



Application Program

H20-0368-2

System/360 Continuous System

Modeling Program

Operator's Manual

Program Number 360A-CX-16X

This is an IBM System/360 program for the simulation of continuous systems. It provides an application-oriented input language that accepts problems expressed in the form of either an analog block diagram or a system of ordinary differential equations.

This manual contains information and procedures that will enable the user to incorporate the System/360 Continuous System Modeling Program into an Operating System/360 library; to include a procedure in the Operating System/360 procedure library (OS/360 SYS1.PROCLIB); and subsequently to execute S/360 CSMP under the control of, and using the services of, OS/360.

CONTENTS

Compiling and Link Editing	1
Basic Distribution	2
Optional Distribution	3
Modifying DEJCSMP2	5
S/360 CSMP Cataloged Procedure	6
Console Operating Instructions	11
Halts and Message List	11
Storage Map	11
Restart Procedures.	14
Execution Phase Load Module Storage	15

Third Edition

This edition, H20-0368-2, is a major revision obsoleting H20-0368-1. It applies to Version 1, Modification Level 2, of System/360 Continuous System Modeling Program (360A-CX-16X) and to Release 16 of OS/360. It applies to subsequent versions and modifications of S/360 CSMP until otherwise indicated in new editions or Technical Newsletters.

Changes are continually made to the specifications herein. Therefore, before using this publication, check the latest System/360 SRL Newsletter, N20-0360, for the editions that are applicable and current.

Copies of this and other IBM publications can be obtained through IBM branch offices.

A form is provided at the back of this book for readers' comments. If this form has been removed, address comments concerning the contents of this publication to IBM, Technical Publications Department, 112 East Post Road, White Plains, N. Y. 10601

COMPILING AND LINK EDITING

The process of incorporating the System/360 Continuous System Modeling Program into a private library of the OS/360 module library SYS1.LINKLIB is relatively straightforward. It is expected that the individual who is responsible for the installation and maintenance of S/360 CSMP will be reasonably familiar with OS/360 and its associated procedures.

S/360 CSMP, as distributed by IBM, consists of:

1. Basic material -- the object modules, link-edit control cards, sample problem, OS/360 control cards, and assembly source for DEJCSMP2.

<u>File</u>	<u>DS Name</u>	<u>Members</u>	<u>Description</u>
1	CSMP.OBJMOD	All S/360 CSMP subroutines by subroutine name	Object card images
2	CSMP.SYMBM	TRANMOD (108K region)	Primary link-edit input for creating S/360 CSMP translation phase load modules
		TRANMIN (96K region)	
		EXECMOD	Primary link-edit input for creating S/360 CSMP execution phase load modules
3	CSMP.DECKS	CTLCDs	Primary link-edit input used by sample procedure
		SAMPLE	Cable reel problem input deck
		JCLCARDS	OS/360 control cards for Figures 3 - 8
		DEJCSMP2	Assembly source cards for DEJCSMP2

2. Optional material -- FORTRAN and assembly source modules

<u>File</u>	<u>DS Name</u>	<u>Members</u>	<u>Description</u>
1	CSMP.SOURCE	All S/360 CSMP subroutines by subroutine name	Source card images

Both basic and optional material is distributed on nine-track magnetic tapes as unloaded partitioned data sets (PDS).

Basic Distribution

To link-edit the object modules as distributed:

1. Mount the basic distribution tape containing S/360 CSMP on a nine-track tape drive (Figure 1 presumes use of unit 283).
2. Run the OS/360 control cards and data, prepared as shown in Figure 1, as a normal OS/360 batch job. If a unit other than 283 has been used for the basic distribution tape, modify the DD card for TAPE1 accordingly. This run will load the entire contents of the distributed tape onto a direct access device (DASD).
3. Run the OS/360 control cards and associated data, prepared as shown in Figure 2, as a normal OS/360 batch job. This will punch the sample problem, control cards, and data corresponding to Figures 3 - 8, and also the source deck for DEJCSMP2. Interpret the decks produced; note that each deck is identified in cc 73-80. Replace cards FIG5A 100 and FIG6 007 with end-of-file cards to correspond with Figures 5a and 6.
4. Select the deck identified as FIG6. Modify the control cards of this deck to reference the desired data set name and volume serial number (this is illustrated in Figure 6). If the generated system is to operate in a restricted region (96K) or on a 128K machine with a 32K resident system, card FIG6 100 must be changed to use member TRANMIN. Run the modified control cards as a normal OS/360 batch job. This will create load modules for the translation and execution phases of S/360 CSMP.
5. After creation of the load modules, the object module data set may be scratched to save space on the DASD. This may be done by running control cards 1 - 4 of deck FIG6 (see Figure 6) followed by the data card

