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**VS APL for CMS:
Installation Reference Material**

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The changes for this edition are summarized under "Summary of Amendments" following the preface. Specific changes are indicated by a vertical bar to the left of the change. These bars will be deleted at any subsequent republication of the page affected. Editorial changes that have no technical significance are not noted.

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WHAT THIS BOOK IS ABOUT

This book is intended for people who need to know how to:

- Plan for installing VS APL
- Install VS APL
- Customize VS APL session manager commands and messages
- Modify the VS APL session manager default profile
- Specify VS APL options
- Convert APLSV, APL\360 and APL/CMS workspaces for use under VS APL
- Add auxiliary processors to VS APL
- Create and maintain VS APL private, project, and public libraries
- Transport workspaces and VS APL data files in to and out of CMS

Readers should have knowledge of VS APL and the Conversational Monitor System (CMS), including CP, CMS, and VS APL commands.

TASKS THIS BOOK WILL HELP YOU DO

This book covers the following major topics:

"Installing VS APL" lists hardware and software requirements for installation, and explains: the differences between a shared and a nonshared system; how to specify a load address for shared VS APL; and how to specify VS APL options. This chapter also gives an overview of the installation procedure and a detailed description of each step.

"Customizing VS APL" explains how to: add translate tables to redefine APL characters for hardcopy; specify synonyms for VS APL session manager commands and change the text of messages; modify the VS APL session manager profile; modify the APLEXIT exec; and specify VS APL options.

"Converting Workspaces to VS APL" tells how to convert APLSV, APL/CMS, and APL\360 workspaces so they can be used under VS APL.

"Defining Resources for VS APL" covers several topics, such as how to: define VS APL users; add auxiliary processors to VS APL; create and maintain private, public, and project libraries; and transport workspaces and VS APL data files in to and out of CMS.

"Appendix A. Virtual Storage Requirements" contains the virtual storage requirements for installing and executing VS APL, and for executing the conversion programs.

"Appendix B. Auxiliary Storage Requirements" contains the auxiliary storage requirements for installing VS APL.

REQUIRED PUBLICATIONS

You should be familiar with following publications:

- IBM Virtual Machine Facility/370: Introduction, GC20-1800, provides a general description of CMS.

- IBM Virtual Machine Facility/370: CMS Command and Macro Reference, GC20-1818, has reference material on the syntax of CII5 commands, EDIT subcommands, EXEC control statements, and CMS assembler language macro instructions.
- IBM Virtual Machine Facility/370: Edit Guide, GC20-1805, describes how to use the CMS editor.
- IBM Virtual Machine Facility/370: Planning and System Generation Guide, GC20-1801, has information on: shared systems; Program Level Change (PLC) commands; how to define 3800 printer fonts; and how to define users and direct access storage.
- IBM Virtual Machine Facility/370: CMS User's Guide, GC20-1819, provides basic information about CII5 and how to use the CMS editor to create and modify programs.
- IBM Virtual Machine Facility/370: CP Command Reference for General Users, GC20-1820, provides a reference for the syntax and usage of CP commands.
- VS APL for CMS: Terminal User's Guide, SH20-9067, describes how to use VS APL under CMS.
- IBM Virtual Machine Facility/370: System Programmer's Guide, GC20-1807, describes shared systems and how to define printer fonts for the IBM 3800 Printing Subsystem.
- IBM Virtual Machine Facility/370: Operator's Guide, GC20-1806, has additional information on how to define printer fonts for the IBM 3800 Printing Subsystem.

RELATED PUBLICATIONS

You may need to be familiar with the following:

- VS APL for CMS and TSO: Writing Auxiliary Processors, SH20-9068, explains how to design, write, and implement auxiliary processors.
- VS APL for TSO: Installation Reference Material, SH20-9183, explains how to convert APLSV and APL\360 workspaces for use under TSO, and how to use the APLYUCHV program.
- VS APL for VSPC: Installation Reference Material, SH20-9184, explains how to convert APLSV and APL\360 workspaces for use under VSPC, and how to use the VSPC Service Program.
- VS APL for CICS/VS: Installation Reference Material, SH20-9181, explains how to convert APLSV and APL\360 workspaces for use under CICS/VS, and how to use the CICS/VS Library Service Program.
- Graphical Data Display Manager (GDDM) and Presentation Graphics Feature (PGF) General Information, GC33-0100, has information on GDDM storage requirements for installation and on symbol sets.
- IBM Virtual Machine Facility/370: System Messages, GC20-1808, contains information on CP and CMS messages.
- IBM 3270 Information Display Component Description, GA27-2749, has information on the Program Symbol Feature for GRAPHPAK.
- VS APL GRAPHPAK User's Guide, SH20-9199, has information on the GRAPHPAK program product.

SYNTAX NOTATION

The following syntax notation is used in this book.

Where an entry may take several forms, all the forms are indicated. When an entry is shown, a distinction is made between information that you must enter exactly as shown and information that you may supply, as appropriate. Furthermore, a distinction is made between APL entries and VM entries.

If an item is representative and must be replaced with an appropriate value, the item will appear in underlined lowercase letters.

If an APL entry is to be made exactly as shown, the entry will appear in APL font. For instance, in the following APL system command:

```
)CLEAR size
```

enter)CLEAR at the terminal as shown, and replace size with an appropriate value when you actually make the entry.

If an entry other than an APL command is to be made exactly as shown, the entry will appear in UPPERCASE unless otherwise noted. For instance, in the following VM command, logon is entered exactly as shown, while userid must be replaced:

```
LOGON userid
```

Entries enclosed in brackets are optional. For instance, in the command:

```
)LOAD uname[:password]
```

enter)LOAD at the terminal as shown; if a password is used, replace password with a suitable password when you actually enter the command.

If a vertical line, |, separates two or more entries, choose only one entry.

Where more than one option is shown and one option is the default, all are shown in uppercase and the default value is underlined.

NOTE ON MESSAGES

The only messages documented in this book are conversion program messages, which are printed at the terminal and appear on the conversion report.

Error and diagnostic messages issued by the VS APL executor are documented in VS APL for CMS: Terminal User's Guide. They are identified by a message number with the prefix "APL" and are printed at your terminal. You can look up VS APL messages by message number.

CP and CMS messages are documented in IBM Virtual Machine Facility/370: System Messages. CP messages have message numbers with the prefix "DMK"; CMS message numbers have the prefix "DMS".

NOTE ON TERMINOLOGY

The term "VS APL data file" refers to files created through the use of the VS APL Data File auxiliary processor (AP 121). Other special terms are in the glossary.

SUMMARY OF AMENDMENTS

VS APL RELEASE 4, AUGUST 1982

NEW PROGRAMMING FEATURE

Support for ASCII terminals, including the IBM 3101 Display and 3232 Keyboard Printer Terminals, has been added.

Service Changes

The description of the APNAMES invocation option used in developing and testing new auxiliary processors has been clarified.

Other minor technical and editorial changes are made throughout the book.

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INSTALLING VS APL

This chapter contains:

- The information you need for installing VS APL, such as:
 - Differences between VS APL as a shared system and as a nonshared system
 - Determining a load address for a shared system
 - Hardware requirements
 - Software requirements
 - VS APL options
- An overview of the installation procedure
- A detailed description of each installation step

DIFFERENCES BETWEEN A SHARED AND A NONSHARED SYSTEM

Installing VS APL as a shared system makes better use of virtual storage, since several users can share one copy of the shared module. "Appendix A. Virtual Storage Requirements" illustrates the difference between the virtual machine size required for executing the shared system and the nonshared system.

However, the shared system is more complicated to define than the nonshared system. For example, you must define one or more load addresses that make efficient use of virtual storage.

Figure 1 compares the shared system with the nonshared system by showing where the modules reside for each system.

If you are installing VS APL as a shared system, you should be familiar with the information about shared systems and saved segments in IBM Virtual Machine Facility/370: System Programmer's Guide and IBM Virtual Machine Facility/370: Planning and System Generation Guide.

System	Shared VS APL	Nonshared VS APL
Virtual Machine	Auxiliary Processors ¹	Executor Interpreter Shared Storage Manager Auxiliary Processors
Shared Storage	Executor Interpreter Shared Storage Manager Auxiliary Processors ²	

Figure 1. Differences between the Nonshared and the Shared System: Where the Modules Reside

Notes to Figure 1

- ¹ Only processors not link-edited with APL.
- ² Only processors link-edited with APL.

VS APL AS A SHARED SYSTEM: DETERMINE A LOAD ADDRESS

If you decide to install a shared system, choose one or more segment names and associated load addresses. One segment name is usually sufficient; the ability to define more than one segment name is provided for a shared system where users have different virtual machine sizes. (For information on saved segments, see IBM Virtual Machine Facility/370: Planning and System Generation Guide and IBM Virtual Machine Facility/370: System Programmer's Guide.)

Figure 2 shows the default saved segment names and the recommended load addresses. Define the saved segment names and load addresses during installation "Step 5. Build VS APL."

Saved Segment Name	Load Address (in K Bytes)
APLSYS1	512
APLSYS2	1536
APLSYS3	3584
APLSYS4	7680

Figure 2. Default Saved Segment Names and Recommended Load Addresses

If you define more than one saved segment name and load address during installation, VS APL chooses the load address that makes the most efficient use of virtual storage for a single user. This load address depends upon the user's virtual machine size. For example, if you define the load addresses of 1536K and 3584K during installation, VS APL will load the shared system at either address 1536K or 3584K. If the virtual machine size of a user is 1 megabyte, the shared system will be loaded at address 1536K, because that is the smallest load address greater than 1 megabyte.

You can also define saved segment names other than the default. To determine a load address to be associated with a saved segment name, follow these guidelines:

- The address must be greater than the largest virtual machine of any VS APL user.
- The address should not be unnecessarily high; if it is, storage is wasted for unreferenced CP segment table entries.

Define the segment names and load addresses during installation "Step 5. Build VS APL." You must also define segment names other than the default in the file APLSCSNT ASSEMBLE. (See "Step 6. VS APL as a Shared System: Define, Load, and Save.")

You must not define a load address that allows VS APL to overlap any other shared systems, such as the GDDM program product.

