VM/ESA Design Approach for Year 2000 Support

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Introduction

Overview of Support

On October 31, 1995, IBM announced plans for Year 2000 support in its software products (see Announcement Letter 295-464 for details).

This document is an overview of IBM′s intended design of Year 2000 support for VM/ESA′s CP, CMS, and GCS components.

VM/ESA support of the Year 2000 will be implemented in 2 phases:

- Phase 1 will fix all problems in CP, CMS, and GCS related to 2-digit years and the Year 2000. Application Programming Interfaces (APIs) will be fixed and/or enhanced to handle date formats which include 4-digit years. Command externals will be enhanced to accept and/or display date formats which include 4-digit years. In addition, enhancements to current VM/ESA support for changing the system time of day (TOD) clock at IPL time are being investigated. These enhancements will make it easier to IPL VM/ESA with a system date in the year 2000 or later.
- Phase 2 will enhance additional (not covered in Phase 1) commands and functions which provide date output to display date formats which include 4-digit years. Additional items will also be investigated for possible implementation in Phase 2. For details, see "Items Under Investigation" on page 44.

Whenever possible, changes will be implemented in an upwardly compatible manner to minimize impact to existing applications. However, in some cases, maintaining compatibility between old and new function may not be desirable or practical.

Releases Supported

IBM′s intent is to provide Year 2000 support in VM/ESA Version 2 and VM/ESA Version 1 Release 2.2.

It is possible that not all of the functions described will be implemented on all VM/ESA releases where Year 2000 support is provided.

Effect of Year 2000 on VM/ESA Systems

IPLing a VM/ESA System in the Year 2000

VM/ESA Version 1 Release 2.1 and later systems will IPL correctly with a year of 2000 or later. For VM/ESA Version 1 Releases 2.1 and 2.2, APAR VM57927 must be applied. Beginning with VM/ESA Version 2 Release 1, this capability is included in the base VM system.

In order to change the date of your VM/ESA system, answer ′Yes′ to the ′Change TOD clock (Yes|No)′ prompt during IPL, and change the date and time to the desired date and time. To specify a year of 2000, simply enter ′00′ as the year (and ′01′ for 2001, etc.).

When the system date is changed, a SHUTDOWN REIPL command should be issued immediately after completion of the system IPL as indicated in message HCPITM1161I (this message is only displayed in VM/ESA Version 2, but the recommendation to re-IPL is valid for all levels of VM/ESA). The reason for this is by the time the ′Change TOD clock (Yes|No)′ prompt is issued, components of CP have already developed sensitivities to the actual value of the TOD (time of day) clock. These sensitivities may cause irregular scheduling and dispatching behavior if the value of the TOD clock is changed by a large amount (more than several minutes).

Why Do I Need VM/ESA′s Year 2000 Support?

Although VM/ESA can be correctly IPLed with a date of Year 2000 or later, there are some functions which will not work correctly. In addition, applications which require 4-digit years to execute correctly in the Year 2000 or later may require some of the new functions being added to VM/ESA to support dates in the Year 2000 and beyond.

The following are examples of VM/ESA functions which will not work correctly without VM/ESA′s Year 2000 support:

Control Program (CP): There will be no breakage of CP function caused by not migrating to a level of VM/ESA which supports Year 2000 and beyond. However, application programs and other products which rely upon CP date functions could be affected if they require 4-digit year output to execute correctly in the year 2000.

Conversational Monitor System (CMS): The following CMS functions will not work correctly without VM/ESA′s Year 2000 support:

- FILELIST sorts by date by default and lists the files from newest to oldest. Files with dates in the year of 2000 or later will be placed at the bottom of the list due to the sort acting on the 2-digit year.
- The FILELIST and LISTFILE commands allow BEFORE and AFTER options to list files with a timestamp before a specific date or after a specific date. This will not work correctly for files that have a year of 2000 or later. This is due to the fact that only the 2-digit year is stored (“00”). For example, if ′FILELIST * * A (BEFORE 01/01/99′ is issued, then files with dates in the years 2000-2098 would be included in the list since ′00′-′98′ are less than ′99′.
- Because RDRLIST only has the month and day and not the year to work with, the list of spool files in your virtual reader will not be sorted correctly. This is an existing problem which is not specific to year 2000.

Group Control System (GCS): The following GCS functions will not work correctly without VM/ESA's Year 2000 support:

- QUERY MODDATE LAST, which is a GCS service aid command, will not correctly provide a list of GCS modules compiled on the most recent compilation date if the date of compilation is in the year 2000 or later and GCS modules compiled before the year 2000 are also loaded.
- Application programs and other products which rely upon the GCS implementation of the OS TIME macro could be affected if they require the GCS output to be compatible with the MVS output for dates in the year 2000 or later.

Phase 1 Design Approach

Application Programming Interfaces

CP Diagnose Codes

Diagnose x′00′

The bit map output by Diagnose x′00′ will indicate whether the VM/ESA control program (CP) is Year 2000 enabled. Phase 1 and Phase 2 of CP Year 2000 support will also be indicated.

Diagnose x′14′, x′D8′

The following subcodes of Diagnose x′14′ and Diagnose x′D8′ return a 370-format spool file block (SFBLOK) with the date in format *mm/dd/yy*:

- Diagnose x′14′
  - x′0004′
  - x′0008′
  - x′0FFE′
  - x′0FFF′
- Diagnose x′D8′
  - x′0000′

A 1-byte century indicator, at displacement x′8F′, will be added to the SFBLOK returned by these subcodes. The byte will contain a hexadecimal representation of the century portion of the year (x′19′=′13′, x′20′=′14′, etc.).

Diagnose x′BC′

Subcodes x′0000′ and x′0004′ provide date information for a spool file in the format *mm/dd/yy*. The length of the data buffer which is returned by Diagnose x′BC′ is specified by the user.