SCRATCHVOL=2311=CSMPDK, DSNAME=CSMP. OBJMOD

S/360 CSMP models may now be executed by following the procedure given under "S/360 CSMP Cataloged Procedure".

```

//SCRATCH EXEC PGM=IEHPRGM                                FIG1  1
//DD1 DD VOLUME=SER=CSMPDK,DISP=OLD,UNIT=SYSDA           FIG1  2
//SYSPRINT DD SYSOUT=A                                   FIG1  3
//SYSIN DD *                                             FIG1  4
    SCRATCH VOL=2311=CSMPDK,DSNAME=CSMP.OBJMOD           FIG1  5
    SCRATCH VOL=2311=CSMPDK,DSNAME=CSMP.SYMBM            FIG1  6
    SCRATCH VOL=2311=CSMPDK,DSNAME=CSMP.DECKS            FIG1  7
/*                                                       FIG1  8
//LOADPDS EXEC PGM=IEHMOVE                                FIG1 10
//SYSPRINT DD SYSOUT=A                                   FIG1 20
//TAPE1 DD UNIT=(283,,DEFER),VOLUME=SER=CSMP,LABEL=(,NL),DISP=(OLD, *FIG1 30
//          PASS),DCB=(DEN=2,DSORG=PO,RECFM=FB,BLKSIZE=800,LRECL=80) FIG1 40
//DISK DD UNIT=2311,VOLUME=SER=CSMPDK,DISP=(OLD,KEEP)   FIG1 50
//SYSUT1 DD UNIT=2311,DISP=OLD,VOLUME=SER=CSMPDK        FIG1 60
//SYSIN DD *                                             FIG1 70
COPY TO=2311=CSMPDK,FROM=2400=(CSMP,1),FROMDD=TAPE1,PDS=CSMP.OBJMOD FIG1 80
COPY TO=2311=CSMPDK,FROM=2400=(CSMP,2),FROMDD=TAPE1,PDS=CSMP.SYMBM FIG1 90
COPY TO=2311=CSMPDK,FROM=2400=(CSMP,3),FROMDD=TAPE1,PDS=CSMP.DECKS FIG1 100

```

Figure 1. Control cards and data for loading CSMP partitioned data sets onto a DASD. NOTE: Figures 1 through 6 all presume the use of 2311 direct access units and 2400 tape drives; for other configurations the control and data cards referred to in this manual must be modified accordingly.

```

//PRTPUN EXEC PGM=IEBTPCH FIG2 10
//SYSPRINT DD SYSOUT=A FIG2 20
//SYSUT1 DD UNIT=2311,VOLUME=SER=CSMPDK,DISP=(OLD,KEEP), *FIG2 30
// DSNAME=CSMP.DECKS FIG2 40
//SYSUT2 DD UNIT=SYSCP FIG2 50
//SYSIN DD * FIG2 60
PUNCH TYPRG=PO,MAXNAME=3 FIG2 70
MEMBER NAME=SAMPLE FIG2 80
MEMBER NAME=JCLCARDS FIG2 90
MEMBER NAME=DEJCSMP2 FIG2 100

```

Figure 2. Control cards for punching or printing from partitioned data sets. NOTE: Data shown is for punching sample problem, JCL cards, and source for DEJCSMP2. This procedure may be modified to print or punch any members of the CSMP system data sets (that is CSMP.SYMBM, CSMP.OBJMOD, or CSMP.SOURCE).

Optional Distribution

To update the source and object modules:

1. Mount the DASD containing the S/360 CSMP system. If the object module data set has been scratched to conserve space on the DASD, first run steps 1 and 2 given under "Basic Distribution" using control and data cards FIG1 10-80.
2. Mount the optional distribution tape on a nine-track tape drive. To control cards FIG1 10-70, add the following data card:

```
COPY TO=2311=CSMPDK, FROM=2400=(CSMP,1), FROMDD=TAPE1, PDS=CSMP.SOURCE
```

Run the deck as a normal OS/360 batch job; this will load the source decks onto the DASD.

3. Select the deck identified as FIG3. Add appropriate data to change or delete source statements as required (this is illustrated in Figure 3). Run the modified control cards as a normal OS/360 batch job. This will update the source programs. (NOTE: Individual source decks may be punched using cards prepared as shown in Figure 2, if desired. See note to Figure 2. After modification, source decks may be re-entered using the REPL statement with Figure 3.)
4. Compile or assemble the desired source module by submitting the deck identified as FIG4A or FIG4B (see Figures 4a and 4b). This will result in updated object module.

```

//UPDATE EXEC PGM=IEBUPDTE FIG3 10
//SYSUT1 DD DSNAME=CSMP.SOURCE,UNIT=2311,VOLUME=SER=CSMPDK, *FIG3 20
// DISP=(OLD,KEEP),DCB=(RECFM=FB,LRECL=80,BLKSIZE=1680) FIG3 30
//SYSUT2 DD DSNAME=CSMP.SOURCE,UNIT=2311,VOLUME=SER=CSMPDK, *FIG3 40
// DISP=(OLD,KEEP),DCB=(RECFM=FB,LRECL=80,BLKSIZE=1680) FIG3 50
//SYSPRINT DD SYSOUT=A FIG3 60
//SYSIN DD * FIG3 70
./ CHANGE LIST=ALL,SEQFLD=774,NAME=STATUS
IFIRST=5 STAT 270
./ ENDUP