HARDWARE REQUIREMENTS

The following hardware is required to install and to execute VS APL:

- A virtual machine large enough to install VS APL (see "Appendix A. Virtual Storage Requirements")
- If you are installing a shared system, permanent space on a CP-owned DASD volume
- Enough auxiliary storage to be defined as the CMS A- and Y-disks (see "Appendix B. Auxiliary Storage Requirements")
- One or more of the following terminals:
 - IBM 2741 Communication Terminals
 - IBM 3101 Display Terminals
 - IBM 3270 Display Stations
 - IBM 3767 Communication Terminals (in 2741 migration-aid mode)
 - IBM 5100, 5110, or 5120 Portable Computer with the communication adaptor feature
 - IBM 3232 (ASCII) Keyboard Printer Terminal (under VM/SP Release 2 only)

SOFTWARE REQUIREMENTS

One of the following CMS systems is required:

- VM/Basic System Extensions Program Product (BSEPP) Release 2 (or later)
- VM/System Extensions Program Product (SEPP) Release 2 (or later)
- VM/System Program Product (VMSP) release 1 (or later)

You also need:

- The VS APL installation tape
- A Graphical Data Display Manager (GDDM) program product in order to use:
 - VS APL session manager
 - GDDM auxiliary processor (AP 126)

- VS APL Session Manager Command auxiliary processor (AP 120)
- IBM 3270 printers

For information on GDDM program product storage requirements, see Graphical Data Display Manager (GDDM) and Presentation Graphics Feature (PGF) General Information. (If you decide to install GDDM, define a load address that doesn't overlap VS APL.)

- The GDDM program product, the GDDM auxiliary processor, and the Program Symbol Feature in order to use GRAPHPAK (for information on the Program Symbol Feature, see IBM 3270 Information Display Component Description).

OVERVIEW OF VS APL OPTIONS

This section describes the options you can specify during installation to:

- Define the CMS system and release level
- Specify whether nonsubset CMS commands can be used
- Specify whether GDDM is a shared or a nonshared system
- Change the filetype of:
 - Workspaces in a private library
 - VS APL data files in a private library
 - The VS APL session manager profile
- Specify the default and required minimum amount of virtual storage for the following:
 - The active workspace
 - CMS commands issued through the CMS Command auxiliary processor (AP 100)
 - The shared storage manager
- Define auxiliary processors supplied with VS APL

Figure 3 explains each of the APLSCOPT parameters you can use to change the VS APL options.

Parameter	Use To:	Default	Cross References
REL	Define the CMS system and release level. Choices are: BSEPP,2 SEPP,2 VMSP,1	VMSP,1	See the section "Software Requirements" for more information on CMS systems.
CMSCMD ¹	Specify when CMS subset and nonsubset commands can be used. Choices are: ALLSHR: Users can issue CMS subset and nonsubset commands if VS APL and the GDDM program product are shared, and no auxiliary processors are loaded using the RESAPS parameter. ALL: Users can issue CMS subset and nonsubset commands regardless of whether VS APL or GDDM is shared and any auxiliary processors are loaded. SUBSET: Users can only issue CMS subset commands.	ALLSHR	
GDDM	Specify whether GDDM is shared, available, or not available. Choices are: SHARE - Shared YES - Available NO - Not Available	SHARE	
PRIVWS	Change the filetype suffix, WS, of workspaces in private libraries; the suffix must be two characters.	WS	
PRIVFIL	Change the filetype suffix, FL, of VS APL data files in private libraries; the suffix must be two characters.	FL	

Figure 3 (Part 1 of 3). VS APL Options

Parameter	Use To:	Default	Cross References
PRIVPRO	Change the filetype suffix, PR, of the VS APL session manager profile; the suffix must be two characters.	PR	
FRSIZE	Specify the default amount of virtual storage for CMS commands issued through AP 100.	65536 bytes (64K)	See <u>VS APL for CMS: Terminal User's Guide</u> for information on the FRESIZE invocation option.
FRMIN	Specify the minimum required amount of virtual storage for CMS support functions; if this amount is not available, VS APL is not initialized.	20480 bytes (20K)	
WSSIZE	Specify the maximum amount of virtual storage for the active workspace.	12582912 bytes (12 Megabytes)	See <u>VS APL for CMS: Terminal User's Guide</u> for information on the WSSIZE invocation option.
WSMIN	Specify the minimum required amount of virtual storage for the active workspace; if this amount is not available, VS APL is not initialized.	32768 bytes (32K)	
SHSIZE	Specify the default amount of virtual storage for the shared storage manager.	32768 bytes (32K)	See <u>VS APL for CMS: Terminal User's Guide</u> for information on the SHRSIZE invocation option.
SHMIN	Specify the minimum required amount of virtual storage for the shared storage manager; if this amount is not available, VS APL is not initialized.	4096 bytes (4K)	
SMSIZE	Specify the amount of reserved virtual storage for the VS APL session manager; (used as additional free space by GDDM; if you specified GDDMS=NO, specify enough storage to contain GDDM).	32768 bytes (32K)	See <u>Graphical Data Display Manager (GDDM) and Presentation Graphics Feature (PGF) General Information</u> for information on GDDM storage requirements.

Figure 3 (Part 2 of 3). VS APL Options

Parameter	Use To:	Default	Cross References
RESAPS	Specify which auxiliary processors are to be included in the system.	Auxiliary processors (by number) included: 100, 101, 102, 110, 111, 120, 121, 123, 126.	See the section "Defining Auxiliary Processors" for a list of the numbers and names of auxiliary processors provided.
GDMPTY	Specify the filetype for GDDM print files.	ADMPRINT This matches the value of DFTOPRTF as distributed by GDDM. If you change the value of DFTOPRTF, change the value of GDMPTY also.	See <u>GDDM User's Guide</u> for a discussion of DFTOPRTF.
MMDDYY	Specify the format of dates. The value YES causes APL to format dates as MM/DD/YY (month/day/year); the value NO causes APL to format dates as DD-MM-YY (day-month-year).	YES	

Figure 3 (Part 3 of 3). VS APL Options

Note to Figure 3

- ¹ Some CMS commands (particularly commands requiring program storage), and user-written programs may cause VS APL to terminate.

OVERVIEW OF THE INSTALLATION PROCEDURE

In brief, the procedure for installing VS APL under CMS is as follows. The procedure is described in detail in the next section: "Description of Each Installation Step."

1. Log on to VM and access the A- and Y-disks.
2. Check the files on the A- and Y-disks.
3. Mount the installation tape.
4. Transfer the APLINSTL exec from the installation tape to the A-disk.
5. Build VS APL by executing APLINSTL.
6. If installing the shared system: define, load, and save the system.
7. Test whether VS APL is installed correctly.
8. Define the 3800 printer fonts.
9. If installing GRAPHPAK, define the GRAPHPAK symbol sets.
10. If GDDM is nonshared, define GDDM modules.

DESCRIPTION OF EACH INSTALLATION STEP

This section describes each installation step in more detail.

STEP 1. LOG ON TO VM AND ACCESS THE A- AND THE Y-DISKS

Log on to CMS and define enough virtual storage to install VS APL:

```
DEF STOR nnnnn
IPL CMS
```

where nnnnn is the size of the virtual machine. (See "Appendix A. Virtual Storage Requirements" for the virtual storage requirements.)

Link to and access the system A- and Y-disks. For example:

```
CP LINK userid vaddr1 vaddr2 mode
ACCESS vaddr2 A
```

where

userid is the identification of the directory to be searched for the device vaddr1.

vaddr1 is the virtual device address in the directory.

vaddr2 is the virtual device address that is to be assigned to the minidisk.

mode is WR (read/write).

If the A- and Y-disks are newly allocated, format them, using the CMS FORMAT command:

```
FORMAT vaddr Y
FORMAT vaddr A
```

where vaddr is the virtual device address.

The **A-disk** will contain all the files transferred from the installation tape and the module files shown in the program directory. (The program directory is sent to you with the installation tape.)

The **Y-disk** will contain the generated VS APL system, and will be accessed by VS APL users. (Files on the Y-disk are listed in the program directory.)

For information on how to define the CMS A- and Y-disks, see IBM Virtual Machine Facility/370: Planning and System Generation Guide.

STEP 2. CHECK THE FILES ON THE A- AND THE Y-DISK

If the A and the Y-disks are not newly allocated, rename CMS files that duplicate VS APL module names listed in the program directory.

To check the A- and the Y-disks for duplicate CMS file names, issue the CMS LISTFILE command:

```
LISTFILE * * A
LISTFILE * * Y
```

STEP 3. MOUNT THE INSTALLATION TAPE

Use the CP MSG command to ask the system operator to mount the installation tape and to attach the tape drive as virtual device 181, 182, 183, or 184.

STEP 4. TRANSFER THE APLINSTL EXEC

Transfer the APLINSTL EXEC (the CMS exec that builds VS APL) from the installation tape to the A-disk by issuing these Program Level Change (PLC) commands:

```
VMFPLC2 REW (TAPn)
VMFPLC2 LOAD * * A (TAPn)
```

where n is the symbolic tape identification or address of the device on which the installation tape is mounted. For information on PLC commands, see IBM Virtual Machine Facility/370: Planning and System Generation Guide.

STEP 5. BUILD VS APL

Determine whether you want to change the installation options. If so, modify the APLSOPT macro instruction in the file APLSCOPT ASSEMBLE and change the values for the parameters to fit your needs.

The format of the macro instruction is:

```
APLSOPT parm1=val1,parm2=val2,...,parmn=valn
```

where

parm1-parmn

are the parameters (described in Figure 3), which can be specified in any order.

val1-valn

are the values you can specify for the parameters.

For example, to specify a different CMS system and release level, change the value of the REL parameter:

```
APLSOPT ...REL=(BSEPP,2)...
```

For information on the parameters, see Figure 3.

Next, invoke the exec that builds VS APL by issuing the CMS command:

APLINSTL

The exec is conversational and prompts you for the following information:

- Whether APLSCOPT has the correct options.
- Whether this is the initial installation or a regeneration of APL.
- The tape address of the install tape.
- The tape density of the install tape.
- Whether the conversion programs are to be generated.
- Whether VS APL is to be installed as a shared or a nonshared system.
- If installed as a shared system, what the saved segment name is.