Fields containing the spool file date in full-year (*mm/dd/yyyy*) and ISO (*yyyy-mm-dd*) formats will be added to the end of the data buffers returned by subcodes x′0000′ and x′0004′ of Diagnose x′BC′.

Diagnose x′270′

A new diagnose code, x′270′, will be defined. Diagnose x′270′ will return the same information as Diagnose x′0C′ with the addition of the date in full-year (*mm/dd/yyyy*) and ISO (*yyyy-mm-dd*) formats. The length of the output buffer will be defined by the user in the Ry register.

Privilege Class: Any

Use DIAGNOSE code X′270′ to cause CP to store the number of bytes of time and date information specified in the Ry register at the address specified in the Rx register.

Entry Values:

Rx
: Contains the address of an area where the time information is to be stored. The address must be in second-level storage (that is, in the storage that appears real to your virtual machine) and must be on a doubleword boundary.

Ax
: Is used only by XC virtual machines in access register mode. Ax contains the ALET for the address space containing the buffer where the time information is to be stored. When Rx is general register 0, Ax is not examined. The ALET is assumed to be X′00000000′, which indicates the host-primary address space.

Ry
: Contains the length of the buffer in bytes. 32 bytes are necessary to obtain the same output as Diagnose x′0C′. 48 bytes are necessary to obtain the output provided by Diagnose x′0C′ plus the date in the full-year format. 64 bytes are necessary to obtain the output provided by Diagnose x′0C′ plus the date in full-year format and the date in ISO format.

Exit Values: The output area contains the following information:

0	MM/DD/YY
8	HH:MM:SS
10	VIRTCPU
18	TOTALPROC
20	MM/DD/YYYY
30	YYYY-MM-DD

The first eight bytes of the output area contain the date (*mm/dd/yy*) in EBCDIC.

The next eight bytes contain the time of day (*hh:mm:ss*) in EBCDIC. The next eight bytes (16 through 23), VIRTCPU, contain the virtual time consumed by the virtual CPU that issued the DIAGNOSE instruction. The next eight bytes (24 through 31), TOTALPROC, contain the total of the virtual time (VIRTCPU) and the simulation time spent on behalf of the virtual CPU that issued the DIAGNOSE instruction. Thus, TOTALPROC is always greater than or equal to VIRTCPU. The difference between them represents the time that CP has spent specifically on behalf of the virtual CPU. VIRTCPU and TOTALPROC are doubleword, unsigned integers; the time is expressed in microseconds, not as TOD clock units. These values are also part of the response for the CP command INDICATE USER.

Bytes 32 through 41 contain the date in full year format (*mm/dd/yyyy*). Bytes 48 through 57 contain the date in ISO format (*yyyy-mm-dd*).

Callable Services Library (CSL) Routines

CMS File System CSL Routines

The CMS File System is comprised of minidisk, Shared File System (SFS), and Byte File System (BFS) files. Dates are a subset of the attributes maintained for all files. Applications can retrieve these dates by using Callable Services Library (CSL) routines. The date and time of the last update are supported for all three file systems. For SFS and BFS files, the date and time of creation of the file, the date of last reference, and the date and time of last change are maintained. Unlike minidisk and SFS files, the dates for BFS files are stored with 4-digit years, but as output from the CSL routines, only 2-digit years are returned.

Support will be added to allow 4-digit years to be entered as input and returned as output from CSL routines. This will be accomplished through a new parameter that will specify which format the input or output date parameter is in (2-digit year versus 4-digit year). For CSL routines that return dates in an output buffer, fields will be added to the end of the buffer that will contain the date(s) with 4-digit years.

The following approach will be taken when implementing 4-digit year support:

Note: Because input and output date parameters on these CSL routines are in *yy/mm/dd* format today, the formats will be *yy/mm/dd* (SHORTDATE) and *yyyy/mm/dd* (FULLDATE). There will not be a third keyword for ISODATE format.

1. For CSL routines that return the date along with other information in a buffer specified by the user, new field(s) will be added to the buffer for 4-digit year date(s).
2. For CSL routines that have an input or output parameter for a date and already have a keyword parameter (i.e. COMMIT/NOCOMMIT on DMSCLOSE), SHORTDATE and FULLDATE will be added as a new group to the keyword parameter. The date parameter will then reflect this format. To maintain compatibility with prior releases of VM, SHORTDATE will be the default. See the CMS Application Development Reference for more information on syntax and conventions for file I/O CSL routines.
3. For CSL routines that have an input or output parameter for a date and do not have an existing keyword parameter, a new keyword parameter will be added to the end of the parameter list that will signify the format of the date. The keywords will be SHORTDATE and FULLDATE. To maintain compatibility with prior releases of VM, SHORTDATE will be the default.
4. For CSL routine DMSERP (Extract/Replace), specific information names are related to date/time. New information names will be added that will give the same information back with 4-digit years instead of 2-digit years.

The tables below categorize the CSL routines based on the above approach.

Table 1. Case 1. CSL routines that will provide the SHORTDATE and FULLDATE formats of the date(s) in a buffer specified by the user.

CSL routine	Description
DMSEXIST	Checks for the existence of a file, directory, or external object and retrieves information about the file, directory, or external object.
DMSGETDI	Reads directory records after a directory has been opened using Open Directory (DMSOPDIR).
DMSRDCAT	Returns catalog information.

Table 2. Case 2. CSL routines that will add new keywords to an existing keyword parameter to specify the format of the input or output date.

CSL routine	Description
DMSCLBLK	Closes files that have been opened previously using Open Blocks (DMSOPBLK).
DMSCLDBK	Closes files that have been opened previously using the Open Data Block routine (DMSOPDBK)
DMSCLOSE	Closes files that have been opened previously using the Open routine (DMSOPEN).
DMSCRDIR	Creates a directory once you have been enrolled as a user in an SFS file pool.
DMSCRFIL	Creates a new empty file in an SFS directory.
DMSCROB	Creates an external object in an SFS directory.
DMSEXIDI	Checks for the existence of a directory and retrieves directory-related information.
DMSEXIFI	Checks for the existence of a file and retrieves file-related information.
DMSOPBLK	Prepares a file for subsequent use by DMSRDBLK, DMSWRBLK, or DMSCLBLK.
DMSOPDBK	Prepares a file for data block I/O operations.
DMSOPEN	Prepares a file for subsequent reading or writing of data records.
DMSTRUNC	Deletes records from the end of an existing minidisk or SFS file.

