procedures. Users should consult the *SYSGEN Reference* manual and the *Install Guide* for naming requirements.

CONSOLE Macro

MVS system consoles provide a way to communicate with the system. Multiple console support is a standard MVS feature. One console must be defined to function as the master console. The master console serves as the primary communication interface and is automatically authorized to issue all MVS operator commands. All other system consoles are defined as secondary consoles. Either the master or a secondary console can serve as an alternate to backup a non-operational console.

The following figure summarizes a subset of the parameters of the CONSOLE macro.

PARAMETER	PURPOSE
MCONS	Identifies the master console
SECONS	Identifies secondary consoles
ALTCONS	Designates the alternate for the console being defined

Figure 3.13   CONSOLE Macro Parameters

Each device defined as a console must also be described by an IODEVICE macro.

Figure 3.14 is an example of a console configuration.

❶ ONE OF THE CONFIGURATION'S CONSOLES MUST BE DESIGNATED AS A MASTER CONSOLE.

❷ ALL OTHER CONSOLES IF ANY, ARE DESIGNATED AS SECONDARY CONSOLES.

❸ SOME CONSOLES MAY BE SPECIFIED AS ALTERNATE CONSOLES. ALTERNATE CONSOLES ACT AS BACKUP FOR OTHER CONSOLES.
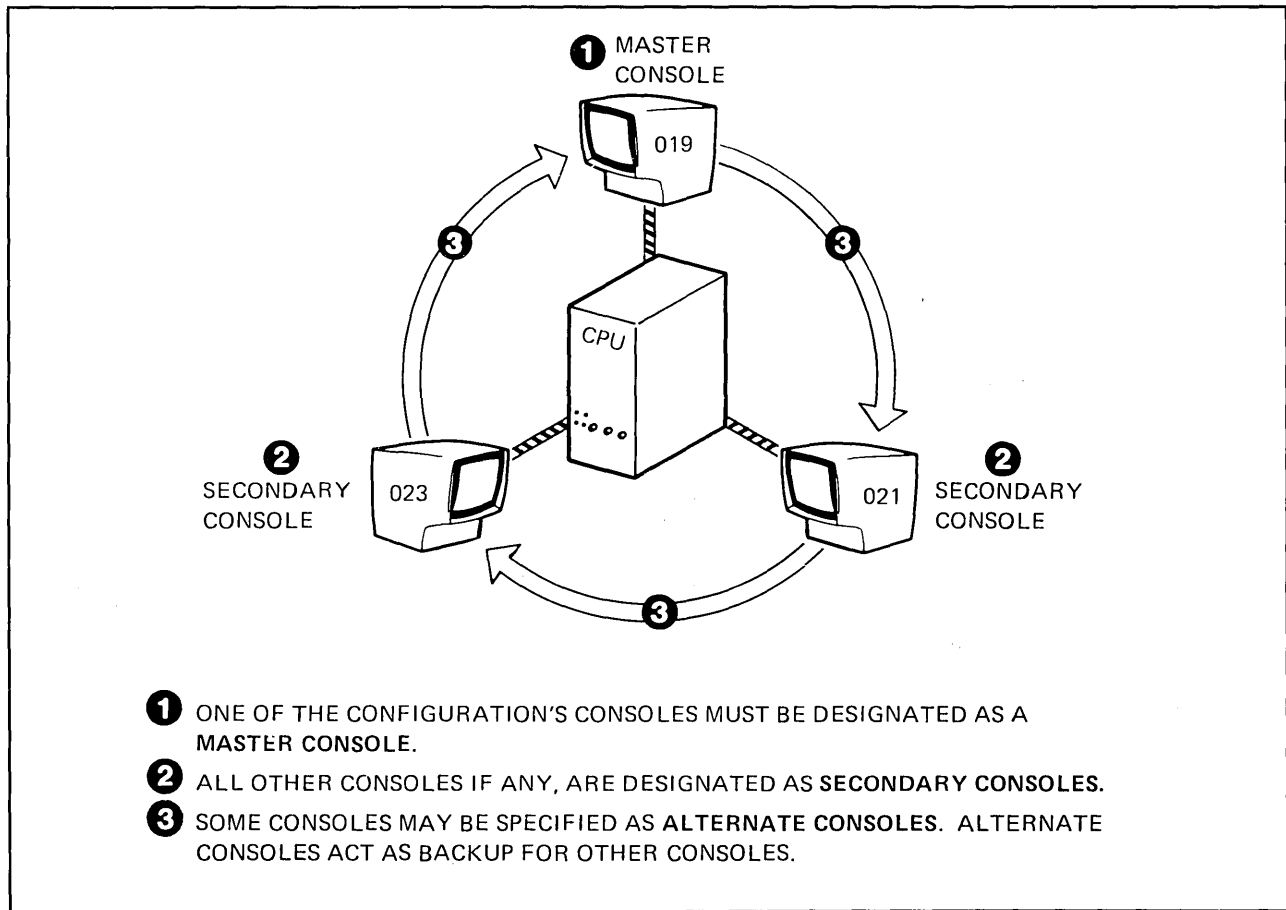
Figure 3.14   Master, Secondary, and Alternate Consoles