You can re-create a shared system at a different load address, or re-create the module files APL, VSAPL, APLCVCMS, or APLCVRPQ, by specifying the REGEN option. If you specify REGEN, the APLINSTL exec:

1. Creates the APL MODULE.
2. Creates the VSAPL MODULE and/or does a SAVESYS for saveseg, where saveseg is the save segment name you respond with for a saved system. One or both of these actions will occur depending on what response was given to the prompts.
3. Creates the following conversion programs (depending upon the responses to the prompts):
 - APLCVCMS MODULE
 - APLCVRPQ MODULE

The APLINSTL EXEC performs the following actions (if you do not specify the REGEN option):

1. Transfers the required text, exec, and macro files from the installation tape to the A-disk.
2. Generates the file APLMAC MACLIB.
3. Creates the following files (depending upon the responses to the prompts):
 - APL MODULE (the module that determines whether a nonshared or a shared system is to be loaded).
 - VSAPL MODULE (the executor, interpreter, and shared storage manager for the nonshared system).
 - saveseg (where saveseg is the segment name(s) you defined for the shared system; the executor, interpreter, and shared storage manager for the shared system). VS APL creates saveseg only if you are installing VS APL as a shared system.
 - APLCVCMS MODULE (the conversion program for APL\360 and APLSV workspaces).

- APLCVRPQ MODULE (the conversion program for APL/CMS workspaces).

STEP 6. VS APL AS A SHARED SYSTEM: DEFINE, LOAD, AND SAVE

If installing VS APL as a shared system, define, load, and save the system by using the following procedure. (If not, go on to "Step 7. Test VS APL.")

1. Allocate permanent space on a CP-owned DASD volume to contain the saved system.
2. Define the system to be saved by adding a NAMESYS macro to your installation's DMKSNT ASSEMBLE module (see IBM Virtual Machine Facility/370: Planning and System Generation Guide). Define each segment name you chose in the section "VS APL as a Shared System: Determine a Load Address" by using the NAMESYS macro. You can define four default saved segment names: APLSYS1, APLSYS2, APLSYS3, and APLSYS4. You can also define your own segment names, as explained in the section "VS APL as a Shared System: Determine a Load Address." The following example of the NAMESYS macro defines APLSYS1:

```

APLSYS1 NAMESYS  SYSNAME=APLSYS1,
                  SYSSIZE=320K,
                  VSYSADR=IGNORE,
                  VSYSRES=,
                  SYSCYL=,
                  SYSVOL=serial-number1,
                  SYSSTRT=(cylinder,page)2,
                  SYSPGM=(128-223)3,
                  SYSPGCT=964,
                  SYSHRSG=(8,9,10,11,12,13)

```

Examples of definitions for APLSYS2, APLSYS3, and APLSYS4 are:

```

APLSYS2: SYSPGM=(384-479)
          SYSHRSG=(24,25,26,27,28,29)

APLSYS3: SYSPGM=(896-991)
          SYSHRSG=(56,57,58,59,60,61)

APLSYS4: SYSPGM=(1920-2015)
          SYSHRSG=(120,121,122,123,124,125)

```

¹The serial number of the direct access storage volume allocated.

²The starting cylinder and page address for the saved segment.

³The page numbers to be saved. To calculate the starting page number, divide the load address by 4.

⁴The total number of pages designated by SYSPGM.

More information on the NAMESYS macro is contained in IBM Virtual Machine Facility/370: Planning and System Generation Guide and IBM Virtual Machine Facility/370: System Programmer's Guide.

3. Assemble the new system name table, DMKSNT, by using the GENERATE EXEC procedure as described in IBM Virtual Machine Facility/370: Planning and System Generation Guide.

4. Issue APLSCLNK saveseg DCSS for each saved segment. APLSCLNK loads the APL text decks and issues a SAVESYS command for the system name 'saveseg'. An example of this procedure is:

```
APLSCLNK APLSYS2 DCSS
```

5. Redefine your virtual machine to have a size no greater than the saved system's load address.
6. If you defined saved segment names other than the default, you must define the segment names in a CSECT named APLSCSNT ASSEMBLE:

- a. Use the CMS editor to edit APLSCSNT.
- b. Add the name of each saved segment you defined:

```
DC CL8'name'
```

where name is the name of the saved segment.

- c. Terminate the list:

```
DC      8X'FF'      END OF LIST INDICATOR
```

STEP 7. TEST VS APL

For shared APL, ensure that the virtual machine is smaller than the lowest address of the DCSS, and is at least 912K bytes.

Enter APL and run the Installation Verification Program workspace by executing:

```
)LOAD 2 CMSIVP
IVP
```

The IVP function prompts you for configuration information and produces messages telling which components are successfully installed.

STEP 8. DEFINE THE IBM 3800 PRINTING SUBSYSTEM FONTS

Use the IMAGELIB and GENIMAGE utilities to define the 3800 printer fonts. For information on the IMAGELIB and GENIMAGE utilities, see IBM Virtual Machine Facility/370: System Programmer's Guide, IBM Virtual Machine Facility/370: Operator's Guide, and IBM Virtual Machine Facility/370: Planning and System Generation Guide.

STEP 9. DEFINE THE GRAPHPAK SYMBOL SETS

If you have the Graphical Data Display Manager (GDDM) program product, perform the following procedure.

GRAPHPAK includes symbol sets for the following:

- Image characters
- Vector graphics characters
- Shading patterns

To define the symbol sets:

1. Access as your A-disk the minidisk that will contain the GRAPHPAK symbol sets:

```
CP LINK userid vaddr1 vaddr2 mode
ACCESS vaddr2 A
```

where

userid.

is the identification of the directory to be searched for the device vaddr1.

vaddr1.

is the virtual device address in the directory.

vaddr2

is the virtual device address that is to be assigned to the minidisk.

mode

is W (Write access).

2. Invoke VS APL and GRAPHPAK as follows:

```
APL SHRSIZE(60K) WSSIZE(400K)
)LOAD 2 GRAPHPAK
```

3. Define the symbol sets as follows:

```
OPENGP
```

The message, APLW708W: SYMBOL SETS DO NOT EXIST ON AUXILIARY STORAGE is written to your terminal; issue the commands:

```
WRITESS
OPENGP
)OFF HOLD
```

The minidisk that contains the GRAPHPAK symbol sets should be available to VS APL users for read-only. See VS APL GRAPHPAK User's Guide for more information on GRAPHPAK.

STEP 10. IF GDDM IS NONSHARED, DEFINE GDDM MODULES

If GDDM is nonshared, you must define GDDM in the APLEXIT exec. (See Figure 3 for information on how to define GDDM as shared or nonshared.)

Use the CMS editor to modify the APLEXIT exec and add a CMS GLOBAL TXTLIB command to define the GDDM modules. (A comment in the APLEXIT exec shows where to add the command.) For information on the GLOBAL command, see IBM Virtual Machine Facility/370: CMS Command and Macro Reference.

STEP 11. COPY APL EXECUTION FILES TO SYSTEM DISK

Copy the following files to a disk accessible to users at APL session initiation:

```
APL MODULE, VSAPL MODULE, APLIBTAB APLIBTAB,
DEFAULT VSAPLPR, APLEXIT EXEC, and ASVPSRVC TEXT.
```

The following files can be placed on a disk accessible to users who need to run the conversion programs:

```
APLCVCMC EXEC, APLCVCMC MODULE, APLCVRPQ EXEC,
and APLCVRPQ MODULE.
```

The following files can be placed on a disk accessible to users who write auxiliary processors:

```
APLMAC MACLIB and APLSCTBL TEXT.
```


- Define or display PF key settings
- Produce a continuous copy of your terminal session
- Query the current setting of any of the commands

For a complete description of the VS APL session manager commands and messages, see VS APL for CMS: Terminal User's Guide.

HOW TO DEFINE SYNONYMS FOR COMMANDS AND CHANGE THE TEXT OF MESSAGES

You can customize the VS APL session manager by defining synonyms for commands and by changing the text of messages.

1. Edit the APLACMSG module; the module has the following statements:

```
APLACMD
END
```

- To define a synonym for a command or keyword, modify the APLACMD macro instruction. The format of the macro instruction is:

```
APLACMD cmd1=usercmd1,cmd2=usercmd2,...cmdn=usercmdn
```

where

cmd1-cmdn

are VS APL session manager commands or parameters truncated to their initial seven characters:

```
CODE
COLUMN
COPY
DEFAULT
DELAY
DISPLAY
EDS
HELP
HOLD
ID
IMMEDIATE (specify as IMMEDIA)
LINE
LOAD
LOG
OFF
ON
ORIGIN
PAGE
PFK
PROFILE
RENUMBER (specify as RENUMBE)
SAVE
SCREEN
SIZE
SUPPRESS (specify as SUPPRES)
WRAP
```

For a description of the VS APL session manager commands and keywords, see VS APL for CMS: Terminal User's Guide.

usercmd1-usercmdn

are the command or keyword names you define.

Do not define a synonym that is:

- The same as any other command, keyword, or synonym. Two of these words are considered the same if their first 8 characters are identical.
- Longer than 12 characters.

- An abbreviation for a command or keyword. For example, do not define a synonym of CO for the command COLUMN, since CO could also be an abbreviation for the command COPY. (The VS APL session manager allows you to abbreviate commands and parameters, if the abbreviations are unique.)

For example, to redefine the VS APL session manager command, LOG, as SCROLL, modify the APLACMD macro instruction as follows:

```
APLACMD LOG=SCROLL
END
```

- To change the text of a message, add the following macro instruction to the APLACMSG module:

```
APLAMSG MSGID=APLMnnnc,MSGTEXT='text
of message'
```

where

nnn is the message number.

c is the message level:

```
E - Eventual Action
W - System Wait
I - Information
A - Immediate Action
```

text of message

is the text you define for the message. The length of the text may not exceed 60 characters.

For example, to change the VS APL session manager message, APLM423E NOT ENOUGH FREESPACE, to APLM423E INCREASE FREESPACE AND TRY AGAIN, add the following to the APLACMSG module:

```
APLACMD
APLAMSG MSGID=APLM423E,
MSGTEXT='INCREASE FREESPACE AND
TRY AGAIN'
END
```

2. Assemble the APLACMSG module.
3. Invoke the APLINSTL exec:

```
APLINSTL
```

Specify the REGEN option when prompted to.

HOW TO MODIFY THE DEFAULT PROFILE

The VS APL session manager profile defines some settings of the VS APL session manager commands. It is copied during installation to the Y-disk. You can modify the profile and change the default settings by using the CMS editor. The file identification is:

```
DEFAULT VSAPLPR *
```

where * is any filemode.

VS APL for CMS: Terminal User's Guide tells how to create new VS APL session manager profiles. (Other profiles you define override the default profile when they are used.) VS APL session manager settings are also described in the Terminal User's Guide.