Table 3. Case 3. CSL routines that will have a new keyword parameter added to the end of the parameter list to specify the format of the input or output date.

CSL routine	Description
DMSENUSR	Enrolls one or more SFS users or one byte file system in a specified file pool.
Enrolls one or more users in a specified SFS file pool.	
DMSGETDA	Reads one directory record after a directory has been opened using Open Directory (DMSOPDIR).
DMSGETDF	Reads one directory record after a directory has been opened using Open Directory (DMSOPDIR) with an intent of FILE.
DMSGETDS	Reads one directory record after a directory has been opened using Open Directory (DMSOPDIR) with an intent of SEARCHAUTH.
DMSGETDX	Reads one directory record containing extended file attributes. The directory first needs to be opened using Open Directory (DMSOPDIR).

New CSL Routines

A general date/time conversion routine will be developed. This routine will compute date and time intervals between date/time stamps in various formats, as well as convert date/time stamps from one format to another.

Macros

OS Simulation TIME Macro

The MVS TIME macro that is simulated in VM (in both the GCS component and the CMS component) will provide century information in the output. The format will be:

Table 4. Century values for output from TIME macro

Hexadecimal value of CC in CCYYDDDF returned by TIME macro	Century	Time frame of Century
X′00′	20th	01/01/1901-12/31/2000
X′01′	21st	01/01/2001-12/31/2100
X′02′	22nd	01/01/2101-12/31/2200

CMS Pipelines Stages

There are currently no changes required for CMS Pipelines to support Year 2000 and beyond.

Date Formats for CP and CMS Commands

For CP and CMS commands which support multiple date formats, capability to set the default date format will be provided on a system-wide and user (virtual machine) basis. Default date formats may also be set for individual CMS commands which are supported by the DEFAULTS command.

Date formats for CP and CMS commands are defined as follows:

Table 5. Date Format Definitions for CP and CMS Commands

Name (Abbreviation in CAPS)	Format
SHOrtdate	mm/dd/yy (mm/dd in some cases)
FULldate	mm/dd/yyyy
ISOdate	yyyy-mm-dd
SYSdefault	Use the system-wide default setting
VMDate	Use the virtual machine's default setting

To maintain compatibility with prior releases of VM, unless specified otherwise, the system-wide and user settings will be initialized as indicated in the following table. Also shown is the initial setting for those CMS commands which are supported by the CMS DEFAULTS command and support multiple date formats. This will cause all commands to provide date output in the same format as in prior releases of VM.

Table 6. Initial Settings

Type	Date Format Default
System-wide	SHOrtdate
User (Virtual Machine)	SYSdefault
Commands supported by CMS DEFAULTS	VMDate

Setting Date Format Defaults

A new system configuration file statement, SYSTEM_DATEFormat, will allow the default system-wide date format to be set. New commands SET DATEFormat and QUERY DATEFormat will allow the default date formats for both the system and individual users to be set and queried. A new directory statement, DATEFormat, will allow a user's default date format to be specified in the directory.

SYSTEM_DATEFormat Statement

Use SYSTEM_DATEFormat to set the system-wide default date format.

If SYSTEM_DATEFormat is not specified, the system-wide default date format is SHOrtdate.

```
>--SYSTEM_DATEFormat--------+--SHOrtdate--+--------<<
                            |--FULldate---|
                            +--ISOdate----+
```

SET DATEFormat Command

Privilege Class - B,G

Use the SET DATEFormat command to set the default date format for individual users or the entire system.

If SET DATEFormat is not specified for an individual user, and there is not a DATEFORMAT statement in the user's directory entry, the default date format for that user is the system-wide default (SYSdefault).

```
                                            +---USER---+
                                            |          |
>-----SET DATEFormat--------+--SHOrtdate--+-----+----------+---<<
                            |--FULldate---|     |          |
                            |--ISOdate----|     +--SYSTEM--+
                            +--SYSdefault-+
```

- USER is the default for both Class B and G.
- SYSTEM is only valid for Class B.
- SYSdefault is not valid with SYSTEM.

QUERY DATEFormat Command

Privilege Class - B,G

Use QUERY DATEFormat to display the current default date format for an individual user or the system.

```
                            +---USER---+
                            |          |
>---Query DATEFormat--------+----------+---<<
                            |          |
                            +--SYSTEM--+
```

- USER is the default for both Class B and G.
- SYSTEM is only valid for Class B.

DATEFormat Directory Statement

The DATEformat statement specifies a user's default date format.

If DATEformat is not specified, and the SET DATEFormat command is not used to set a user's default date format, the default date format for that user is the system-wide default (SYSdefault).

```
>-----DATEFormat--------+--SHOrtdate--+--------------------<<
                        |--FULldate---|
                        |--ISOdate----|
                        +--SYSdefault-+
```

DEFAULTS Command

The DEFAULTS command will allow the default date format to be changed for CMS commands which support the new date formats and are supported by DEFAULTS (FILELIST and RDRLIST). The date format specified on the DEFAULTS SET command will override the user′s (virtual machine′s) default date format setting.

In addition to SHOrtdate, FULldate, and ISOdate, VMDate will also be supported as a date format option on those commands that are supported by the DEFAULTS command. When VMDate is specified for these commands, the virtual machine′s default date setting will be used. VMDate will not be supported on other CP and CMS commands; if no date format is specified on these commands, the virtual machine′s default setting will be used.

Individual Commands

Date formats may be specified on each CP and CMS command that provides dates as part of its output. Changes to these commands are described in “Command Changes” on page 18.