The CONSOLE and IODEVICE macros describing this illustration are as follows:

```
CONSOLE   MCONS=019,ALTCONS=021
CONSOLE   SECONS=021,ALTCONS=023
CONSOLE   SECONS=023,ALTCONS=019
IODEVICE  UNIT=3277,ADDRESS=019,MODEL=2
IODEVICE  UNIT=3277,ADDRESS=021,MODEL=2
IODEVICE  UNIT=3277,ADDRESS=023,MODEL=2
```

Non I/O Macros

SVCTABLE Macro

The SVCTABLE macro instruction permits the addition of user provided SVCs to the SVC Table. The SVC Table is an MVS data area that describes the characteristics of all SVCs (both IBM and user supplied). There are 256 slots in the SVC Table, each containing information about the SVC associated with that slot number. SVCs are therefore numbered from 0-255. SVCs for the MVS system control program are assigned from 0-199. Other SVCs can be assigned from 255 down to 200.

The SVC Table defined within System IPO, has been generated to include SVCs used in the Model Installation. These should be reviewed and, if necessary, changed for your installation. System IPO provides a job for post-SYSGEN processing of the SVCTABLE.

The SVCTABLE macro only initializes the SVC Table. It does not place the user provided SVC routines into system data sets. The latter function is not part of IOGEN processing (it is allowable at full SYSGEN time). If your installation uses SVCs that are not part of the standard MVS SCP, the processing routines can be added to system data sets by a post-IOGEN procedure. The routines can be linkedited, copied, or processed by SMP. Additionally, System IPO provides a post-IOGEN procedure to update the SVC Table if necessary.

PARAMETER	PURPOSE	VALID PARAMETER VALUES
SVC-nnn	specifies the SVC number	decimal 200-255
Tn	Specifies the SVC type	1,2,3,4,5, or 6
Ln	Specifies requirements for system locks	1 (Local) 2 (CMS) 3 (SRM) 4 (SALLOC) 5 (Dispatcher)
FC01	Restricts use of the SVC to authorized programs	Not Applicable
NP	Specifies that the SVC is nonpreemptible for I/O interrupts	Not Applicable

Figure 3.15 SVCTABLE Macro Parameters

SVC numbers must be unique and should be entered in descending order from 255 to 200. The coding format of the SVCTABLE macro differs from that of other macros. Hyphens are used as shown in the following example that defines three unrestricted user-provided SVCs.

```
SVCTABLE    SVC-255-T1,SVC-254-T5,SVC-253-T3
```

GENERATE Macro

The GENERATE macro is required for any system generation and must be the last SYSGEN macro in Stage I input. In addition to identifying the volume serial number and device type of the new system residence volume, GENERATE also specifies processing options to be in effect during the generation. The following figure summarizes all GENERATE macro parameters:

PARAMETER	DEFINES/DESCRIBES
GENTYPE	Generation type (ALL=full, IO=IOGEN)
RESVOL	New system residence volume serial number and device type
INDEX	For IOGEN, temporary high level qualifier assigned to system data sets on the volume indicated by the RESVOL parameter
JCLASS	Class in which the SYSGEN job stream will execute
OCLASS	Output class for Stage II output
OBJPDS	Name of data sets used as temporary storage areas by Stage II processing

Figure 3.16 GENERATE Macro Parameters

For IOGEN processing, the RESVOL parameter identifies the volume containing the system libraries to be updated. For System IPO users, the RESVOL parameter has been precoded to specify IPORES.