For information on how to use the CMS editor, see IBM Virtual Machine Facility/370: Edit Guide.

MODIFYING THE APLEXIT EXEC

The APLEXIT exec is invoked to define CMS and CP settings when VS APL is initialized and to restore the CMS session at the end of an APL session. You can modify the APLEXIT exec to, for example, allow messages to be printed to your terminal during your VS APL session. Also, you can use the APLEXIT exec to protect against a possible loss of CMS storage when dynamically loading auxiliary processors using the APNAMES invocation option. For a discussion of this latter use of the APLEXIT exec, see the "Defining Auxiliary Processors" section below.

To modify the APLEXIT exec, edit the file:

APLEXIT EXEC

using an editor, as described in IBM Virtual Machine Facility/370: CMS Command and Macro Reference.

SPECIFYING VS APL OPTIONS

To specify VS APL options, do the following:

1. Edit the APLSCOPT module and modify the APLSOPT macro instruction, changing the values for the parameters. The macro instruction format is:

APLSOPT parm1=val1,parm2=val2,...parmn=valn

where

parm1-parmn

are the parameters (described in Figure 3), which can be specified in any order.

val1-valn

are the values you can specify for the parameters.

For example, to indicate that GDDM is not available, change the value of the GDDM parameter:

APLSOPT ...GDDM=NO...

2. Assemble the APLSCOPT module.
3. Invoke the APLINSTL exec:

APLINSTL

Specify the REGEN option when prompted to.

CONVERTING WORKSPACES TO VS APL

This chapter explains how to convert APL\360, APLSV, and APL/CMS workspaces so you can use them under VS APL. There is no need, however, to convert workspaces from previous releases of VS APL to VS APL Release 4. The following topics are covered:

- Planning for conversion, such as how to identify and change invalid library numbers and workspace names, and how to plan the auxiliary storage
- Conversion input
- An overview of the conversion procedure
- A detailed description of each conversion step

PLANNING FOR CONVERSION

This section explains how to change input workspace identifications that are invalid for CMS and how to plan the auxiliary storage you use for converting workspaces.

HOW TO IDENTIFY AND CHANGE INVALID LIBRARY NUMBERS AND WORKSPACE NAMES

CMS does not accept:

- Library numbers with more than seven digits
- A workspace name that contains deltas, underscored letters, lowercase letters, or national characters
- A workspace name longer than eight characters

You should have the workspace owner modify these items before the workspace is dumped to tape. Modifying these items **before**, rather than during, the conversion procedure will simplify the procedure.

If unacceptable items still remain, use the conversion program RENAME option during conversion to change library numbers or workspace names. You can also use the IGNORE option to not convert a workspace at all. (These options are described in "Step 5. Interact with the Conversion Program.")

PLANNING AUXILIARY STORAGE

The auxiliary storage you require differs, depending on whether you are converting:

- APL/CMS, APL\360, or APLSV workspaces for use under CMS. for use under CMS You need A-disk space; the APLCVRPQ or the APLVCMS conversion program transfers the converted workspaces to your A-disk.
- APL/CMS workspaces for use under CICS/VS, VSPC, or TSO. You need both A-disk space and a scratch tape. The APLCVRPQ conversion program transfers the converted workspaces to the scratch tape and creates two JCL files on your A-disk.

Estimate the amount of auxiliary storage required according to the number of workspaces to be converted, their size, and the amount of data they contain. Use an A-disk with sufficient space for all the workspaces to be converted. (If you do not have a large enough A-disk, the conversion program gives you a message

and terminates; you can define more auxiliary storage and restart the conversion program.)

CONVERSION INPUT

Input to the conversion procedure is a conversion tape containing a dump of the workspaces to be converted. It is possible to have more than one tape, and workspaces can span two volumes.

To produce a conversion tape for APL/CMS workspaces, issue the CMS TAPE DUMP command. The tape should only contain workspaces that were created on Version 2 of APL/CMS.

You can obtain conversion tapes containing APLSV or APL\360 workspaces from a CICS/VS or VSPC installation.

OVERVIEW OF THE CONVERSION PROCEDURE

The conversion procedure differs, depending on the source of the workspaces and the destination.

You can convert:

- APL/CMS workspaces for use under CMS (see Figure 5)
- APL/CMS workspaces for use under VSPC, CICS, or TSO (see Figure 6)
- APLSV or APL\360 workspaces for use under CMS (see Figure 7)

Figure 4 shows which CMS program converts workspaces for use under different subsystems. For information on converting APLSV or APL\360 workspaces for use under CICS/VS, TSO, or VSPC, see VS APL for CICS/VS: Installation Reference Material; VS APL for TSO: Installation Reference Material; or VS APL for VSPC: Installation Reference Material.

Workspace Source	Program Used to Convert for:			
	CICS/VS	CMS	TSO	VSPC
APLSV	—	APLCVCMS	—	—
APL\360	—	APLCVCMS	—	—
APL/CMS	APLCVRPQ	APLCVRPQ	APLCVRPQ	APLCVRPQ

Figure 4. CMS Programs Used to Convert Workspaces

In general, the steps for converting workspaces to VS APL are:

1. Log on to VM.
2. Access the A-disk.
3. Mount the conversion tape.
4. Invoke the conversion program: APLCVCMS if converting APLSV or APL\360 workspaces; APLCVRPQ if converting APL/CMS workspaces.
5. Interact with the conversion program; specify workspace names and library numbers.
6. Change the identification of workspaces for use under CMS.
7. Distribute converted workspaces and the conversion report according to the destination of the workspaces.