Date Format Priorities

The following are the date format priorities for CP and CMS commands (in order from highest to lowest):

- Command operand/option - this overrides all default settings
- DEFAULTS setting (for FILELIST and RDRLIST)
- Virtual machine default
- System-wide default

Summary

The system-wide date format setting will be initialized to SHOrtdate. This may be changed with either the system configuration file statement SYSTEM_DATEFormat or the SET DATEFormat command with the SYSTEM operand.

The user (virtual machine) date format will be initialized to the system-wide default (SYSdefault). This may be changed with either the DATEFormat statement in a user′s directory or the the SET DATEFormat command with the USER operand.

The CMS DEFAULTS command can be used to change the default date format on CMS commands that support multiple date formats and that are supported by the CMS DEFAULTS command.

Specifying the date format on the actual command takes precedence over all other settings in effect.

Command Changes

CP Commands

QUERY CPLEVEL

QUERY CPLEVEL will be changed to accept new operands to display dates with 2-digit years (same as the current response), 4-digit years, or in ISO format. If no date format operand is specified, the user's default date format setting will be used.

2-digit year (same as current response)

```
q cplevel SHOrtdate

VM/ESA Version 2 Release 1.0, service level 9505
Generated at 08/04/95 11:43:12 EDT
IPL at 08/04/95 14:38:09 EDT

------------------------------------------------

q cplevel SHOrtdate

VM/ESA Version 2 Release 1.0, service level 0005
Generated at 08/04/00 11:43:12 EDT
IPL at 08/04/00 14:38:09 EDT
```

4-digit year

```
q cplevel FULldate

VM/ESA Version 2 Release 1.0, service level 9505
Generated at 08/04/1995 11:43:12 EDT
IPL at 08/04/1995 14:38:09 EDT

------------------------------------------------

q cplevel FULldate

VM/ESA Version 2 Release 1.0, service level 0005
Generated at 08/04/2000 11:43:12 EDT
IPL at 08/04/2000 14:38:09 EDT
```

ISO format

```
q cplevel ISOdate

VM/ESA Version 2 Release 1.0, service level 9505
Generated at 1995-08-04  11:43:12 EDT
IPL at 1995-08-04 14:38:09 EDT

------------------------------------------------

q cplevel ISOdate

VM/ESA Version 2 Release 1.0, service level 0005
Generated at 2000-08-04  11:43:12 EDT
IPL at 2000-08-04 14:38:09 EDT
```

QUERY TIME

QUERY TIME will be enhanced to accept new operands to display dates with 2-digit years, 4-digit years, and in ISO format. If no date format operand is specified, the user's default date format setting will be used.

2-digit year (same as current response)

```
q time SHOrtdate

TIME IS 14:38:53 EDT FRIDAY 08/04/95
CONNECT= 00:00:20 VIRTCPU= 000:00.56 TOTCPU= 000:00.76

------------------------------------------------

q time SHOrtdate

TIME IS 14:38:53 EDT FRIDAY 08/04/00
CONNECT= 00:00:20 VIRTCPU= 000:00.56 TOTCPU= 000:00.76
```

4-digit year

```
q time FULldate

TIME IS 14:38:53 EDT FRIDAY 08/04/1995
CONNECT= 00:00:20 VIRTCPU= 000:00.56 TOTCPU= 000:00.76

------------------------------------------------

q time FULldate

TIME IS 14:38:53 EDT FRIDAY 08/04/2000
CONNECT= 00:00:20 VIRTCPU= 000:00.56 TOTCPU= 000:00.76
```

ISO format

```
q time ISOdate

TIME IS 14:38:53 EDT FRIDAY 1995-08-04
CONNECT= 00:00:20 VIRTCPU= 000:00.56 TOTCPU= 000:00.76

------------------------------------------------

q time ISOdate

TIME IS 14:38:53 EDT FRIDAY 2000-08-04
CONNECT= 00:00:20 VIRTCPU= 000:00.56 TOTCPU= 000:00.76
```

QUERY RDR/PRT/PUN/NSS/IMG/NLS/TRF/UCR ALL

QUERY RDR/etc. will be enhanced to accept new operands to display dates with no year (same as current output), 4-digit years, or in ISO format. If no date format operand is specified, the user's default date format setting will be used.

For QUERY RDR/PRT/PUN, a DIST/NODIST option will also be added to specify whether to display the distribution code with 4-digit years or ISO format dates. The default for these formats will be NODIST so each output record fits within an 80-character buffer.

No Year (same as current response)

q rdr all SHOrtdate

```
OWNERID  FILE CLASS RECORDS  CPY HOLD DATE  TIME     NAME      TYPE     DIST
OPERATOR 0002 A PUN 00000019 001 NONE 08/04 14:39:46 SCANMES   EXEC     35H:0253
OPERATOR 0003 A PUN 00000007 001 NONE 08/04 14:40:11 DIAGBC0   TEXT     35H:0253
OPERATOR 0004 A PUN 00000047 001 NONE 08/04 14:40:11 DIAGBC0   ASSEMBLE 35H:0253
```

4-digit year (default is NODIST)

q rdr all FULldate NODIST

```
OWNERID  FILE CLASS RECORDS  CPY HOLD DATE       TIME     NAME      TYPE
OPERATOR 0002 A PUN 00000019 001 NONE 08/04/1995 14:39:46 SCANMES   EXEC
OPERATOR 0003 A PUN 00000007 001 NONE 08/04/1995 14:40:11 DIAGBC0   TEXT
OPERATOR 0004 A PUN 00000047 001 NONE 08/04/1995 14:40:11 DIAGBC0   ASSEMBLE
```

----

q rdr all FULldate DIST

```
OWNERID  FILE CLASS RECORDS  CPY HOLD DATE       TIME     NAME      TYPE     DIST
OPERATOR 0002 A PUN 00000019 001 NONE 08/04/2000 14:39:46 SCANMES   EXEC     35H:0253
OPERATOR 0003 A PUN 00000007 001 NONE 08/04/2000 14:40:11 DIAGBC0   TEXT     35H:0253
OPERATOR 0004 A PUN 00000047 001 NONE 08/04/2000 14:40:11 DIAGBC0   ASSEMBLE 35H:0253
```