The Stage II job stream consists of 5 multi-step jobs. These can be multi-tasked in 3 initiators. It may be advisable to prevent the SYSGEN jobs from executing in job classes required by application jobs with critical turnaround requirements.

Stage II produces a large volume of printed output. If your installation has a special output class set up for such loads, that class should be considered for the OCLASS parameter.

Summary

System IPO is designed to minimize the time required for System IPO users to research and prepare Stage I input macros. You should review the macros precoded in System IPO to determine which should be respecified.

The *Contents Guide* lists the Stage I macro input used to perform a full system generation in the creation of the System IPO-supplied SCP. These macros, precoded in the STAGE1A and STAGE1B members of IPO1.GENLIB, are altered or replaced as necessary for the IOGEN tailoring process. The *Contents Guide* also lists the hardware configuration supported by the precoded I/O configuration macros.

The *Installation Guide* documents the System IPO developers' rationale for SYSGEN parameter selection. It also details what macro parameters can be changed at IOGEN time, which parameters can be updated directly in SYS1.PARMLIB, and what SYSGEN macro options can be achieved through post-IOGEN procedures.

Chapter 3 Review

The following points are arranged in the sequence of presentation within the text. Use a separate sheet of paper to record your answers. When you have completed recording your answers, compare them to those on the following page.

Questions 1-3 are based upon the following coded IODEVICE macro:

```
IODEVICE  ADDRESS=(330,4),UNIT=3350,OPTCHAN=9,   X
          FEATURE='(ALTCTRL,SHARED)
```

Answer the following as True or False.

1. Four devices are defined.

2. The devices are to be used by a single CPU system.

3. There is just one path by which the CPU can access the devices.

4. Devices in the groups defined by a UNITNAME macro must be of the same type.

5. Only one console can be defined as the master console.

6. System consoles must be defined by IODEVICE macros as well as CONSOLE macros.

7. The SVCTABLE macro causes the SVC processing routines to be included in system data sets.

8. The RESVOL parameter of the GENERATE macro identifies the driving system's system residence volume.

Answers to Chapter 3 Review

1. **True.** Devices at addresses 330,331,332,and 333 are defined. (IODEVICE Macro)

2. **False.** The SHARED feature indicates that the devices are to be accessed by 2 or more CPU systems. (IODEVICE macro and Sharing Devices Between Two Systems.

3. **False.** The OPTCHAN parameter and the ALTCTRL feature indicate two physical paths to the device. There are not only two channels accessing the devices, but also two control units attached to the devices. (Alternate Channel and Alternate Control Unit)

4. **False.** Different device types can be included in the same logical group. One or more devices from different device strings can be combined. (UNITNAME Macro)

5. **True.** Other system consoles are defined as secondary consoles. (CONSOLE Macro)

6. **True.** The IODEVICE macro describes the console device's physical characteristics; CONSOLE describes the functional capabilities. (CONSOLE Macro)

7. **False.** SVCTABLE just initializes the SVC Table entries. For IOGEN, the SVC routines can be added as a post-generation task. (SVCTABLE Macro)

8. **False.** The RESVOL parameter identifies the target SYSRES. (GENERATE Macro)

Chapter 4:

Post-generation Considerations

Introduction

Generation of the system control program is just one of a number of tasks involved in the conversion to or reinstallation of MVS. This chapter highlights some of the activities that follow IOGEN to prepare for further additions and testing as a full production system is developed.

Some of the topics addressed in this section are relevant to ongoing support of your MVS system. The discussion presented in "Servicing a System IPO Based System" and "Post-IOGEN Changes to SYSGEN Parameters" should be read by all System IPO users.

The final topic, IPOCAT Considerations, is meaningful only to those who plan to use the IPOCAT volume. If your installation is already an MVS user and prefers to IPL the newly generated system using your existing master catalog and page data sets, you may bypass this topic.