```

Figure 3. Updating CSMP partitioned data set members. NOTE: The example shown will change a card in the STATUS subroutine and list the revised member (see IBM System/360 Operating System Utilities, C28-6586, for complete updating capability). NOTE ALSO: Modifications to these cards to refer to CSMP.OBJMOD or CSMP.SYMBM will allow changes or replacement of object decks or link edit primary input members.

```

//COMP EXEC PGM=IEKAA00,PARM='MAP,DECK,OPT=2' FIG4A 10
//SYSPRINT DD SYSOUT=A FIG4A 20
//SYSPUNCH DD UNIT=SYSCP FIG4A 30
//SYSUT1 DD UNIT=SYSDA,SPACE=(TRK,(20,10)) FIG4A 40
//SYSUT2 DD UNIT=SYSDA,SPACE=(TRK,(20,10)) FIG4A 50
//SYSLIN DD UNIT=SYSDA,DCB=(RECFM=FB,LRECL=80,BLKSIZE=1680),DISP=OLD,*FIG4A 60
// VOLUME=SER=CSMPDK,DSNAME=CSMP.OBJMOD(STATUS) FIG4A 70
//SYSIN DD UNIT=SYSDA,DISP=OLD,VOLUME=SER=CSMPDK,*FIG4A 80
// DSNAME=CSMP.SOURCE(STATUS) FIG4A 90

```

Figure 4a. Control cards for creating an object module from a FORTRAN source module. NOTE: This example uses FORTRAN IV (Level H, opt 2) to compile subroutine STATUS. The output object replaces the STATUS member in the object module data set and is also punched out. Modify these control cards for the desired compiler options and CSMP.SOURCE member.

```

//ASSMB EXEC PGM=IEUASM,PARM='LOAD,DECK' FIG4B 10
//SYSLIB DD DSNAME=SYS1.MACLIB,DISP=OLD FIG4B 20
//SYSUT1 DD UNIT=SYSDA,SPACE=(1700,(400,50)) FIG4B 30
//SYSUT2 DD UNIT=SYSDA,SPACE=(1700,(400,50)) FIG4B 40
//SYSUT3 DD UNIT=SYSDA,SPACE=(1700,(400,50)) FIG4B 50
//SYSPRINT DD SYSOUT=A FIG4B 60
//SYSPUNCH DD UNIT=SYSCP FIG4B 70
//SYSGO DD UNIT=SYSDA,DCB=(RECFM=FB,LRECL=80,BLKSIZE=1680),DISP=OLD,*FIG4B 80
// VOLUME=SER=CSMPDK,DSNAME=CSMP.OBJMOD(DEJCSMP2) FIG4B 90
//SYSIN DD UNIT=SYSDA,DISP=OLD,VOLUME=SER=CSMPDK,*FIG4B100
// DSNAME=CSMP.SOURCE(DEJCSMP2) FIG4B110

```

Figure 4b. Control cards for creating an object module from an assembly source module. NOTE: This example uses the OS assembler to obtain object output for DEJCSMP2. The output object replaces the DEJCSMP2 member in the object module data set and is also punched out.

5. Select the deck identified as FIG6. Modify the control cards of this deck to reference the desired data set and volume serial number (this is illustrated in Figure 6). Run the modified control cards as a normal OS/360 batch job. This will create load modules for the translation and execution phases of S/360 CSMP.
6. S/360 CSMP models may now be executed by following the procedure given under "S/360 CSMP Cataloged Procedure". However, it is good practice to first create a "restore tape" containing the updated source and object modules. Run the control cards and data identified as deck FIG5A (see Figure 5a) as an OS/360 batch job. This will create a "restore tape" and scratch or remove the source and object modules from the DASD.
7. If subsequent modification of S/360 CSMP is required, mount the "restore tape" created in step 6 and run the deck identified as FIG5B as a normal OS/360 batch job. Then proceed with steps 3 - 6 above.

```

//UNLOAD EXEC PGM=IEHMOVE FIG5A 10
//SYSPRINT DD SYSOUT=A FIG5A 20
//DISK DD UNIT=2311,VOLUME=SER=CSMPDK,DISP=(OLD,KEEP) FIG5A 30
//TAPE3 DD UNIT=(184,,DEFER),VOLUME=SER=CSMP,LABEL=(,NL),DISP=(NEW, FIG5A 40
// PASS),DCB=(DEN=2,DSORG=PO,RECFM=FB,BLKSIZE=800,LRECL=80) FIG5A 50
//SYSUT1 DD UNIT=2311,DISP=OLD,VOLUME=SER=CSMPDK FIG5A 60
//SYSIN DD * FIG5A 70
COPY TO=2400=(CSMP,1),TODD=TAPE3,FROM=2311=CSMPDK,PDS=CSMP.OBJMOD FIG5A 80
COPY TO=2400=(CSMP,2),TODD=TAPE3,FROM=2311=CSMPDK,PDS=CSMP.SOURCE FIG5A 90
/* FIG5A100
//SCRATCH EXEC PGM=IEHPRGM FIG5A110
//DD1 DD VOLUME=SER=CSMPDK,DISP=OLD,UNIT=SYSDA FIG5A120
//SYSPRINT DD SYSOUT=A FIG5A130
//SYSIN DD * FIG5A140
SCRATCH VOL=2311=CSMPDK,DSNAME=CSMP.OBJMOD FIG5A150
SCRATCH VOL=2311=CSMPDK,DSNAME=CSMP.SOURCE FIG5A160