ISO format (default is NODIST)

q rdr all ISOdate NODIST

```
OWNERID  FILE CLASS RECORDS  CPY HOLD DATE       TIME     NAME      TYPE
OPERATOR 0002 A PUN 00000019 001 NONE 1995-08-04 14:39:46 SCANMES   EXEC
OPERATOR 0003 A PUN 00000007 001 NONE 1995-08-04 14:40:11 DIAGBC0   TEXT
OPERATOR 0004 A PUN 00000047 001 NONE 1995-08-04 14:40:11 DIAGBC0   ASSEMBLE
```

----

q rdr all ISOdate DIST

```
OWNERID  FILE CLASS RECORDS  CPY HOLD DATE       TIME     NAME      TYPE     DIST
OPERATOR 0002 A PUN 00000019 001 NONE 2000-08-04 14:39:46 SCANMES   EXEC     35H:0253
OPERATOR 0003 A PUN 00000007 001 NONE 2000-08-04 14:40:11 DIAGBC0   TEXT     35H:0253
OPERATOR 0004 A PUN 00000047 001 NONE 2000-08-04 14:40:11 DIAGBC0   ASSEMBLE 35H:0253
```

CPLISTFILE

CPLISTFILE will be enhanced to accept new operands to display file dates with 2-digit years, 4-digit years, and in ISO format. If no date format operand is specified, the user's default date format setting will be used.

2-digit year (same as current response)

cplistfile * * a SHOrtdate

Filename	Filetype	FM	Fmt	LRecL	Records	Date	Time	Cache
CPLOAD	MODULE	A	V	65535	70	09/01/95	13:26:21	No
DEFAULT	LOGO	A	F	80	16	06/08/00	13:57:58	No
ESA210	CONFIG	A	F	80	124	06/14/95	10:35:32	No
JAF1	LOGO	A	F	78	16	01/23/95	15:45:00	No
JAF1	MESSAGE	A	F	78	1	01/23/95	16:00:18	No
JAF1RDEV	CONFIG	A	F	80	73	01/10/95	10:43:42	No
LOCAL	LOGO	A	F	78	15	04/27/00	15:42:07	No
LOGO	CONFIG	A	F	80	35	06/16/94	13:05:08	No

4-digit year

cplistfile * * a FULldate

Filename	Filetype	FM	Fmt	LRecL	Records	Date	Time	Cache
CPLOAD	MODULE	A	V	65535	70	09/01/1995	13:26:21	No
DEFAULT	LOGO	A	F	80	16	06/08/2000	13:57:58	No
ESA210	CONFIG	A	F	80	124	06/14/1995	10:35:32	No
JAF1	LOGO	A	F	78	16	01/23/1995	15:45:00	No
JAF1	MESSAGE	A	F	78	1	01/23/1995	16:00:18	No
JAF1RDEV	CONFIG	A	F	80	73	01/10/1995	10:43:42	No
LOCAL	LOGO	A	F	78	15	04/27/2000	15:42:07	No
LOGO	CONFIG	A	F	80	35	06/16/1994	13:05:08	No

ISO format

cplistfile * * a ISOdate

Filename	Filetype	FM	Fmt	LRecL	Records	Date	Time	Cache
CPLOAD	MODULE	A	V	65535	70	1995-09-01	13:26:21	No
DEFAULT	LOGO	A	F	80	16	2000-06-08	13:57:58	No
ESA210	CONFIG	A	F	80	124	1995-06-14	10:35:32	No
JAF1	LOGO	A	F	78	16	1995-01-23	15:45:00	No
JAF1	MESSAGE	A	F	78	1	1995-01-23	16:00:18	No
JAF1RDEV	CONFIG	A	F	80	73	1995-01-10	10:43:42	No
LOCAL	LOGO	A	F	78	15	2000-04-27	15:42:07	No
LOGO	CONFIG	A	F	80	35	1994-06-16	13:05:08	No

Stand-Alone Program Loader

The FILELIST function (PF9) currently displays dates in format *yy/mm/dd*. This will be changed to *yyyy-mm-dd*.

CMS Commands

FILELIST and LISTFILE

To support dates in year 2000 and beyond, the FILELIST and LISTFILE commands will be changed as follows:

- The BEFORE and AFTER options will be changed to support dates in year 2000 and beyond. The dates entered with the BEFORE and AFTER options may be in format *mm/dd/yy*, *mm/dd/yyyy*, or *yyyy-mm-dd*.
- FILELIST and LISTFILE will correctly sort files newest to oldest by default.
- FILELIST and LISTFILE will each have new options that will display dates with 2-digit years, 4-digit years, or in ISO format. In order for the 4-digit year and ISO formats to be displayed, the command area on the left-hand side of the panel will be reduced.

  FILELIST will also support a new date format option, VMDate. This option will cause FILELIST to display dates in the user's default date format.

If no date format option is specified, FILELIST will use the DEFAULTS date format setting, if one exists. Otherwise, the user's default date format setting will be used.