Servicing a System IPO Based System

System IPO contains preventive maintenance available at the time the System IPO SCP was generated and validated. By the time System IPO is ordered by your location, there will probably be additional maintenance available from IBM. To compensate for this, a cumulative service tape is supplied with the System IPO package. Since this maintenance has not been included in the System IPO build and validation processes, it is recommended that it *not* be installed until you have successfully completed some verification that the basic system functions are operating properly. (This can be achieved through the Installation Verification Procedures).

The cumulative service tape is installed in the same manner as normal system maintenance. The servicing strategy used to maintain all MVS SCPs is known as 'PUT processing'. IBM releases MVS maintenance at approximately 30-day intervals. This maintenance is packaged as a collection of Program Temporary Fixes (PTFs) on a Program Update Tape (PUT). The same packaging technique is used for the cumulative service tape. The PUT process uses the System Modification Program (SMP) to install the PTFs. Therefore servicing any MVS system (Release 3.8 or later) requires a working knowledge of PUT processing and of SMP (release 4 or later). Using System IPO to generate the new MVS SCP does not remove this requirement. System IPO does, however, supply procedures to aid the user in performing the maintenance task.

Using SMP and System IPO

SMP is an MVS service aid used to build MVS Distribution Library data sets and to maintain MVS systems. The System IPO group created the IPODLB volume by SMP processing of the distributed MVS SCP elements. The pre-installed maintenance was also processed through SMP.

SMP not only installs changes to system software, but also maintains a profile of the SCP and an audit trail of maintenance activities. Some data sets associated with SMP document the status of an MVS system. The entries within these data sets are critical to managing changes to the SCP components.

All but one of the primary data sets needed to begin SMP processing are included in the System IPO package. Figure 4.1 lists the supplied data sets. The one data set that needs to be created is the SMP PTF Temporary Store data set (SYS1.SMPPTS). System IPO provides a procedure to create this data set. SYS1.SMPPTS is not needed to perform the SMP Control data set (SYS1.SMPCDS) update that must occur following the IOGEN. However, it is needed to install the cumulative service tape, subsequent system maintenance, and new functions.

DATA SET NAME		RESIDES ON:
SYS1.SMPACDS	Alternate Control Data Set	IPODLB
SYS1.SMPACRQ	Alternate Conditional Requisite Queue Data Set	IPODLB
SYS1.SMPCDS	Control Data Set	IPORES
SYS1.SMPCRQ	Conditional Requisite Queue Data Set	IPORES
SYS1.SMPSCDS	Save Control Data Set	IPORES
SYS1.SMPMTS	Macro Temporary Store Data Set	IPORES
SYS1.SMPSTS	Source Temporary Store Data Set	IPORES
SYS1.SMPLOG	Log Data Set	IPORES

Figure 4.1 SMP Data Sets Supplied with System IPO

In SMP terminology, changes are described as System Modifications (SYSMODs), SYSMODs can be grouped into two categories:

- FUNCTION

  Any additional functional enhancement to the SCP including Selectable Units and those licensed program products that are distributed in SMP format.

- SERVICE

  Including PTFs, APAR fixes, and User Modifications. Because the cumulative service tape and the monthly PUT tapes contain PTFs, they are categorized as service.

In order to control and document changes to the MVS system software, the SMP data set entries need to describe

1) What elements exist in your MVS SCP and how they were processed at system generation (full or IOGEN).

2) Any changes to those elements resulting from subsequent maintenance activity.

The first of these SMP requirements must be met by updating the SMP Control Data Set with information contained in the job stream executed by Stage II of SYSGEN processing. Subsequent use of SMP to install service SYSMODs, assures that an accurate record of changes to your system is available. Only in this way can future upgrades to your system - both function and service upgrades - be controlled.

System IPO also provides three JCL procedures that contain the data definition (DD) statements needed to execute SMP.

- IPOSMP4L

  This procedure can be used for SMP LIST and RECEIVE processing. It allocates only those SMP data sets needed to satisfy SMP LIST and RECEIVE requests.

- IPOSMP4S

  This procedure can be used for SMP APPLY processing. It allocates all SMP data sets, all necessary system data sets, and only those DLIB data sets necessary to do assemblies.