```

Figure 5a. Control cards for unloading the source and object data sets onto a tape and to scratch them from the DASD

```

//LDPDS EXEC PGM=IEHMOVE FIG5B 10
//DISK DD UNIT=2311,VOLUME=SER=CSMPDK,DISP=(OLD,KEEP) FIG5B 20
//TAPE3 DD UNIT=(184,,DEFER),VOLUME=SER=CSMP,LABEL=(,NL),DISP=(OLD, *FIG5B 30
// PASS),DCB=(DEN=2,DSORG=PO,RECFM=FB,BLKSIZE=800,LRECL=80) FIG5B 40
//SYSUT1 DD UNIT=2311,DISP=OLD,VOLUME=SER=CSMPDK FIG5B 50
//SYSPRINT DD SYSOUT=A FIG5B 60
//SYSIN DD * FIG5B 70
COPY TO=2311=CSMPDK,FROM=2400=(CSMP,1),FROMDD=TAPE3,PDS=CSMP.OBJMOD FIG5B 80
COPY TO=2311=CSMPDK,FROM=2400=(CSMP,2),FROMDD=TAPE3,PDS=CSMP.SOURCE FIG5B 90

```

Figure 5b. Control cards for loading source and object modules onto a DASD from a tape

```

//LOADMOD EXEC PGM=IEHPRGM FIG6 1
//DD1 DD VOLUME=SER=CSMPDK,DISP=OLD,UNIT=SYSDA FIG6 2
//SYSPRINT DD SYSOUT=A FIG6 3
//SYSIN DD * FIG6 4
SCRATCH VTOC,VOL=2311=CSMPDK,PURGE,SYS FIG6 5
SCRATCH VOL=2311=CSMPDK,DSNAME=CSMP.LOADM FIG6 6
/* FIG6 7
//TRMOD EXEC PGM=IEWL,PARM='MAP,OVLY,DC,SIZE=(80K,6K)',REGION=96K FIG6 10
//SYSPRINT DD SYSOUT=A FIG6 20
//SYSLIB DD DSNAME=SYS1.FORTLIB,DISP=OLD FIG6 30
//SYSLMOD DD DSNAME=CSMP.LOADM,UNIT=SYSDA,DISP=(NEW,CATLG), *FIG6 40
// SPACE=(TRK,(100,50,12)),VOLUME=SER=CSMPDK FIG6 50
//SYSUT1 DD UNIT=SYSDA,SPACE=(TRK,(30,10)) FIG6 60
//OBJLIB DD DSNAME=CSMP.OBJMOD,UNIT=SYSDA,DISP=(OLD,PASS), *FIG6 70
// VOLUME=SER=CSMPDK,DCB=(RECFM=FB,LRECL=80,BLKSIZE=1680) FIG6 80
//SYSLIN DD UNIT=SYSDA,DISP=(OLD,KEEP),VOLUME=SER=CSMPDK, *FIG6 90
// DSNAME=CSMP.SYMBM(TRANMOD) FIG6 100
//EXMOD EXEC PGM=IEWL,PARM='MAP,NCAL,DC,SIZE=(80K,6K)',REGION=96K FIG6 110
//SYSPRINT DD SYSOUT=A FIG6 120
//SYSLIB DD DSNAME=SYS1.FORTLIB,DISP=OLD FIG6 130
//SYSLMOD DD DSNAME=CSMP.LOADM,UNIT=SYSDA,DISP=(OLD,KEEP), *FIG6 140
// SPACE=(TRK,(100,50,12)),VOLUME=SER=CSMPDK FIG6 150
//SYSUT1 DD UNIT=SYSDA,SPACE=(TRK,(30,10)) FIG6 160
//OBJLIB DD DSNAME=CSMP.OBJMOD,UNIT=SYSDA,DISP=(OLD,PASS), *FIG6 170
// VOLUME=SER=CSMPDK,DCB=(RECFM=FB,LRECL=80,BLKSIZE=1680) FIG6 180
//SYSLIN DD UNIT=SYSDA,DISP=(OLD,KEEP),VOLUME=SER=CSMPDK, *FIG6 190
// DSNAME=CSMP.SYMBM(EXECMOD) FIG6 200

```

Figure 6. Control cards for creating load modules on DASD. NOTE: CSMP.LOADM is the name of the data set that will contain the modules required by the sample procedure. CSMPDK is the serial number of the direct access device required by the sample procedure. If your procedure is different from the sample procedure, these control cards must be modified accordingly. NOTE ALSO: The IEW0201 warning message will print after link edit of module DEJCSMP2 and can be ignored. It is assumed that IEWL invokes the F level linkage editor; the E level linkage editor of Releases 15-16 of OS/360 cannot be used.

Modifying DEJCSMP2

As distributed, DEJCSMP2 attaches FORTRAN IV, Level G (entry point IEYFORT), as the second of the four program phases. If Level E or H is to be used, DEJCSMP2 must be modified to attach to the appropriate compiler. If the optional distribution tape is available, the modification may be performed using the technique previously described under "Optional Distribution". If only the basic distribution tape is available, the modification can be performed as follows:

1. Modify the source deck of DEJCSMP2 punched from step 3 under "Basic Distribution" to attach to the desired compiler.
2. Using the modified DEJCSMP2 program, run an OS/360 Assembler job with the deck option.