How FILELIST works today (without Year 2000 support)

```
FILELIST

 FORTUNAT FILELIST A0   V 108   Trunc=108  Size=902  Line=1  Col=1  Alt=2
Cmd    Filename Filetype Fm Format Lrecl      Records       Blocks    Date       Time
       IDENTIFY CHANGES  A1 F        132            5            1  10/02/95  11:03:38
       NOTE     CHANGES  A0 V         71           13            1  10/02/95  11:02:13
       RDRLIST  CHANGES  A1 V         79           30            1  01/01/00  12:52:34



1= Help       2= Refresh   3= Quit   4= Sort(type)   5= Sort(date)   6= Sort(size)
7= Backward   8= Forward   9= FL /n  10=             11= XEDIT/LIST  12= Cursor
```

FILELIST with 2-digit years and Year 2000 support

```
FILELIST (SHOrtdate

 FORTUNAT FILELIST A0   V 108   Trunc=108  Size=902  Line=1  Col=1  Alt=2
Cmd    Filename Filetype Fm Format Lrecl      Records       Blocks    Date       Time
       RDRLIST  CHANGES  A1 V         79           30            1  01/01/00  12:52:34
       IDENTIFY CHANGES  A1 F        132            5            1  10/02/95  11:03:38
       NOTE     CHANGES  A0 V         71           13            1  10/02/95  11:02:13



1= Help       2= Refresh   3= Quit   4= Sort(type)   5= Sort(date)   6= Sort(size)
7= Backward   8= Forward   9= FL /n  10=             11= XEDIT/LIST  12= Cursor
```

FILELIST with 4-digit years

```
FILELIST (FULldate

 FORTUNAT FILELIST A0   V 108   Trunc=108  Size=902  Line=1  Col=1  Alt=2
Cmd Filename Filetype Fm Format Lrecl      Records       Blocks     Date        Time
    RDRLIST  CHANGES  A1 V         79           30            1  01/01/2000  12:52:34
    IDENTIFY CHANGES  A1 F        132            5            1  10/02/1995  11:03:38
    NOTE     CHANGES  A0 V         71           13            1  10/02/1995  11:02:13



1= Help       2= Refresh   3= Quit   4= Sort(type)   5= Sort(date)   6= Sort(size)
7= Backward   8= Forward   9= FL /n  10=             11= XEDIT/LIST  12= Cursor
```

FILELIST with date in ISO format

```
FILELIST (ISOdate
 FORTUNAT FILELIST A0   V 108   Trunc=108  Size=902  Line=1  Col=1  Alt=2
Cmd Filename Filetype Fm Format Lrecl      Records       Blocks     Date        Time
    RDRLIST  CHANGES  A1 V         79           30            1  2000-01-01  12:52:34
    IDENTIFY CHANGES  A1 F        132            5            1  1995-10-02  11:03:38
    NOTE     CHANGES  A0 V         71           13            1  1995-10-02  11:02:13



1= Help       2= Refresh   3= Quit   4= Sort(type)   5= Sort(date)   6= Sort(size)
7= Backward   8= Forward   9= FL /n  10=             11= XEDIT/LIST  12= Cursor
```

IDENTIFY

The IDENTIFY command will be enhanced to accept new options to display the date with 2-digit years, 4-digit years, and in ISO format. If no date format option is specified, the user′s default date format setting will be used.

2-digit years (same as current)

```
IDENTIFY (SHOrtdate

FORTUNAT AT GDLVM7    VIA RSCS      10/02/95  11:02:50  EDT        MONDAY

          ------------------------------------------------

IDENTIFY (SHOrtdate

FORTUNAT AT GDLVM7    VIA RSCS      10/02/00  11:02:50  EDT        MONDAY
```

4-digit years

```
IDENTIFY (FULldate

FORTUNAT AT GDLVM7    VIA RSCS      10/02/1995  11:02:50  EDT        MONDAY

          ------------------------------------------------

IDENTIFY (FULldate

FORTUNAT AT GDLVM7    VIA RSCS      10/02/2000  11:02:50  EDT        MONDAY
```

ISO format

```
IDENTIFY (ISOdate

FORTUNAT AT GDLVM7    VIA RSCS      1995-10-02  11:02:50  EDT        MONDAY

          ------------------------------------------------

IDENTIFY (ISOdate

FORTUNAT AT GDLVM7    VIA RSCS      2000-10-02  11:02:50  EDT        MONDAY
```

NOTE

The date header that appears when you issue the NOTE command will be changed from a 2-digit year to a 4-digit year.

```
Date: 2 October 1995, 11:01:20 EDT
From: Susan F. Timashenka                        FORTUNAT at GDLVM7
To:   JFRANCIS at GDLVM7

      ------------------------------------------------

Date: 2 October 2000, 11:01:20 EDT
From: Susan F. Timashenka                        FORTUNAT at GDLVM7
To:   JFRANCIS at GDLVM7
```

RDRLIST

RDRLIST will be enhanced to correctly sort files in chronological order. The problem of files being sorted without respect to the calendar year will be fixed.

New options will be added to RDRLIST to display file dates with no year (same as current response), 4-digit years, and in ISO format. In order for these new formats to be displayed, the command area on the left-hand side of the panel will be reduced.

RDRLIST will also support a new date format option, VMDate. This option will cause RDRLIST to use the user's default date format.

If no date format option is specified, RDRLIST will use the DEFAULTS date format setting, if one exists. Otherwise, the user's default date format setting will be used.

No year (same as current output)

RDRLIST (SHOrtdate

```
 FORTUNAT RDRLIST   A0   V 164   Trunc=164  Size=48  Line=1  Col=1  Alt=0
Cmd   Filename Filetype Class User   at Node      Hold  Records  Date      Time
      FIELDS   GDLVM7   PUN A FIELDS   GDLVM7    NONE       187  08/04     15:52:23
      JFRANCIS NOTE     PUN A JFRANCIS GDLVM7    NONE        24  08/07     12:04:24
      FIELDS   GDLVM7   PUN A FIELDS   GDLVM7    NONE       213  08/08     05:55:09
      TIMASHEN NOTE     PUN A TIMASHEN GDLVM7    NONE         6  08/15     11:20:22
      GREGREID NOTE     PUN A GREGREID TOROLAB6  NONE        21  08/16     10:13:14
      JFRANCIS NOTE     PUN A JFRANCIS GDLVM7    NONE        28  01/01     15:47:23


1= Help      2= Refresh  3= Quit     4= Sort(type)  5= Sort(date)  6= Sort(user)
7= Backward  8= Forward  9= Receive  10=           11= Peek       12= Cursor
```