- IPOSMP4D

  This procedure can be used for SMP ACCEPT processing. It allocates all SMP data sets, and all necessary DLIB data sets.

Whoever is responsible for maintaining the MVS system at your location should be trained or experienced in the use of SMP. That person should consult the *System Guide* for details of the built-in SMP facilities provided by System IPO. That guide also gives an overview of SMP concepts and processing for those who are interested only in background information.

Program Update Tapes

Once the required SMP data sets are available, normal PUT processing can occur. Figure 4.2 and the following discussion summarizes the PUT processing activities.

```
┌──────────────────────────────────────────────────────────────┐
│ ┌────────────────────────────────────────────────────────────┤
│ │  RESEARCH PHASE                                              │
│ │ ┌──────────────────────────────────────────────────────────┤
│ │ │  • IDENTIFY PTFS TO BE EXCLUDED                            │
│ │ │ SETUP PHASE                                                │
│ │ │ ┌────────────────────────────────────────────────────────┤
│ │ │ │  • EXAMINE PUT DOCUMENTS                                 │
│ │ │ │                                                          │
│ │ │ │  • PREPARE DRIVER AND TARGET SYSTEMS                     │
│ │ │ │ INSTALL PHASE                                            │
│ │ │ │ ┌──────────────────────────────────────────────────────┤
│ │ │ │ │  • "RECEIVE" PTFs ONTO SMP STAGING DATA SET (SMPPTS)   │
│ │ │ │ │                                                        │
│ │ │ │ │  • FINALIZE LIST OF PTFS TO BE EXCLUDED                │
│ │ │ │ │                                                        │
│ │ │ │ │  • "APPLY" MAINTENANCE ON TARGET SYSTEM                │
│ │ │ │ │ POST PHASE                                             │
└─┴─┴─┴─┴──────────────────────────────────────────────────────┘
```

• "ACCEPT" MAINTENANCE INTO DLIB'S

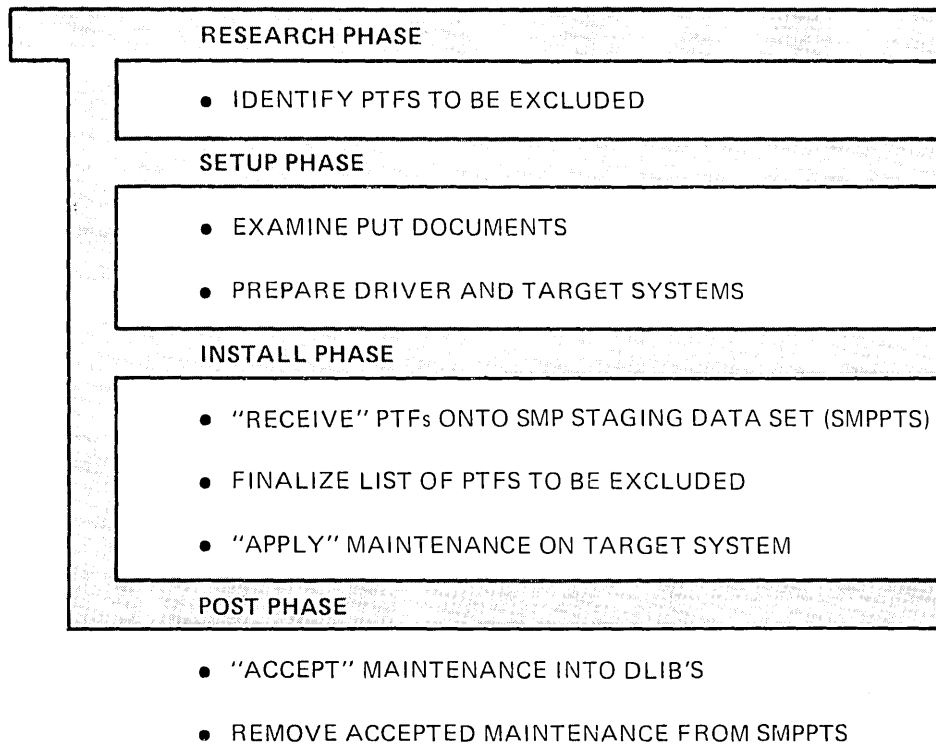• REMOVE ACCEPTED MAINTENANCE FROM SMPPTS

Figure 4.2 PUT Processing Flow

1) *Research Phase:*
   During this period, the local IBM Field Engineering software service function should be consulted for information on critical SMP fixes and any PTFs found to be in error since the packaging of the PUT tape.