3. Link-edit the resulting object deck using control cards FIG6 110-160 followed by the set of cards:

```
//SYSLIN DD *
```

Object cards

```
NAME      DEJCSMP2(R)
```

```
/*
```

Note that step 3 may also be used for permanently adding user-supplied subroutines to supplement the set of S/360 CSMP functional elements. The NAME card should be supplied with the appropriate name for the new subroutine.

S/360 CSMP CATALOGED PROCEDURE

To minimize the number of OS/360 control cards required to run S/360 CSMP, and to standardize the units used by S/360 CSMP at a given computer installation, it is suggested that a standard procedure be incorporated into the OS/360 SYS1.PROCLIB. All S/360 CSMP users at a given installation could then use this procedure to run the program.

The OS/360 utility program IEBUPDTE, which should be used to place procedures in the OS/360 SYS1.PROCLIB library, is described in the manual IBM System/360 Operating System Utilities (C28-6586).

A sample procedure for running S/360 CSMP is illustrated in Figure 7. This procedure, or one modified to reflect the facilities of the installation, should be cataloged in the OS/360 SYS1.PROCLIB using the series of OS/360 control cards and input stream illustrated in Figure 8.

The procedure shown in Figure 7 is based on the following assumptions:

1. S/360 CSMP is on a private library.
2. The name of the data set containing S/360 CSMP load modules is CSMP.LOADM.
3. The name of the data set member containing the link-editor control cards is CTLCDS.
4. The direct access device serial number is CSMPDK.

If any of these assumptions are not true, cards numbered FIG7 210 and FIG7 220, shown in Figure 7, should be changed accordingly.

To run S/360 CSMP using the procedure cataloged above, the OS/360 input stream must consist of the control cards and S/360 CSMP input shown in Figure 9. The assumptions are the same as those for the procedure illustration (Figure 7), with the additional assumption that the name of the cataloged procedure is CSMP360. If S/360 CSMP is in the OS/360 SYS1.LINKLIB, the JOBLIB DD control card shown in Figure 9 is not necessary. If the S/360 CSMP input statements are contained on a magnetic tape, the // CSMP1.SYSIN DD* card should be changed to // CSMP1.SYSIN DD (parameters identifying tape and unit, and describing tape makeup). Note that under certain circumstances, several S/360 CSMP jobs can be stacked as one OS/360 job. Some comments on this possibility are made later in this section.

Any of the control statements in the cataloged procedure may be temporarily modified during the run of a particular job. The method for doing this is described under "Overriding Cataloged Procedures" in the manual IBM System/360 Operating System: FORTRAN IV (G) Programmer's Guide (C28-6639).

The operation of S/360 CSMP requires several data sets. The required data sets are defined by OS/360 DD statements at run time, as shown in the sample procedure in Figure 7. The DD statements specify the unit that the data sets will occupy, the space required by the data sets, and the disposition of the data sets upon completion of the S/360 CSMP run.

The data sets used are:

<u>FT02F001</u>	Output data set used to punch the symbolic deck if DECK option is chosen.
<u>FT01F001</u>	Input data set equated to SYSIN. (SYSIN is the normal input data set containing the models.)
<u>FT06F001</u>	SYSOUT data set for translation and execution phases.
<u>FT07F001</u>	Output data set used as input to FORTRAN compiler.

<u>FT05F001</u>	Output data set containing data cards used as input by execution phase.
<u>FT13F001</u> <u>FT14F001</u>	Intermediate scratch data sets.
<u>FT15F001</u>	Output data set containing plot information if PREPAR is used.
<u>SYSPRINT</u>	SYSOUT data set for link editor phase.
<u>COMPRINT</u>	SYSOUT data set for FORTRAN compile phase.
<u>SYSLIN</u>	Output from FORTRAN compiler which will be input to LINK editor.
<u>SYSLINK</u>	Input data set to LINK EDITOR; includes output data set from FORTRAN and data set containing control cards.
<u>SYSLIB</u>	Library data set.
<u>SYSLMOD</u>	Output data set from LINK EDITOR containing execution phase load module.

In the sample procedure shown in Figure 7, note that all data sets except FT15F001 are assigned to direct access devices. This is recommended for speed but is not necessary. All may be assigned to tapes, if available, with the exception of SYSLMOD, which must be on a direct access device.

When using the ENDJOB STACK feature for stacking models, it must be understood that, if a plot tape is being written using the PREPAR option, the tape will be rewound before the execution of each new model. This means that only the output from the last such model will be available after S/360 CSMP returns to OS/360.

The number of models that may be stacked is limited by the amount of space assigned on the SYSLMOD DD card. The space assignment in the sample procedure should be sufficient for stacking eight to ten models. If a SYSABEND with system code E37 should occur, the space assigned was not sufficient for the number of models stacked. This situation would then require separate stacks for long jobs.