4-digit year

RDRLIST (FULldate

```
 FORTUNAT RDRLIST   A0   V 164   Trunc=164  Size=48  Line=1  Col=1  Alt=0
Cmd  Filename Filetype Class User   at Node      Hold  Records    Date      Time
     FIELDS   GDLVM7   PUN A FIELDS   GDLVM7    NONE       187  08/04/1995  15:52:23
     JFRANCIS NOTE     PUN A JFRANCIS GDLVM7    NONE        24  08/07/1995  12:04:24
     FIELDS   GDLVM7   PUN A FIELDS   GDLVM7    NONE       213  08/08/1995  05:55:09
     TIMASHEN NOTE     PUN A TIMASHEN GDLVM7    NONE         6  08/15/1995  11:20:22
     GREGREID NOTE     PUN A GREGREID TOROLAB6  NONE        21  08/16/1995  10:13:14
     JFRANCIS NOTE     PUN A JFRANCIS GDLVM7    NONE        28  01/01/2000  15:47:23


1= Help      2= Refresh  3= Quit     4= Sort(type)  5= Sort(date)  6= Sort(user)
7= Backward  8= Forward  9= Receive  10=           11= Peek       12= Cursor
```

ISO format

RDRLIST (ISOdate

```
 FORTUNAT RDRLIST   A0   V 164   Trunc=164  Size=48  Line=1  Col=1  Alt=0
Cmd  Filename Filetype Class User   at Node      Hold  Records    Date      Time
     FIELDS   GDLVM7   PUN A FIELDS   GDLVM7    NONE       187  1995-08-04  15:52:23
     JFRANCIS NOTE     PUN A JFRANCIS GDLVM7    NONE        24  1995-08-07  12:04:24
     FIELDS   GDLVM7   PUN A FIELDS   GDLVM7    NONE       213  1995-08-08  05:55:09
     TIMASHEN NOTE     PUN A TIMASHEN GDLVM7    NONE         6  1995-08-15  11:20:22
     GREGREID NOTE     PUN A GREGREID TOROLAB6  NONE        21  1995-08-16  10:13:14
     JFRANCIS NOTE     PUN A JFRANCIS GDLVM7    NONE        28  2000-01-01  15:47:23


1= Help      2= Refresh  3= Quit     4= Sort(type)  5= Sort(date)  6= Sort(user)
7= Backward  8= Forward  9= Receive  10=           11= Peek       12= Cursor
```

DEFAULTS

DEFAULTS will be enhanced to allow the new date format options (SHOrtdate, FULldate, ISOdate, and VMDate) to be set as defaults for RDRLIST and FILELIST.

GCS Commands

QUERY MODDATE

QUERY MODDATE will be enhanced to display dates with 4-digit years.

Example of QUERY MODDATE with 4-digit years

```
q moddate gctits

Date of GCTITS is 10/09/1995

------------------------------------------------

q moddate last

Date of GCTACC is 10/05/2001
```

IPL Message

The message displayed when GCS is IPLed will be enhanced to display dates with 4-digit years.

Example of IPL GCS with 4-digit years

```
i gcsr30

GCS Release 3.0
Generated at 08/04/1995 08:01:38
GCTACC423I A (0191) R/W

------------------------------------------------

i gcsr30

GCS Release 3.0
Generated at 08/04/2000 08:01:38
GCTACC423I A (0191) R/W
```

OpenEdition Commands and Callable Services

With the exception of the Distributed Computing Environment (DCE) feature for VM/ESA, OpenEdition VM, including the Byte File System (BFS), does not require any changes in order to support Year 2000 and beyond since 4-digit years are already maintained. The DCE Feature is still being evaluated.

REXX and EXEC2 changes

The DIAG function provided with REXX/VM will be enhanced to support the new Diagnose x′270′ (see "Diagnose x′270′" on page 9. for more information). You will also be able to take advantage of the 4-digit year support being added to Diagnose x′14′ and Diagnose x′BC′ through the REXX/VM DIAG function.

The &DATE statement in EXEC 2 will be enhanced to support a 4-digit year. This will be accomplished through a new argument added to &DATE.

Internals

Change Time of Day Clock During IPL

Enhancements to remove the requirement to re-IPL VM/ESA after changing the system time-of-day (TOD) clock (see "IPLing a VM/ESA System in the Year 2000" on page 6) are being investigated. If feasible, these enhancements will be implemented during Phase 1 of VM/ESA′s Year 2000 support.

System Flags

A 4-digit year will be stored in a new field in the system common area (HCPSYSCM) whenever the existing SYSYEAR field is updated.

A new flag will be added to HCPSYSCM to indicate that this is a Year 2000 enabled system.

SPTAPE

When a spool file is SPTAPE DUMPed, the century portion of the year will be stored in hexadecimal at displacement x′8F′ in the SFBLOK that is stored on tape (the spool file date is currently stored in format *mm/dd/yy* at displacement x′40′).

When a spool file is SPTAPE LOADed, the century portion of the year will be included in the date which is used to compute the TOD clock value in the SPFBK of the spool file that is being loaded. If the century field has not been set (this could occur when a loading a file that was dumped from an earlier release VM system), a sliding window will be used to determine the century portion of the year.

FST (File Status Table)

When you access a disk or SFS directory, a file directory is stored in your virtual machine. The entries in the file directory for each CMS file are called the File Status Tables (FST). The FSTs describe the attributes of each file. One of the attributes of a file is the date/time of the last update which is currently stored in 6 bytes (*yy mm dd hh mm ss*), where each byte holds two decimal digits. This is the date and time that the accessed file was last updated.

Support will be added to allow for a 4-digit year by adding a century flag FSTCENTW (x′08′) in the FST flag byte (FSTFLAGS) for both FST forms (see table below). This is bit 4. Bit 4 will describe the century the file was last written or updated. If bit 4 is off, then the year is in the 1900s. If bit 4 is on, then the year is in the 2000s. This solution supports years in the range 1900-2099.