   The *Service Guide* identifies service integrated in the MVS/SP System IPO integrated base and segmented base systems. It also contains information relating to corrective fixes that were validated on the Model Installation system, and information relating to problems (APARs) that were encountered for which no corrective fix was available. These corrective fixes are not integrated in the delivered MVS/SP System IPO and should be reviewed for applicability to your installation.

2) *Setup Phase:*
   The PUT documentation should be carefully reviewed for information regarding the PTFs on the tape and for any changes to PUT processing instructions.

   Any critical fixes that apply to SMP should be installed on the driving system before beginning the system wide maintenance procedure.

   Since the installation of a PUT tape may introduce a large number of fixes to your production system, it is recommended that the changes be made to a copy of that system. The MVS system libraries to be updated by the PUT process are known as the target libraries (or target system).

3) *Install Phase:*
   The PTFs are processed at this time. Highlights of this phase include:

   - "RECEIVE" (an SMP function) puts the maintenance onto the SMPPTS (SYS1.SMPPTS).

   - The list of PTFs to be excluded from the process is completed and the associated SMP control statements are generated

   - "APPLY" (an SMP function) puts the maintenance from the SMPPTS onto the target system and updates the SMPCDS (SYS1.SMPCDS)

4) *Post Phase:*
   After a period of testing the newly installed fixes, two other tasks should be completed. They are:

   - "ACCEPT" (an SMP function) the maintenance into the the system's DLIBs. Since the DLIBs serve as the source for system elements (macros, modules, source code), it is important that they too be updated in sychronization with your production system. If you need to use the DLIBs in a subsequent system generation but have not updated them with ongoing maintenance, the resultant system will be at a lower service level.

   - The maintenance that has been ACCEPTed can be removed from the SMPPTS volume.

The System IPO Service Checker

The Service Checker is a System IPO-provided program used to cross-check the SMP installed maintenance between two MVS systems. While the Service Checker is used primarily when installing a later release of MVS, it can also be used following the installation of maintenance to your 'old' MVS production system. The Service Checker compares records of maintenance activity in the two SMP control data sets checking for differences in service level. It is used to detect a regression of service from one system to another. It assumes that the new MVS SCP is at a higher service level than the old. Therefore, it expects that PTFs existing on the old system have been provided for in the new one. In reporting these service level differences, the Service Checker lists only those differences that may require action by the user.

Complete information on the procedures to be used and the reports that are generated with this program are contained in the *System Guide.* This should be consulted if use of the Service Checker is indicated on your new MVS SCP.

Post-IOGEN Changes to SYSGEN Parameters

System IPO includes procedures to add or change certain SYSGEN related options without performing a SYSGEN.

The items are listed here simply to make you aware of this alternative. Full documentation can be found in the *System Guide*. Figure 4.3 briefly describes the support to be added, names the System IPO provided job, and identifies the related SYSGEN macro and, where applicable, macro parameter.

IPO JOB NAME	PURPOSE	RELATED SYSGEN MACRO
SVCTBL	Initialize SVC table entries for user-provided SVC's	SVCTABLE
PPTUPDT	Update the Program Properties Table	AFFINITY
PWFADD**	Add power warning system support for disk and tape devices with uninterruptable power supplies	CRTLPROG WARN= IO-DEVICE AP=
JESNMT	Update Subsystem Name Table	SCHEDULR

Figure 4.3 IPO Supplied Post-generation Procedures

** Power warning support is normally specifiable only at full SYSGEN. The IPO PWFADD job bypasses the full SYSGEN requirement, but does require coding at IOGEN time. If your installation requires this support, you should code the appropriate values on the WARN and AP parameters in the IOGEN Stage I macro input. Following IOGEN but before IPLing the new system, run the PWFADD job to complete the installation of this support.