For stacking jobs that utilize the PREPAR option, and for all system configurations in which the card reader is not SYSIN, an alternate procedure is used for stacking jobs. This is illustrated in Figure 10.

```

//CSMP1 EXEC PGM=DEJCSMP2,REGION=108K FIG7 10
//FT02F001 DD UNIT=SYSCP,DCB=(RECFM=F,BLKSIZE=80) FIG7 20
//FT06F001 DD SYSOUT=A,DCB=(,RECFM=UA) FIG7 30
//FT07F001 DD UNIT=SYSDA,SPACE=(TRK,(40,10)),DCB=(RECFM=F,BLKSIZE=80) FIG7 40
//FT05F001 DD UNIT=SYSDA,SPACE=(TRK,(40,10)),DCB=(RECFM=F,BLKSIZE=80) FIG7 50
//FT13F001 DD UNIT=SYSDA,SPACE=(TRK,(40,40)), *FIG7 80
// DCB=(RECFM=V,LRECL=200,BLKSIZE=204) FIG7 90
//FT14F001 DD UNIT=SYSDA,SPACE=(TRK,(40,40)), *FIG7 100
// DCB=(RECFM=V,LRECL=200,BLKSIZE=204) FIG7 110
//FT15F001 DD UNIT=(SYSSQ,,DEFER),DSNAME=&PLOTPE,DISP=(NEW,PASS), *FIG7 120
// LABEL=(,NL),VOLUME=SER=SCRATCH,SPACE=(TRK,(40,10)) FIG7 130
//SYSPRINT DD SYSOUT=A FIG7 140
//COMPRINT DD SYSOUT=A FIG7 150
//SYSUT1 DD UNIT=SYSDA,SPACE=(TRK,(40,10)) FIG7 160
//SYSUT2 DD UNIT=SYSDA,SPACE=(TRK,(40,10)) FIG7 170
//SYSLIN DD UNIT=SYSDA,SPACE=(TRK,(30,10)) FIG7 180
//SYSLINK DD DSNAME=*.SYSLIN,DISP=(OLD,PASS),UNIT=SYSDA, *FIG7 190
// VOLUME=REF=*.SYSLIN FIG7 200
// DD DSNAME=CSMP.SYMBM(CTLCDS),UNIT=SYSDA,DISP=OLD,VOLUME=SER=CSMPDK FIG7 210
//SYSLIB DD DSNAME=CSMP.LOADM,DISP=OLD,UNIT=SYSDA,VOLUME=SER=CSMPDK FIG7 220
// DD DSNAME=SYS1.FORTLIB,DISP=OLD FIG7 230
//SYSLMOD DD DSNAME=&NOSET(DEJEXE),UNIT=SYSDA,SPACE=(TRK,(50,20,1)) FIG7 240
//FT01F001 DD DDNAME=SYSIN FIG7 250

```

Figure 7. Sample procedure. NOTE: COMPRINT is the SYSOUT DD for the FORTRAN compiler. SYSPRINT is the SYSOUT DD for the link editor.

```

//PROCD EXEC PGM=IEBUPDTE FIG8 10
//SYSPRINT DD SYSOUT=A FIG8 20
//SYSUT1 DD DSNAME=SYS1.PROCLIB,UNIT=SYSDA,DISP=(OLD,KEEP) FIG8 30
//SYSUT2 DD DSNAME=SYS1.PROCLIB,UNIT=SYSDA,DISP=(OLD,KEEP) FIG8 40
//SYSIN DD * FIG8 50
./ ADD LIST=ALL,NAME=CSMP360
INSERT FIGURE 7 CARDS HERE
./ ENDUP

```

Figure 8. Control cards for adding CSMP procedure to the procedure library. NOTE: Use the REPL feature if this procedure is to replace an existing procedure.

```

//JOBX JOB ACC.NO.,PROG.,MSGLEVEL=1
//JOBLIB DD DSNAME=CSMP.LOADM,DISP=(OLD,PASS),VOLUME=SER=CSMPDK, *
// UNIT=SYSDA
//STEP1 EXEC PROC=CSMP360
//CSMP1.SYSIN DD *

( S/360 CSMP STATEMENTS FOR MODEL 1 )

ENDJOB STACK
( BLANK CARD )

( S/360 CSMP STATEMENTS FOR MODEL 2 )

ENDJOB STACK
( BLANK CARD )

( S/360 CSMP STATEMENTS FOR MODEL 3 )

.
.
.
( S/360 CSMP STATEMENTS FOR MODEL N )

ENDJOB
/*

```

Figure 9. User-supplied cards at run time

```

//JOBX   JOB   ACC.NO.,PROG.,MSGLEVEL=1
//JOBLIB DD   DSNAME=CSMP.LOADM,DISP=(OLD,PASS),VOLUME=SER=CSMPDK,   *
//      DD   UNIT=SYSDA
//STEP1  EXEC  PROC=CSMP360
//CSMP1.SYSIN DD *

      ( S/360 CSMP STATEMENTS FOR MODEL 1 )

ENDJOB
/*
//STEP2  EXEC  PROC=CSMP360
//CSMP1.FT15F001 DD UNIT=(SYSSQ,,DEFER),DSNAME=&PLOTPE,DISP=(OLD,PASS),*
//      DD   LABEL=(2,NL),VOLUME=SER=SCRATCH,SPACE=(TRK,(40,10))
//CSMP1.SYSIN DD *

      ( S/360 CSMP STATEMENTS FOR MODEL 2 )

ENDJOB
/*
//STEP3  EXEC  PROC=CSMP360
//CSMP1.FT15F001 DD UNIT=(SYSSQ,,DEFER),DSNAME=&PLOTPE,DISP=(OLD,PASS),*
//      DD   LABEL=(3,NL),VOLUME=SER=SCRATCH,SPACE=(TRK,(40,10))
//CSMP1.SYSIN DD *

      ( S/360 CSMP STATEMENTS FOR MODEL 3 )
      .
      .
      .
      ( S/360 CSMP STATEMENTS FOR MODEL N )

ENDJOB
/*

```

Figure 10. User-supplied cards at run time. Note method for stacking jobs. This method must be used if more than one job uses PREPAR or for those configurations in which SYSIN is not the card reader.