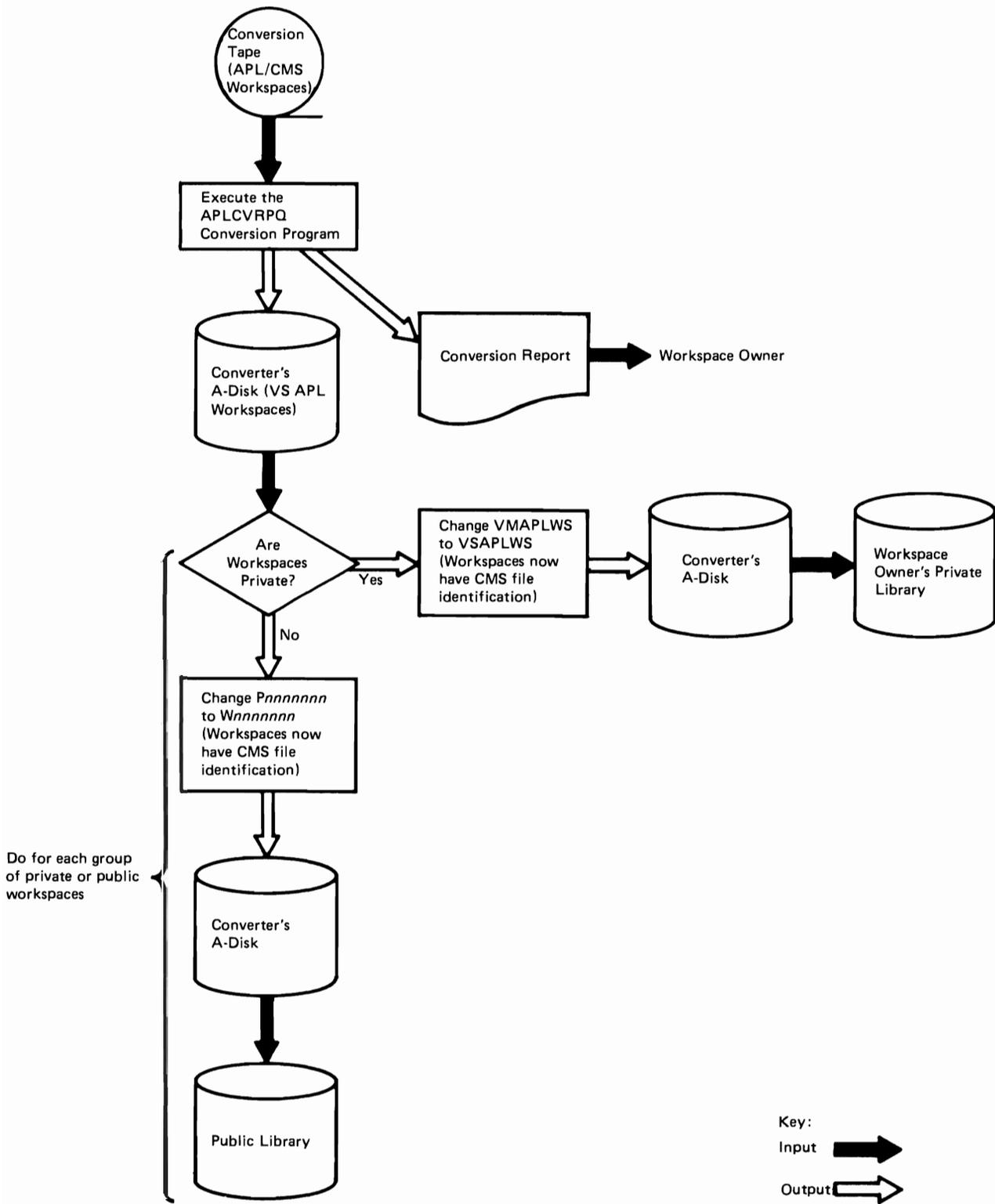


Figure 5. Converting APL/CMS Workspaces for Use under CMS

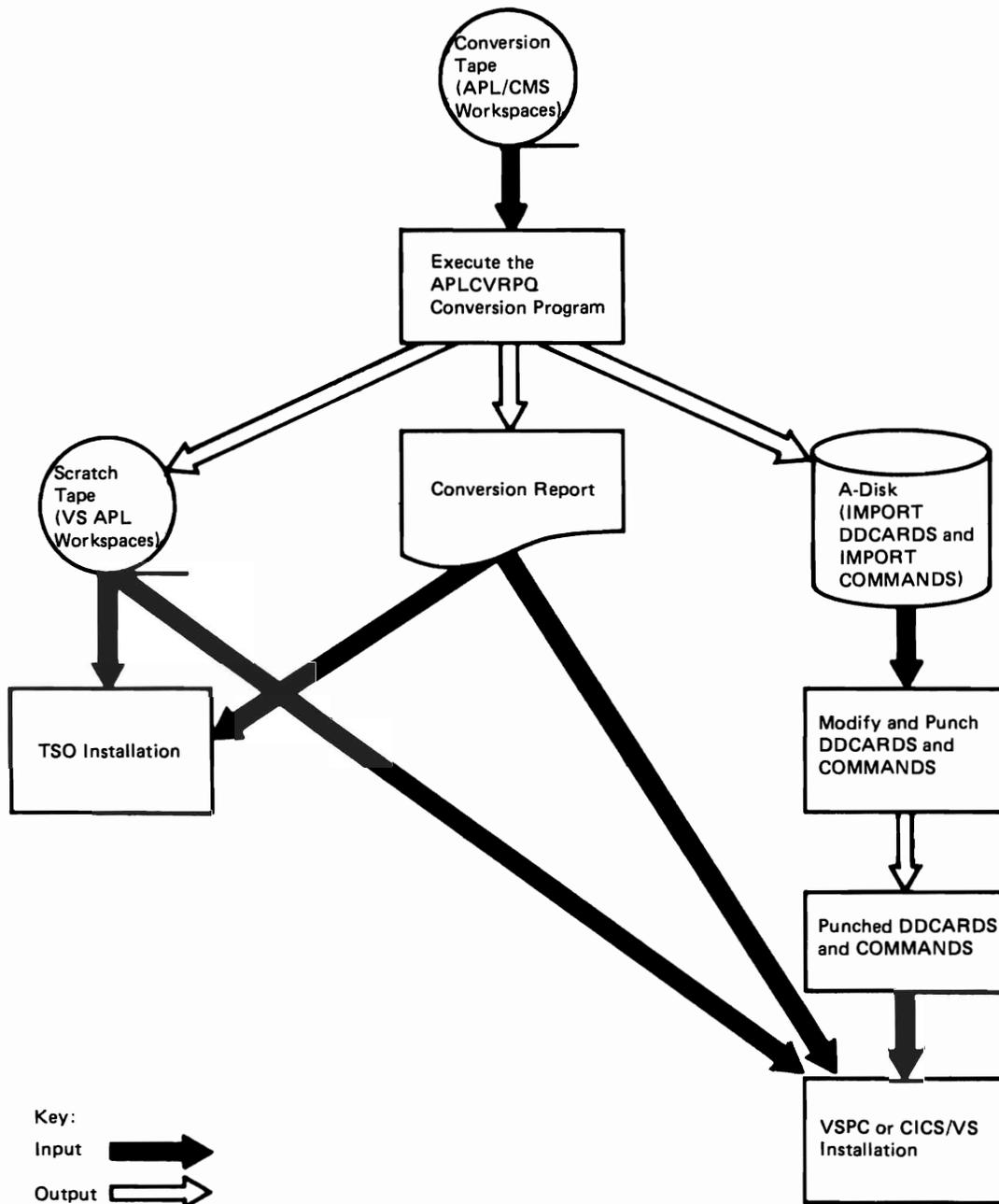


Figure 6. Converting APL/CMS Workspaces for Use under VSPC, CICS/VS, or TSO

DESCRIPTION OF EACH CONVERSION STEP

This section describes each step for converting a workspace to VS APL.

STEP 1. LOG ON

Log on to VM and issue these CP commands:

```
DEF STOR nnnnn
IPL CMS
```

where nnnnn is the virtual machine size. Be sure you have enough virtual storage to execute the conversion program (see "Appendix A. Virtual Storage Requirements").

STEP 2. ACCESS THE A-DISK

Link to and access for read/write the A-disk that you identified in "Planning Auxiliary Storage." If the A-disk is newly allocated, format it using the CMS FORMAT command:

```
FORMAT nnn A
```

where nnn is the virtual device address.

STEP 3. MOUNT THE CONVERSION TAPE

Issue the CP MSG command and ask the system operator to mount the conversion tape (or the first one if you have more than one tape). Have the operator attach the tape drive as virtual device 181. If you are converting APL/CMS workspaces for use under VSPC, CICS/VS, or TSO, ask the system operator to also mount a scratch tape as virtual device 182.

STEP 4. INVOKE THE CONVERSION PROGRAM

Invoke the conversion program to convert APLSV or APL\360 workspaces by using the following command:

```
APLCVCMS [FULL|RESUME|SELECT]
[CONTENT|NOCONTENT]
```

To convert APL/CMS workspaces, use:

```
APLCVRPQ [FULL|RESUME] [CONTENT|NOCONTENT]
```

The options are as follows:

- **FULL:** all workspaces on the tape are converted to VS APL.
- **RESUME:** all workspaces, beginning with a specified workspace, are converted. (Specify the workspace identification during "Step 5. Interact with the Conversion Program.")
- **SELECT:** only specified workspaces are processed. (Specify the identification of the workspaces to be converted during "Step 5. Interact with the Conversion Program.") Notice that you can not use the SELECT option with APLCVRPQ.
- **CONTENT:** workspaces and **function statements** are converted to VS APL format. Content conversion examines function statements that may not execute under VS APL and converts them to their VS AP equivalent, if there is one. Function statements that are not converted are listed in the conversion report, so that users can change them.

- **NOCCONTENT:** workspaces are converted to VS APL, but functions are neither converted to their VS APL equivalent, nor included in the conversion report.

The default options are FULL and CONTENT.

STEP 5. INTERACT WITH THE CONVERSION PROGRAM

The conversion procedure is conversational; enter information when you are prompted.

Representing APL Characters with EBCDIC Characters

When entering workspace identification in response to conversion program prompts, represent APL characters with EBCDIC (Figure 8):

APL	EBCDIC
0 - 9	0-9
A - Z	A-Z
<u>A</u> - <u>Z</u>	a-z
Δ	*
<u>Δ</u>	\$

Figure 8. EBCDIC Representation of APL

When the conversion program displays a workspace identification as part of a prompt, it uses the EBCDIC representation for APL characters shown in Figure 8.

Responding to Conversion Program Prompts

Respond to the following prompt:

IS OUTPUT FOR VSPC (YES|NO)

Enter YES if the workspaces are intended for VSPC, CICS/VS, or TSO; enter NO, if otherwise.

The conversion program prompts for the numbers of libraries and names of workspaces to be converted (unless you specified FULL as a conversion option).

If you chose RESUME in "Step 4. Invoke the Conversion Program," specify the identification of the workspace at which conversion is to begin in response to the prompt, WSID:

library-number workspace-name

If you chose SELECT, specify the identification of a workspace to be converted in response to each prompt, WSID:

- Either:

library-number workspace-name

to select a specific workspace.

- Or:

library-number

to select all workspaces in a library.

Press the RETURN key (the ENTER key if you are using an IBM 3270 Display Station) after each entry. To terminate the list, press the RETURN key or the ENTER key twice. You can specify up to 100 entries. Workspaces in the list that are not found on the input tape are ignored.

Changing Invalid or Duplicate Workspace Names and Library Numbers

If a workspace identification on the conversion tape is invalid (see "How to Identify and Change Invalid Library Numbers and Workspace Names"), the conversion program prompts you for one of the following options:

- **RENAME:** To give the workspace a new name. Specify the new name in response to the prompt, CMS FILENAME. Specify the new library number in response to the prompt, CMS FILETYPE. Press the RETURN key (or ENTER key for IBM 3270 Display Stations) alone to leave either one unchanged.
- **IGNORE:** To not convert the workspace.

If you do not choose either of these options, the conversion program does not convert workspaces with invalid names or library numbers.

If an identification duplicates the identification of a file on the A-disk, the conversion program prompts you for one of the following options:

- **RENAME:** To give the workspace a new name. Specify the new name in response to the prompt, CMS FILENAME. Specify the new library number in response to the prompt, CMS FILETYPE. Press the RETURN or ENTER key alone to leave either one unchanged.
- **REPLACE:** To replace the CMS file on the A-disk with the workspace to be converted.
- **IGNORE:** To not convert the workspace.
- **CANCEL:** To terminate the conversion program.

If you do not choose one of these options, the conversion program replaces the CMS file with the workspace.

Restarting the Conversion Program

AT THE END OF THE TAPE: When the end of the conversion tape or the scratch tape is reached:

- Either enter CANCEL to terminate the conversion program
- Or continue on to the next tape:
 1. Enter CP mode by pressing the ATTN key twice (or press the PA1 key if you are using an IBM 3270 Display Station).
 2. Use the CP MSG command to ask the system operator to mount the next tape on the tape drive.
 3. Type the CP BEGIN command.
 4. Type RESTART.

BECAUSE OF UNEXPECTED TERMINATION: If the conversion program terminates because the A-disk is full, or because of some unrecoverable error, the last partially converted workspace is erased from the A-disk. Its identification is printed at the terminal. Complete the procedure for the converted workspaces by performing the last two steps of the conversion procedure.

Process the partially converted workspace and others not yet converted by following these steps:

1. Rewind the conversion tape by issuing this CMS command:

```
TAPE REW
```
2. Make sure that you have enough A-disk space.
3. Invoke the conversion program again. Specify the RESUME option and the identification of the workspace that was named when the conversion program terminated. If you want to specify that individual workspaces be converted, use the SELECT option; be sure to specify the identification of the workspace that was named when the conversion program terminated.

STEP 6. CHANGE CONVERTED WORKSPACE IDENTIFICATION FOR USE UNDER CMS

If you are converting workspaces for use under CMS, you should change the filetype of all private workspaces and of APL/CMS public workspaces to make the converted workspace identification consistent with VSAPL identification.

How the Conversion Program Changes Workspace Identification

When an APL360 or APLSV workspace is converted, the conversion program changes the identification to a CMS file identification. The workspace name, truncated from the right to eight characters, becomes the CMS filename. The library number becomes the CMS filetype. It is truncated from the left to seven digits, or extended to the left with zeros to seven digits, and prefixed with a W. The CMS filemode is always A1. For example:

Workspace Identification	CMS File Identification
25 GENNORK	GENWORK W0000025 A1
1234567 COMPUTATION	COMPUTAT W1234567 A1
12345678 XREF	XREF W2345678 A1

Figure 9. How the Conversion Program Changes Workspace Identification

When an APL/CMS workspace is converted, the conversion program doesn't change its identification. The filetype of a private APL/CMS workspace is VMAPLWS. The filetype of public APL/CMS workspaces is Pnnnnnnnn, where nnnnnnnn is the library number. You have to change the filetype of private and public APL/CMS workspaces (see the next section, "Changing Converted Workspace Identification," for how to do this).