IPOCAT Considerations

The following two topics are oriented toward System IPO users who either must use the IPOCAT volume or have elected to use the IPOCAT volume to perform post-generation testing and extensions to the new system.

Updating the New Master Catalog

Users of the MVS master catalog on the IPOCAT volume should update that catalog to incorporate entries from their old system catalog.

Member SYSCATLG in SYS1.NUCLEUS on the IPORES volume is already initialized to identify IPOCAT as the volume containing the Master Catalog for the new system. As delivered, the IPOCAT catalog has entries for the SYS1. and IPO1. data sets that comprise the System IPO based system. The entries in the System IPO supplied catalog allow IPL and functional testing of the newly generated system. System IPO provides two procedures that update the catalog to include entries needed for further installation or reinstallation tasks. One procedure, CATCVTN, is to be used when the old catalog is a non-VSAM system catalog. Procedure CATCVTV is for conversions based upon an existing MVS master catalog or OS/VS1 VSAM master catalog.

Important points to be noted in this process are:

- The catalog conversion should be done before beginning active use of the new catalog

- The new MVS SCP is used to drive this conversion process

- The old catalog must be accessed by the new system

- The old catalog is not altered by the conversion process

- Where duplicate data set names are encountered (as for SYS1. data sets), the old entries will not be carried forward.

Page Data Sets

As with the master catalog, The IPOCAT page data sets have been supplied to enable IPL and limited testing of the new system. As you expand the MVS system to full production status, it is strongly recommended that you spread the placement of page data sets across multiple DASD volumes. Further, as the new system is tuned, your location should evaluate increasing the number of page data sets and consider the use of swap data sets. The *Installation Guide* and *System Guide* document System IPO provisions for page and swap data sets. The *Tuning Guide* and the *Init & Tuning Guide* manual discuss the performance considerations.

Summary

Each installation needs to determine the activities required to complete preparations for extending the MVS SCP to a full production system. This chapter presented information about three such activities.

MVS/SP System IPO based systems are serviced in the same way as any other MVS (release 3.8 or later) system. SMP and PUT processing are integral to the MVS service strategy and are supported by productivity aids within the System IPO based system.

System IPO also supplies procedures for altering certain SYSGEN related options. Most of these procedures can be used whenever the need arises and therefore you can avoid having to plan and perform a SYSGEN to specify or respecify the option.

IPOCAT users need to prepare the master catalog and page data sets to establish an environment that will allow further testing and enhancements to the new system.

Chapter 4 Review

The following review points are arranged in the presentation sequence of the text. Use a separate sheet of paper to record your answers, then compare them to those in the Answers section immediately following this test. The relevant section topic is listed at the end of each answer.

Answer the following True or False.

1. When received at your installation, System IPO will have all available maintenance preinstalled.

2. To service an MVS SCP, a working knowledge of SMP processing is required.

3. PUT processing can not be used to service an MVS system that was generated using System IPO.

4. SVC Table entries can be initialized only during Stage II SYSGEN processing.

   If your installation does not plan to use IPOCAT, you may skip the following questions.

5. The master catalog on IPOCAT should not be altered by additions from your existing catalog.

6. Page data sets should be spread across multiple DASD volumes for better system performance.

Answers to Chapter 4 Review

1. **False.** Only the maintenance available during the System IPO build and verfication processing will be preinstalled. (Servicing a System IPO Based System)

2. **True.** A working knowledge of SMP, plus PUT processing, is required to service an MVS SCP. (Servicing a System IPO Based System)

3. **False.** PUT processing is applicable to all MVS systems. (Servicing a System IPO Based System)

4. **False.** SVC Table entries can be initialized using a System IPO provided post-IOGEN procedure. (Post-IOGEN Changes to SYSGEN Paramters)

5. **False.** System IPO provides conversion procedures to update the IPOCAT master catalog with entries from your existing system catalog. (IPOCAT Considerations)

6. **True.** The page data sets are provided on IPOCAT simply to enable IPL and preliminary testing of the new SCP. Users should determine the best page data set configuration in terms of both placement and numbers. (IPOCAT Considerations)

Glossary

This glossary defines important terms and abbreviations used in this Guide. It does not include all terms established previously for the MVS system control program. If you do not find the term you are looking for, refer to the *IBM Data Processing Glossary*, GC20-1699.