CONSOLE OPERATING INSTRUCTIONS

S/360 CSMP source statements with the appropriate OS/360 job control language and DD control cards, as outlined and described in this manual, are submitted as a normal job for batch processing under OS/360.

No special or additional console operating instructions are required when running S/360 CSMP jobs, other than the normal procedures associated with OS/360.

HALTS AND MESSAGE LIST

There are no halts in S/360 CSMP. The Operating System/360 may cause a halt during the running of S/360 CSMP. If this should happen, action should be taken in accordance with the Operating System/360 instructions. Any action required of the operator will be requested by Operating System/360, not by S/360 CSMP.

Diagnostic messages may occur during the running of a S/360 CSMP model. The User's Manual contains a complete list and description of these messages. The run may be terminated prematurely; however, control will be returned to the OS/360 so that the next job may be processed.

STORAGE MAP

The region size required for execution of the CSMP system in an MVT environment is determined by the maximum of the requirements for each of the four phases: translator, compiler, linkage editor, and execution. If the FORTRAN G compiler (96K region) and the 88K Linkage Editor F (96K region) are invoked, the translator will normally be the maximum requirement. The sample procedure (Figure 7) and the TRANMOD overlay structure will operate in a region size of approximately 108K. The TRANMIN overlay structure, which requires a region size of approximately 96K, may be used in place of TRANMOD with a slight increase in translator running time. The execution phase requirement, which is dependent on the size of the model (the number of variable names required for the symbol table plus the core required for UPDATE and user-supplied subroutines), is usually less than the translator requirement except for very large models. Increasing the data set block sizes will require a corresponding increase in region size.

The approximate sizes of the individual S/360 CSMP routines presented in this section are in hexadecimal bytes. Where the source language was FORTRAN, the level H compiler with optimization was used to create the distributed object modules. The load modules described in this section are those created by step 4 of the Basic Distribution procedures.

Control program for all phases: Load module DEJCSMP2
DEJCSMP2 308

The TRANMOD overlay contains the following System/360 CSMP object module placement.

Translation phase routines always present in core during translation:

SHIFT	42
BOOLE	70
INTRP	1A2
CSMPST	4AC
BUILD	396
MOVE	1C2
CONTIN	220
CSTORE	3D8
CKSTOR	22E
STORE	18C
SSTORE	18C
NTOBCD	1E0
NAME	1A4
SPLIT1	36C
SPLIT	274
TRANSA	182
COMMON	AB20
TRMAIN	A8

Translation phase first overlay:

BCDIST	FFC
--------	-----

Translation phase second overlay:

RMACST	1306
DAST	B60
STRUST	DDC
MMACST	EC4
INTGST	E5E
IMPL1ST	658
STORST	462
SCAN	D64

Translation phase third overlay

SEQUEST	16A6
GEN1ST	E52

Translation phase fourth overlay:

GEN2ST	2A00
--------	------

The translator load module, which also includes FORTRAN Library routines, has the following approximate size:

DEJCSMPT	17DB8 (TRANMOD overlay)
	14FD8 (TRANMIN overlay)

Each of the following overlay segments was link-edited separately and stored in the CSMP load module data set.

Execution phase routines always present in core during execution:

DEJROOT load module

MAINEX	1B8
MAIN	AA
CSTORE	3D8
SHIFT	42
BOOLE	70
COMMON	9924 (minimum)

Execution phase first overlay: DEJALPH1

INITLZ	6D0
--------	-----

Execution phase second overlay: DEJALPH2

STATUS	A92
SIMOUT	14EA

First sub-overlay: DEJBETA1

F	1C0
MILNE	D74

Second sub-overlay: DEJBETA2

RKS	9E4
ADAMS	364

Third sub-overlay: DEJBETA3

RECT	15C
TRAPZ	278
SIMP	2D6
NOCENT	128

Fourth sub-overlay: DEJBETA4

CENTRL	D90
--------	-----

Execution phase third overlay: DEJALPH3

PLOTR	9FC
RANG1	26E

Execution phase fourth overlay: DEJALPH4

INTRAN	19C0
CKSTOR	22E
NUMER	850
BUILDR	214
SPLITR	2B0

First sub-overlay: DEJGAMM1

ALPHA	62A
-------	-----

Second sub-overlay: DEJGAMM2

RANG2	3A6
-------	-----

Note: The overlay load modules are link-edited together with UPDATE, CSMP functions as called, and user-supplied routines during the linkage editor phase of a CSMP run. The size of the executable load module, member name DEJEXE, is model-dependent.