Changing Converted Workspace Identification

You can either change workspace identifications before you distribute the workspaces, or let the workspace owners make the changes.

To change workspace identification yourself:

- Change the filetype of **all private** workspaces to VSAPLWS. Use the CMS editor to create the NEWTYPE EXEC, containing these statements:

```
&CONTROL ERROR  
RENAME &1 &2 &3 = VSAPLWS =
```

Use these commands to change the workspace filetypes:

```
LISTFILE * filetype A(EXEC
CMS NEWTYPE
```

where

filetype
of APLSV and APL\360 workspaces is Wnnnnnnn, where
nnnnnnn is the library number of one owner's workspaces.
In the case of APL/CMS, filetype is VMAPLWS.

Distribute all the APLSV and APL\360 workspaces for one owner before changing any more filetypes. For how to do this, see "Step 7. Distribute Converted Workspaces and the Conversion Report."

- Change the filetype of APL/CMS public workspaces to Wnnnnnnn, where nnnnnnn is the source APL library number. Issue the RENAME command for each public workspace:

```
RENAME * Pnnnnnnn A = Wnnnnnnn =
```

- Change lowercase letters or national characters in APL/CMS file identifications to uppercase letters or numbers.

STEP 7. DISTRIBUTE CONVERTED WORKSPACES AND THE CONVERSION REPORT

FOR USE UNDER CMS: To distribute workspaces intended for use under CMS, follow these steps:

- If the workspaces are APL/CMS, issue these commands for each workspace:

```
SPOOL PUNCH userid
DISK DUMP filename filetype
ERASE filename filetype
```

where

userid
is the owner's user identification.

filename filetype
is the identification of the APL/CMS workspace.

- If the workspaces are APL\360 or APLSV, issue these CMS commands:

```
SPOOL PUNCH userid
LISTFILE * filetype A(EXEC
CMS DISK DUMP
ERASE * filetype a(EXEC
```

where

userid
is the owner's user identification.

filetype
is either VSAPLWS for a private workspace or Wnnnnnnn
for a public workspace.

Separate the conversion report into sections by library number and distribute the sections to their owners. It is a good idea to also stress the importance of reading the conversion report, since the report indicates conversion errors and problems which the workspace owner should correct.

FOR USE UNDER CICS/VS OR VSPC: To complete the conversion procedure, send the converted workspaces (on the scratch tape), the two JCL files (IMPORT DDCARDS and IMPORT COMMANDS on your

A-disk), and the conversion report to the CICS/VS or VSPC installation.

At a CICS/VS installation, the workspaces will be used as input to the IMPORT function of the APL Library Service Program; at a VSPC installation, they will be used as input to the VSPC Service Program. The JCL files will be used to run either the APL Library Service Program or the VSPC Service Program.

Before distributing the workspaces, you should modify the JCL files on your A-disk. The IMPORT DDCARDS file contains the DD statement for each converted workspace:

```
//ddname DD DSN=wsname, UNIT=2400,LABEL=(p,NL),
//          VOL=SER=XXXX,DISP=(OLD,PASS),
//          DCB=(LRECL=80,BLKSIZE=*,RECFM=FBS)
```

where

ddname is M1 through Mn, where n is the total number of converted workspaces.

wsname is the workspace name (the CMS filename).

p is the position of the workspace on the output tape.

The file IMPORT COMMANDS contains the IMPORT statement for each converted workspace.

```
IMPORT wsname FROM(ddname) TYPE(OBJECT) CONTENT(APL)
```

where wsname is the workspace name.

Use the CMS editor to make modifications to the JCL files:

- If you are sending the workspaces to a CICS/VS installation, add the JCL statements required by the APL Library Service Program. (See VS APL for CICS/VS: Installation Reference Material for more information on what JCL to specify.) If you are sending the workspaces to a VSPC installation, add the JCL statements required by the VSPC Service Program. (See VS APL for VSPC: Installation Reference Material.)
- For both CICS/VS and VSPC: Add an AUTH control statement for each set of library numbers specified in the IMPORT COMMANDS file. The AUTH control statement identifies the user level of authorization. (See VS APL for CICS/VS: Installation Reference Material for more information on the APL Library Service Program AUTH control statement. See VS APL for VSPC: Installation Reference Material for more information on the VSPC Service Program.)
- Make the following modifications to the file IMPORT DDCARDS:
 - For each DD statement, change XXXX to the serial number of the output tape.
 - For CICS/VS, change the DCB to (LRECL=800,BLKSIZE=800,RECFM=F).
 - If the output tape has standard labels, change the LABEL subparameter NL in each DD statement to SL.
 - If the host system is DOS/VS and LABEL is specified in the ENVIRONMENT statement, use the information in the IMPORT DDCARDS to prepare the required TLBL statements.
 - Change lowercase letters or national characters in a workspace name to uppercase letters.

- Make these modifications to the file IMPORT COMMANDS:
 - If the workspaces are to be transferred to APL libraries other than those specified in the AUTH control statement, insert the library number in each IMPORT statement.
 - For CICS/VS: Delete TYPE(OBJECT) and CONTENT(APL) from each IMPORT card.
 - Change lowercase letters or national characters in workspace names to uppercase letters or numbers.

Print and punch the JCL files by issuing these CMS commands:

```
PRINT IMPORT DDCARDS
PRINT IMPORT COMMANDS
PUNCH IMPORT DDCARDS
PUNCH IMPORT COMMANDS
```

Send the scratch tape, the conversion report, and the printed and punched JCL files to the CICS/VS or VSPC installation.

FOR USE UNDER TSO: Send the converted workspaces on the scratch tape and the conversion report to the TSO installation.

CONVERSION MESSAGES

The following error messages are printed at the terminal and appear in the conversion report. Additional messages appear in the conversion report. For a list of these, see VS APL for CMS: Terminal User's Guide.

- HDR LABEL I/O ERROR. CONVERSION CANCELLED

Explanation: An unrecoverable error occurred while an input header label was being read.

System Action: Terminates execution of the conversion program.

User Action: Obtain another copy of the conversion tape.

Program issued by: APLCVCMS
- TRLR LABEL I/O ERROR. CONVERSION CANCELLED

Explanation: An unrecoverable error occurred while an input trailer label was being read.

System Action: Terminates execution of the conversion program.

User Action: Do nothing, if the error occurred on the last or only volume. Otherwise, run the conversion program again, using the remaining volumes.

Program issued by: APLCVCMS
- SYSTEM ERROR WHILE CONVERTING WORKSPACE/ DIRECTORY libnum wsname. WORKSPACE/DIRECTORY UNCONVERTED AND PRESUMED DAMAGED

Explanation: A program check occurred, probably because of invalid information in a workspace or directory.

System Action: Prints the contents of the program check, old PSW, and general registers. Conversion continues with the next workspace.

User Action: Obtain another copy of the rejected workspace or library.

- Program Issued By: APLCVCMS or APLCVRPQ
- ERROR UNRECOVERABLE. CONVERSION ABORTED

Explanation: Repeated system errors have occurred.

System Action: Prints a storage dump, and terminates execution of the conversion program.

User Action: Obtain another copy of the input tape.

Program issued By: APLCVCMS or APLCVRPQ
 - WORKSPACE REJECTED, NOT CONVERTED DUE TO I/O ERROR

Explanation: An unrecoverable error occurred while the workspace was being read.

System Action: Continues execution of the conversion program with the next workspace.

User Action: Obtain another copy of the rejected workspace.

Program Issued By: APLCVCMS or APLCVRPQ
 - WORKSPACE FULL

Explanation: The workspace is too large to be converted.

System Action: Continues execution with the next object in the workspace.

User Action: Have the owner of the workspace compress it or split it into two workspaces and obtain a dump of the modified workspace.

Program Issued By: APLCVCMS
 - WRITE ERROR nn WHILE SAVING libnum wsname. CONVERSION CANCELLED

Explanation: The FSWRITE macro returned an error code. nn is the return code. (See IBM Virtual Machine Facility/370: Command Language Guide for General Users.) Probable cause of the error is a full A-disk (return code 13).

System Action: Terminates execution of the conversion program.

User Action: Determine the reason for the error, and correct it. Then run the conversion program again, specifying the RESUME option and the identification of the rejected workspace.

Program Issued By: APLCVCMS
 - IMPORT FILE SEQUENCE NUMBER nnnn

Explanation: Displays the file sequence number nnnn of the converted workspace filename filetype on the output tape.

System Action: None.

User Action: Use the information when preparing the service program control statements for CICS/VS or VSPC.

Program Issued By: APLCVRPQ
 - NOT A CMS DUMP TAPE. CONVERSION CANCELLED

Explanation: The input tape is not a CMS dump tape.

System Action: Terminates execution of the conversion program.

User Action: Mount the correct tape.

Program Issued By: APLCVRPQ

- NOT AN APL/CMS (PRPQ) WORKSPACE

Explanation: The file is not an APL/CMS workspace.

System Action: Continues execution of the conversion program with the next file.

User Action: None necessary, unless all the files on the tape are rejected. If so, mount the correct tape.

Program Issued By: APLCVRPQ

- INADEQUATE SPACE TO RUN CONVERSION. CONVERSION CANCELLED

Explanation: There is less than 64K bytes of free virtual storage space available.

System Action: Terminates execution of the conversion program.

User Action: Define a larger virtual machine.

Program Issued By: APLCVRPQ

- filename filetype WORKSPACE TOO LARGE FOR VIRTUAL MACHINE SIZE. RERUN WITH LARGER MACHINE. WSSIZE IS xxxx. NEED ABOUT yyyy BYTES TO CONVERT.

Explanation: The workspace is too large to be converted.

System Action: Terminates execution of the conversion program.

User Action: Define a larger virtual machine.

Program issued by: APLCVRPQ

- filename filetype WORKSPACE DAMAGED OR INVALID. NOT CONVERTED

Explanation: Either internal pointers in the workspace are invalid, or the workspace is not Version 2.

System Action: Continues execution of the conversion program with the next workspace.

User Action: Obtain a valid copy of the rejected workspace.

Program Issued By: APLCVRPQ

DEFINING RESOURCES FOR VS APL

This chapter explains how to:

- Define new VS APL users to the Control Program (CP)
- Define new auxiliary processors
- Create and maintain public and project libraries
- Transport VS APL workspaces and VS APL data files in to and out of CMS.