A

APAR. Authorized Program Analysis Report.

APAR fix. A temporary correction usually replaced at a later date by a permanent correction in the form of a PTF.

Authorized Program Analysis Report. A report of a suspected defect in an unaltered current release of a program.

C

catalog. A directory of locations of files and libraries.

channel. A device that connects the processing unit and main storage with the I/O control units.

CICS. Customer Information Control System.

configuration. The collection of devices that make up a data processing system.

console. A part of a computer used for communication between the operator and the computer.

D

DASD. Direct Access Storage Device.

data set. The major unit of data storage and retrieval in the operating system, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access.

distribution libraries (DLIBs). IBM-supplied partitioned data sets containing components for subsequent inclusion in a new system.

distribution tape. A reel of magnetic tape on which IBM sends program or data to a customer.

DLIBs. Distribution libraries.

driving system. The system control program under which system generation processing runs.

E

EDTGEN. Eligible Device Table Generation.

eligible device table generation. The system generation process by which multiple device allocation tables are created.

G

generate. To produce a computer program by selection of subsets from skeletal code under the control of parameters.

I

IMS. Information Management System.

initial program load (IPL). The initialization procedure that causes an operating system to begin operation.

installation verification procedure (IVP). A program that tests whether the newly installed system control program is operational.

I/O. Input/output.

IOGEN. A type of system generation that tailors an existing system control program to a new machine configuration.

IPL. Initial program load.

IPOCAT. One of the volumes comprising the MVS/SP System IPO based system. IPOCAT contains the master catalog, page, JES2, and SMF data sets.

IPODLIB. Volume name of the distribution libraries supplied with System IPO.

IPODVR. The system residence volume for the MVS/SP 3350 IPO driver system.

IPOLIB. A volume required if IPORES is restored to a 3330 Model 1 device. IPOLIB contains those IPO1. data sets not needed to IPL the System IPO based system.

IPORES. One of the volumes comprising the MVS/SP System IPO base system. IPORES contains the pregenerated MVS SCP.

IVP. Installation verification procedure.

J

JES. Job entry subsystem.

job entry subsystem. A system facility for spooling, job queuing, and managing the scheduler work area.

M

maintenance. Any corrective or preventive service activity.

master catalog. A key-sequenced VSAM data set that contains data set and volume information required to locate data sets and to allocate and deallocate storage space.

Model Installation. The IBM internal computer facility where generation and testing of the MVS/SP system control program supplied with System IPO was performed.

MVS. Multiple Virtual Storage.

MVS/SP. MVS System Product.

O

OS/VS1. Operating System/Virtual Storage 1.

P

parameter. Short for keyword parameter. A parameter that consists of a keyword, followed by one or more values.

program product. A licensed IBM program that is added to the generated system control program after installation and testing.

program temporary fix (PTF). A correction to a defect in a current unaltered release of a program.

program update tape (PUT). A service tape containing PTFs and distributed by IBM at approximately monthly intervals.

PTF. Program Temporary Fix.

PUT. Program Update Tape.

S

SCP. System control program.

selectable unit (SU). A collection of new and changed modules and macros that provide added program function or hardware support for MVS.

service checker. A program supplied with System IPO and used to check service level differences between one MVS system control program and another.

SMF. System Management Facilities.

SMP. System Modification Program.

SMPCDS. System Modification Program Control Data Set.

SU. Selectable Unit.

SYSGEN. System Generation.

system generation. The process of selecting components of a system control program to tailor it to the requirements of a data processing installation.

System IPO. System Installation Productivity Option.

System IPO based system. The volumes (IPORES and IPO-CAT) needed to IPL the System IPO-provided system.

System Management Facilities (SMF). An optional control program feature of OS/VS that provides the means for gathering and recording information that can be used to evaluate system usage.

System Modification Program (SMP). An MVS system control program feature used to construct the distribution libraries and to make additions and deletions of service and function to the system control program.

T

target volume. The DASD volume containing system libraries to be updated by IOGEN processing.

TSO. Time Sharing Option.

V

VIO. Virtual I/O.

VSAM. Virtual Storage Access Method.

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