The following execution phase function routines were link-edited and stored as individual load modules with member names the same as the function names:

DEBUG	A16
DELAY	586
DERIV	2EC
IMPL	342
IMPULS	23E
ZHOLD	11E
RST	168
PULSE	196
RNDGEN	112
AFGEN	4D8
SINE	154
RAMP	AC
NLFGEN	594
GAUSS	1D8
QNTZR	158
DEADSP	DC
INSW	AA
COMPAR	A8
OUTSW	E6
FCNSW	CE
LIMIT	CE
STEP	A4
HSTRSS	18A
AND	B0
IOR	B0
EOR	C2
NOR	B0
NAND	B0
NOT	96
EQUIV	C2
RERUN	14A

RESTART PROCEDURES

If S/360 CSMP detects a source statement error during any phase of processing, an indication of the error will be given with accumulated output (if any) up to the point when the error was detected. The run will be terminated automatically and control returned to OS/360. To successfully execute the S/360 CSMP model, the user must eliminate the error and resubmit the job.

EXECUTION PHASE LOAD MODULE STORAGE

The Execution Phase load module for a particular model may be stored under a unique data set name. This feature is useful when a simulation model is to be run frequently without change of the structure statements, but with many different parameter values or control options. The DECK label followed by the name SYMBOLS creates a data set (FT02F001) containing the symbol table required by the execution phase. The control cards in Figure 11, used with the sample procedure, will store the symbol table and executable load module for the particular model and then execute that load module as in the cataloged procedure for the data and control cards supplied with the run.

```
//CSMP JOB
//JOB LIB DD DSN=CSMP.LCADM,UNIT=SYSDA,DISP=(OLD,PASS),VOL=SER=CSMPDK
//STEP1 EXEC PROC=CSMP360
//CSMP1.FT02F001 DD UNIT=SYSDA,SPACE=(TRK,(0,1)),DISP=(NEW,KEEP), C
// DSN=CSMP.SYMB.CABLE,VOLUME=SER=CSMPDK, C
// DCB=(RECFM=F,BLKSIZE=80)
//CSMP1.SYSLMOD DD UNIT=SYSDA,SPACE=(TRK,(20,20,1)),DISP=(NEW,KEEP), C
// DSN=CSMP.CABLE(DEJEXE),VOLUME=SER=CSMPDK
//CSMP1.SYSIN DD *
DECK SYMBOLS
* CSMP MODEL , STORED UNDER DATA SET NAME CSMP.CABLE
* SYMBOL TABLE STORED UNDER DATA SET NAME CSMP.SYMB.CABLE
* MODEL FOLLOWS
```

Figure 11. Execution Phase Load Module Data Set Storage. NOTE: The data set names are chosen by the user to identify his particular model. The member name DEJEXE, however, is required by the CSMP system.

The Execution Phase of S/360 CSMP may then be executed without again performing translation, compilation, or link editing. The control cards in Figure 12, followed by appropriate data and execution control cards, are required to execute the stored load module for a particular model.

```
//CSMP EXEC JOB
//JOB LIB DD DSN=CSMP.CABLE,UNIT=SYSDA,DISP=(OLD,PASS),VOL=SER=CSMPDK
//GO EXEC PGM=DEJEXE,REGION=108K
//GO.FT05F001 DD UNIT=SYSDA,DISP=OLD,DCB=(RECFM=F,BLKSIZE=80), C
// DSN=CSMP.SYMB.CABLE,VOLUME=SER=CSMPDK
// DD DDNAME=SYSIN
//GO.FT06F001 DD SYSOUT=A
//GO.FT13F001 DD UNIT=SYSDA,SPACE=(TRK,(40,40)), C
// DCB=(RECFM=V,LRECL=200,BLKSIZE=204)
//GO.FT14F001 DD UNIT=SYSDA,SPACE=(TRK,(40,40)), C
// DCB=(RECFM=V,LRECL=200,BLKSIZE=204)
//GO.FT15F001 DD UNIT=(2400,,DEFER),DSN=PREPARE,DISP=(,PASS), C
// LABEL=(,NL),VOLUME=SER=SCRATCH
//GO.SYSIN DD *
DATA AND EXECUTION CONTROL CARDS
STOP
```

Figure 12. Execution of the CSMP Execution Phase for a particular model

When the particular model requires a structure change, the stored data sets must be scratched and then recreated by running Figure 11 control cards with the modified model.

READER'S COMMENT FORM

System/360 Continuous System Modeling

H20-0368-2

Program (360A-CX-16X) Operator's Manual

Please comment on the usefulness and readability of this publication, suggest additions and deletions, and list specific errors and omissions (give page numbers). All comments and suggestions become the property of IBM. If you wish a reply, be sure to include your name and address.

COMMENTS

—
fold

—
fold

—
fold

—
fold

- Thank you for your cooperation. No postage necessary if mailed in the U.S.A.
FOLD ON TWO LINES, STAPLE AND MAIL.

YOUR COMMENTS PLEASE...

Your comments on the other side of this form will help us improve future editions of this publication. Each reply will be carefully reviewed by the persons responsible for writing and publishing this material.

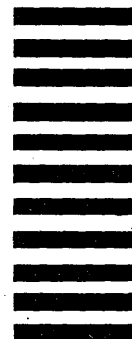
Please note that requests for copies of publications and for assistance in utilizing your IBM system should be directed to your IBM representative or the IBM branch office serving your locality.

fold

fold

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

BUSINESS REPLY MAIL
NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES



POSTAGE WILL BE PAID BY...

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

Attention: Technical Publications

fold

fold



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

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



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

IBM World Trade Corporation
821 United Nations Plaza, New York, New York 10017
(International)