DEFINING VS APL USERS TO CP

Under CP, a VS APL user is a CP user who has access to the VS APL libraries. To define a directory entry for a VS APL user, follow these guidelines:

- Because the user's A-disk is a VS APL private library, define the minidisk with enough space for anticipated workspace storage. See the section "Appendix B. Auxiliary Storage Requirements."
- Because the Y-disk contains the VS APL public libraries, define it as read-only in the user's directory entry.
- Do not link to the project library disks, since VS APL links dynamically to them.

See IBM Virtual Machine/370: Planning and System Generation Guide for information on how to define a user to CP.

DEFINING AUXILIARY PROCESSORS

Under CMS, an auxiliary processor is a CMS file with the filename used to invoke it, a filetype of TEXT, and any filemode acceptable to CMS.

For Use by All VS APL Users

You can define:

- User-written auxiliary processors
- Auxiliary processors provided with VS APL and not defined during installation

To define a user-written auxiliary processor:

1. Assemble the auxiliary processor, using the CMS ASSEMBLE command.
2. Use the CMS editor to edit the APLSCOPT module and to modify the APLSOPT macro instruction. Add the auxiliary processor number to the list of auxiliary processors defined by the RESAPS parameter. For example, to add a new auxiliary processor 600 to your system:

```
APLSOPT RESAPS=(...600)
```

You can specify up to 15 auxiliary processors with the RESAPS option.

3. Assemble the APLSCOPT module.

4. Modify the APLSCLNK EXEC on your A-disk by adding the name of the text file. For example, if you are adding new auxiliary processor AP 600, the INCLUDE statement should look like this:

```
INCLUDE APL100 APL101 APL110 APL111 APL120 APL121 APL123
APL126 APL600
```

The auxiliary processor numbers can be in any order.

VS APL for CMS and TSO: Writing Auxiliary Processors describes how to design, write, and test auxiliary processors.

To define an auxiliary processor supplied with VS APL:

1. Edit the APLSCOPT module and modify the APLSOPT macro instruction, adding the number of the auxiliary processor to the list defined by the RESAPS parameter. For example, to define the VSAM auxiliary processor (AP 123):

```
APLSOPT RESAPS=(...123)
```

2. Modify the APLSCLNK EXEC on your A-disk by adding the name of the text file. For example, to define the VSAM auxiliary processor (AP 123), modify the INCLUDE statement in the APLSCLNK EXEC as follows:

```
INCLUDE APL100 APL101 APL110 AP111 APL120 APL121
APL126 APL123
```

The auxiliary processors provided with VS APL include:

- AP 100: Command Processor
- AP 101: Alternate Input
- AP 110: CMS File
- AP 111: QSAM
- AP 120: VS APL Session Manager Command
- AP 121: VS APL Data File
- AP 123: VSAM
- AP 126: Graphical Data Display Manager

Assemble the APLSCOPT module.

Invoke the APLINSTL exec:

```
APLINSTL
```

Specify the REGEN option when prompted.

For Use by Only One VS APL User

VS APL users can define auxiliary processors for use under their APL sessions by using the APNAMES invocation option to specify the auxiliary processor. For example, if a user invokes VS APL with the following option:

```
APL APNAMES(APL600)
```

auxiliary processor 600 can be used under that user's APL session.

You can specify a maximum of 15 auxiliary processors with the APNAMES option.

Note: There is a slight possibility of losing CMS storage when loading an AP using the APNAMES invocation option. To avoid this possibility, edit the APLEXIT exec prior to loading your AP that uses APNAMES. Add this line to the APLEXIT exec:

LOAD DMSZIT(NOMAP)

If you have not modified the APLEXIT exec, using APNAMES can possibly cause a CMS storage loss in the following way. If you enter APL and load your AP using the APNAMES invocation option, your AP is put in the CMS GETMAIN storage area by means of the OS LOAD (SVC) simulation command. This OS LOAD command increments a pointer (LOCCNT) in HUCON to the next available location in GETMAIN storage. If you then leave APL, the LOCCNT pointer is not reset. The STRINIT macro then resets GETMAIN storage based on the LOCCNT pointer. Consequently, the next time you enter APL, your available GETMAIN storage will have been decreased by the amount of storage used by the AP invoked by APNAMES.

However, even if you have not modified the APLEXIT exec, you will reset the LOCCNT pointer and thus avoid the potential storage loss if you have performed one of the following actions between entering and leaving APL: issued a CMS LOAD command, issued a LOADMOD command, or invoked a nontransient module. The APLEXIT exec, once it has been modified as described above, achieves the same result by issuing a LOAD command each time you leave APL.

For more information about CMS storage handling, see IBM Virtual Machine/System Product: System Programmer's Guide.

For more information on specifying VS APL options when invoking VS APL, see VS APL for CMS: Terminal User's Guide.

CREATING AND MAINTAINING VS APL LIBRARIES

Both project and public libraries contain workspaces that are CMS files with filetypes of Wnnnnnnn, (where nnnnnnn is the library number). For example, public library workspace 1 NEMS is a CMS file with a filename of NEMS and a filetype of W0000001.

Any user can access the workspaces in a public library; however, only VS APL users who know the project library disk's read password can access project library workspaces. For information on which commands VS APL users can issue, see the section "Maintaining Public and Project Libraries."

The CMS file APLIBTAB APLIBTAB defines private, project, and public libraries. To create new libraries, add entries to APLIBTAB, as described in this section. Entries to APLIBTAB must begin in column one, and may not be more than one line. Separate operands with one or more blanks. VS APL users should have access to a copy of APLIBTAB, either on their A-disk or on any other accessed minidisk.

Workspaces added to libraries on a CMS minidisk not formatted with an 800-byte block size are written with a record length of 80 bytes.

NUMBERING LIBRARIES

When creating VS APL libraries, use the numbers 1 to 99 to define public libraries and any number greater than 1001 (but not more than seven digits) to define project libraries. VS APL uses the number 1001 to define private libraries.

Do not define libraries with the numbers 100 to 499; those numbers are reserved for auxiliary processors supplied with VS APL.

CREATING A PRIVATE LIBRARY

Library 1001 is defined as each user's private library in APLIBTAB.

To create a private library in addition to the default:

1. Add an entry to APLIBTAB. A private library entry has the format:

```
PRIVATE libnum|(first-libnum last-libnum)  
owner device | @ filemode
```

where

PRIVATE
is the library type. Only the first three letters are required.

libnum
is the library number. It can be any positive integer not defined for an auxiliary processor (any number greater than 1001 is recommended), but no greater than seven digits.

(first-libnum last-libnum)
is a range of library numbers; the first number must be less than or equal to the second number.

owner device
is the user identification of the owner and the virtual device address of the private library disk.

@ filemode
designates that the library libnum is on the minidisk filemode. If the minidisk is not accessed by the VS APL user, the library libnum is unavailable.

For example, to define a private library with a library number of 1003 for any VS APL user who has access to the minidisk G, add the entry:

```
PRIVATE 1003 @ G
```

To create a private library with a library number of 1002 and device address 191 for VS APL user VUSER, add the entry:

```
PRIVATE 1002 VUSER 191
```

2. Add workspaces by using VS APL commands. For information on VS APL commands, see VS APL for CMS: Terminal User's Guide.

CREATING A PROJECT LIBRARY

To create a project library:

1. Add an entry to APLIBTAB. A project library entry has the format:

```
PROJECT libnum|(first-libnum last-libnum) owner device  
[mode]
```

where

PROJECT
is the library type. Only the first three letters are required.

libnum
is the library number. It can be any positive integer not defined for an auxiliary processor (any number greater

than 1001 is recommended), but no greater than seven digits.

(first-libnum last-libnum)
is a range of library numbers; the first number must be less than or equal to the second number.

owner
is the identification of the owner of the project library disk.

device
is the virtual device address of the project library disk in the disk owner's directory.

mode
is the access mode when writing to the disk; the default is W (write-access).

For example, to create a project library that is owned by the CMS user with the identification of APLPROJ and is on APLPROJ's 197 disk, and has a library number of 4000, use the CMS editor to add this record to APLIBTAB:

```
PROJECT 4000 APLPROJ 197
```

2. Define the CMS minidisk for project libraries.

The procedure for defining a minidisk is described in IBM Virtual Machine Facility/370: Planning and System Generation Guide. When defining a project library minidisk, observe these guidelines:

- Define a minidisk in a user directory entry that is used for no other purpose than to contain the definition of the project library disk. This is recommended because VS APL links to a project library disk dynamically and cannot do so if a permanent link exists. If the disk is defined in an active user directory entry, it must be detached each time the user logs on.
- For maximum security, define a project library on a CMS minidisk that is used only to contain project libraries. Under CMS, passwords are defined for an entire minidisk, rather than for each file.
- Define passwords to impose the desired level of control. To allow uncontrolled access, define a password of ALL.

CREATING A PUBLIC LIBRARY

Public libraries 1 to 99 are defined in APLIBTAB; you can add new public library numbers or change the numbers of existing libraries.

To create a new public library:

1. Add an entry to APLIBTAB. A public library entry has the format:

```
PUBLIC libnum|(first-libnum last-libnum)  
[filemode]
```

where

PUBLIC
is the library type

libnum
is a library number; it can be any positive integer other than 1001 (the numbers 1 to 99 are recommended), but no greater than seven digits.

(first-libnum last-libnum)

is a range of library numbers; the first number must be less than or equal to the second number.

filemode

is a single letter that identifies the minidisk on which the public library or range of libraries is located. If omitted, Y is assumed.

For example, if you want to create a public library with a library number of 99 on your F-disk, use the CMS editor to add this entry to APLIBTAB:

```
PUBLIC 99 F
```

2. Add workspaces to the library by using VS APL commands. (See the section "Maintaining Public and Project Libraries" for how to use VS APL and CMS commands to add and delete library workspaces.)

To change the numbers assigned to existing public libraries, modify APLIBTAB entries. For example, to redefine public libraries 1 through 5 as libraries 6 through 10, use the CMS editor to change the entry:

```
PUBLIC (1 5) Y
```

to

```
PUBLIC (6 10) Y
```

MAINTAINING PUBLIC AND PROJECT LIBRARIES

Only a VS APL user with write access can delete, replace, or save workspaces in a public or project library. Any VS APL user can access workspaces in a **public** library; only VS APL users who know the read password for a **project** library minidisk can access workspaces in a project library.

To **add** or **replace** a workspace to a project or public library:

1. Have the VS APL user who created the workspace send it to you:

```
SPOOL PUNCH userid  
DISK DUMP filename filetype
```

where

userid

is your user identification.

filename filetype

is the workspace identification.

You can also have it sent to you with the CMS PUNCH command if the workspace has a record length of 80 bytes.

```
SPOOL PUNCH userid  
PUNCH filename filetype
```

where

userid

is your user identification.

filename filetype

is the workspace identification.

2. Transfer the workspace from your virtual reader to your A-disk.

If the VS APL user specified DISK DUMP to send the file to you, use the command:

```
DISK LOAD
```

If PUNCH was specified, use the command:

```
READCARD * *
```

3. Access the library disk for read/write, with any filemode (B is used in the following example):

```
CP LINK userid vaddr1 vaddr2 mode  
ACCESS vaddr2 B
```

where

userid
is the identification of the directory to be searched for the device vaddr1.

vaddr1
is the virtual device address in the directory.

vaddr2
is the virtual device address that is to be assigned to the minidisk.

mode
is W (write-access).

4. Copy the workspace from your A-disk to the library disk. For example:

```
COPYFILE NEWPUB VSAPLWS A = W0000003 B (REPLACE
```

Specify the REPLACE option only if the workspace is intended to replace one with the same identification. Rename the workspace by using the CMS COPYFILE command, as shown in the previous example, or do the following:

- a. Invoke VS APL.
- b. Load the workspace into your active workspace. For example:

```
)LOAD NEWS
```
- c. Add the workspace to the public or project library, changing the filetype to the library number. For example:

```
)SAVE 3 NEWS
```

To **delete** a workspace from a public or project library, either access the library disk for read/write, and issue:

```
)DROP 3 NEWS
```

Or the CMS ERASE command:

```
ERASE filename filetype filemode
```

where

filename filetype
is the workspace name and number.

filemode
identifies the library disk.

For information VS APL commands, see VS APL for CMS: Terminal User's Guide.

TRANSPORTING WORKSPACES AND VS APL DATA FILES

This section explains how to transfer workspaces and VS APL data files to and from direct access storage. You can transport workspaces and VS APL data files **OUT** of CMS by transferring them from VS APL libraries to tape. The tape can then be sent to another CMS installation, or to a CICS/VS, TSO, or VSPC installation.

You can transport workspaces and VS APL data files **in** to your VS APL system by obtaining a tape from another CMS installation, or a TSO, CICS/VS, or VSPC installation, and transferring the workspaces and files on the tape into VS APL libraries. For more information about exporting VS APL data files to CMS from CICS/VS or VSPC, see VS APL for CICS/VS: Installation Reference Material or VS APL for VSPC: Installation Reference Material.

You can use the same CMS commands to transport VS APL data files and workspaces. However, VS APL data files have different attributes from workspaces, so you should be careful to specify the correct record format and record length.

Direct VS APL data files have fixed record formats, with record lengths of up to 4054 bytes. Sequential VS APL data files have variable record formats, with record lengths of up to 4074 bytes per CMS block. The actual VS APL object can be longer and is written in as many CMS blocks as required.

TRANSPORTING IN TO CMS

At the CMS installation:

1. Ask the system operator to mount the tape and to attach the tape drive as virtual device 181, 182, 183, or 184.
2. Access for read/write the minidisks to which the workspaces or VS APL data files will be transferred.
3. Define the input device by issuing the CMS FILEDEF command. If you are transferring workspaces, issue the following command:

```
FILEDEF INMOVE TAPn (RECFM F LRECL 800 BLOCK 800
```

where n is 1, 2, 3, or 4 to represent device 181, 182, 183, or 184.

You can also use the FILEDEF command to define the output device when transporting VS APL data files. For example, to define an output device for a direct file with a record length and block size of 132, issue the command:

```
FILEDEF INMOVE TAPn (RECFM F LRECL 132
```

where n is 1, 2, 3, or 4 to represent device 181, 182, 183, or 184.

4. Transfer the workspaces or VS APL data files from tape to disk by issuing these CMS commands for each:

```
FILEDEF OUTMOVE DISK filename filetype filemode  
MOVEFILE
```

where

filename
is the name of the workspace or library.

filetype
is VSAPLWS if the workspace is transferred to a private library; it is Wnnnnnnnn if the workspace is transferred to a public or project library, where nnnnnnnn is the library number.

TRANSPORTING OUT OF CMS

At the CMS installation:

1. Have the system operator mount a scratch tape and attach the tape drive as virtual device 181, 182, 183, or 184.
2. Access for read/write the minidisk to which the workspaces will be transferred.
3. Define the output device with the CMS FILEDEF command. When transporting workspaces, issue the command:

```
FILEDEF OUTMOVE TAPn (RECFM FB LRECL m BLOCK 800
```

where

_n is 1, 2, 3, or 4 to represent device 181, 182, 183, or 184.

_m can be either 80 or 800, depending on the record length of the file.

Use the FILEDEF command to define the output device when transporting VS APL data files. For example, to define a sequential file with a variable-length record format and a maximum record length of 512, issue the command:

```
FILEDEF OUTMOVE TAPn (RECFM V LRECL 512
```

where _n is 1, 2, 3, or 4 to represent device 181, 182, 183, or 184.

4. Transfer the workspaces and VS APL data files to tape by issuing these CMS commands for each:

```
FILEDEF INMOVE DISK filename filetype filemode  
MOVEFILE
```

where

filename filetype filemode
is the CMS identification of the workspace.

5. When all workspaces have been transferred to tape, rewind and unload the tape:

```
TAPE RUN (TAPn
```

APPENDIX A. VIRTUAL STORAGE REQUIREMENTS

The virtual storage estimates in this appendix are based on a VS APL system with:

- One user having a workspace size of 96K bytes.
- All the auxiliary processors available, but not being used. (Use of the auxiliary processors increases the virtual storage estimates depending on which auxiliary processors are used. For example, using the APL Data File auxiliary processor under CMS requires additional virtual storage for each record processed; the amount of additional virtual storage depends on the size of the APL object.)

Figure 10 shows the minimum virtual machine size required to install and execute VS APL for each user, and to execute the conversion programs.

Subsystem	To Install	To Execute	To Execute Conversion Programs
Nonshared VS APL	1 Megabyte	1 Megabyte	200K + 3.1 x WS ² for APLCVCMS 200K + 2.1 x WS ³ for APLCVRPQ
Shared VS APL	SSA ¹ + 512K	512K + 400K (shared main storage)	as above

Figure 10. Virtual Storage Requirements

Notes to Figure 10

- ¹ SSA is the shared system's load address.
- ² WS is the size of each APL workspace.
- ³ WS is the size of the largest APL workspace.

Space requirements for other products, such as GDDM, are not included.

APPENDIX B. AUXILIARY STORAGE REQUIREMENTS

You need the following auxiliary storage to install VS APL:

- 3 megabytes on your A-disk
- 2 megabytes on your Y-disk

GLOSSARY

The following terms are defined as they are used in this book. If you do not find the term you are looking for, see the index, or the IBM Data Processing Glossary, GC20-1699.

A-disk. In CMS, a user's primary disk; accessed for read/write when a CMS terminal session is begun.

APLIBTAB. Formerly called the VS APL library table file. Defines private, public, and project libraries to VS APL.

content conversion. A type of workspace conversion in which the contents of a workspace are analyzed and modified. A list of functions that may not execute properly under VS APL is included in the conversion report. (See also **format conversion**.)

conversion program. Under CMS, the APLCVCHS program, which converts APL\360 and APLSV workspaces, or the APLCVRPQ program, which converts APL/CMS workspaces.

conversion report. A report that is produced by the conversion procedure. It lists information about the conversion process.

customize. To enhance or extend an IBM program by using services and built-in facilities provided by IBM for that purpose.

executor. The component of VS APL that provides environment-dependent services for the interpreter.

filemode. The third field of a CMS file identification. It identifies the minidisk on which the file resides.

filename. The first field of a CMS file identification. VS APL workspaces have filenames that are the same as their workspace names.

filetype. The second field of a CMS file identification; it may implicitly define certain file characteristics. Private library workspaces all have the same filetype; project and public library workspaces have a filetype of the letter W followed by a 7-digit library number.

format conversion. A type of conversion in which workspaces are modified so that they will execute under VS APL. Functions that may not execute under VS APL are not converted to their VS APL equivalent. (See also **content conversion**.)

full conversion. Workspace conversion in which all input workspaces are converted. (See also **selective conversion**.)

install. To make a program ready to do useful work. Includes generating a program, initializing it, and applying PTFs to it.

interpreter. The component of VS APL that scans, analyzes, and executes VS APL statements.

private library. A set of stored workspaces available to a specific VS APL user.

project library. A set of stored workspaces that can be shared among a selected set of VS APL users.

public library. A set of stored workspaces available to all VS APL users.

resource definition. The process of defining to the system those items users need to complete tasks.

session log. (See **VS APL session log**.)

selective conversion. Workspace conversion in which only specified input workspaces are converted. (See also **full conversion**.)

session manager. (See **VS APL session manager**.)

session manager profile. (See **VS APL session manager profile**.)

shared storage manager. The component of VS APL that manages the communication between auxiliary processors.

system disk. The disk that contains the CMS nucleus and disk-resident command modules; accessed for read-only when a CMS terminal session is begun.

VS APL session log. A record of a user's dialog with VS APL; analogous to a console log.

VS APL session manager. A component of VS APL that provides full-screen interaction with VS APL. It produces a log of your VS APL session, enables you to scroll through that log, and provides a set of commands for controlling your VS APL session.

VS APL session manager profile. The file which contains settings for the VS APL session manager.

workspace. The structure in which data, programs, execution status, and other information required by APL are stored. You have one active workspace while signed onto VS APL, and a number of saved workspaces. Only your active workspace is immediately available. To use a saved workspace, you must load it to make it active.

workspace identification. Consists of the library number of the workspace and the workspace name.

Y-disk. In CMS, A disk that is an extension of the system disk. It contains VS APL modules, procedures, and public libraries.

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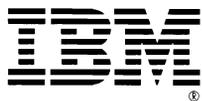
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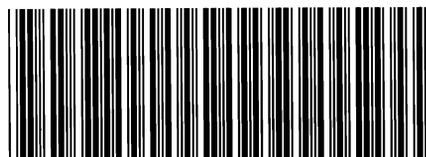
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