If you are interested in the existing flag settings for the FSTFLAGS field, refer to the Usage notes under the FSSTATE macro in the VM/ESA CMS Application Development Reference for Assembler.

If you are using the FST to retrieve the date and time of the last file update in your application, you can add support to use the appropriate CSL routine (see "CMS File System CSL Routines" on page 11) or add support to use the new FSTCENTW flag.

The following is a portion of the FST mapping:

Table 7. Base v. Extended FST Format (not all field names shown)						
Hex Disp	**Dec Disp**	**Size**	**Base**	**Ext**	**Field Name**	**Field Name Description**
0	0	16	B	E	FSTDFNFT	File name File type
		8	B	E	FSTFNAME	File name
		8	B	E	FSTFTYPE	File type
10	16	2	B		FSTDATEW	Date (mm yy) last written
1F	31	1	B	E	FSTFLAGS	FST flag byte
		1 bit	B	E	FSTCENTW	x′08′-Century last written (0=19,1=20)
26	38	2	B		FSTYEARW	Year (yy) last written
36	54	6		E	FSTADATI	Alternate date/time (yy mm dd hh mm ss)

Phase 2 Design Approach

CP Commands

LOGON/LOGOFF/FORCE/DISCONNECT

The responses for the LOGON, LOGOFF, FORCE, and DISCONNECT commands will be changed to display the date according to the system-wide default setting.

- SHOrtdate (current)

  ```
  LOGON AT 09:33:15 EDT FRIDAY 09/08/95

  LOGOFF AT 09:34:14 EDT FRIDAY 09/08/95

  DISCONNECT AT 09:34:55 EDT FRIDAY 09/08/95

  DISCONNECT AT 09:36:20 EDT FRIDAY 09/08/95 BY OPERATOR

  RECONNECTED AT 09:35:41 EDT FRIDAY 09/08/95

  LOGOFF AT 09:37:50 EDT FRIDAY 09/08/95 BY OPERATOR
  ```

- FULldate

  ```
  LOGON AT 09:33:15 EDT FRIDAY 09/08/1995

  LOGOFF AT 09:34:14 EDT FRIDAY 09/08/1995

  DISCONNECT AT 09:34:55 EDT FRIDAY 09/08/1995

  DISCONNECT AT 09:36:20 EDT FRIDAY 09/08/1995 BY OPERATOR

  RECONNECTED AT 09:35:41 EDT FRIDAY 09/08/1995

  LOGOFF AT 09:37:50 EDT FRIDAY 09/08/1995 BY OPERATOR
  ```

- ISOdate

  ```
  LOGON AT 09:33:15 EDT FRIDAY 1995-09-08

  LOGOFF AT 09:34:14 EDT FRIDAY 1995-09-08

  DISCONNECT AT 09:34:55 EDT FRIDAY 1995-09-08

  DISCONNECT AT 09:36:20 EDT FRIDAY 1995-09-08 BY OPERATOR

  RECONNECTED AT 09:35:41 EDT FRIDAY 1995-09-08

  LOGOFF AT 09:37:50 EDT FRIDAY 1995-09-08 BY OPERATOR
  ```

QUERY CPXLOAD

The response for the QUERY CPXLOAD command will be changed to display the date according to the user's default date format setting.

- SHOrtdate (same as current response)

```
Loaded as identifier 0
  File: HCPJAF    TEXT     A
  Loaded by: SYSTEM on 09/08/95 at 09:47:58
  CPXLOAD options: NODELAY NOCONTROL TEMPORARY
  Associated entry points and external symbols:
    HCPMJL00 is at 0044B020
    HCPMJL04 is at 0044B078
    HCPMJL08 is at 0044B0D0
    HCPMJL99 is at 0044B128
    HCPMJL   is at 0044B000    module size is 000178
```

- FULldate

```
Loaded as identifier 0
  File: HCPJAF    TEXT     A
  Loaded by: SYSTEM on 09/08/1995 at 09:47:58
  CPXLOAD options: NODELAY NOCONTROL TEMPORARY
  Associated entry points and external symbols:
    HCPMJL00 is at 0044B020
    HCPMJL04 is at 0044B078
    HCPMJL08 is at 0044B0D0
    HCPMJL99 is at 0044B128
    HCPMJL   is at 0044B000    module size is 000178
```

- ISOdate

```
Loaded as identifier 0
  File: HCPJAF    TEXT     A
  Loaded by: SYSTEM on 1995-09-08 at 09:47:58
  CPXLOAD options: NODELAY NOCONTROL TEMPORARY
  Associated entry points and external symbols:
    HCPMJL00 is at 0044B020
    HCPMJL04 is at 0044B078
    HCPMJL08 is at 0044B0D0
    HCPMJL99 is at 0044B128
    HCPMJL   is at 0044B000    module size is 000178
```

LOGMSG Header Display

The LOGMSG header, which is displayed when a user logs on or reconnects and when QUERY LOGMSG is issued, will be changed to display the date according to the user's default date format setting.

- SHOrtdate (same as current response)

```
q logmsg
LOGMSG - 10:17:32 EDT Friday 09/08/95
*****************************************************************
*                                                               *
*  This is a test LOGMSG file.                                  *
*                                                               *
*****************************************************************
```

- FULldate

```
q logmsg
LOGMSG - 10:17:32 EDT Friday 09/08/1995
*****************************************************************
*                                                               *
*  This is a test LOGMSG file.                                  *
*                                                               *
*****************************************************************
```

- ISOdate

```
q logmsg
LOGMSG - 10:17:32 EDT Friday 1995-09-08
*****************************************************************
*                                                               *
*  This is a test LOGMSG file.                                  *
*                                                               *
*****************************************************************
```

Other CP Date Outputs

Midnight Message

The midnight message will be changed to display the date according to the system-wide default setting.

- SHOrtdate (current)

  00:00:00 HCPMID6001I TIME IS 00:00:00 EDT SATURDAY 09/09/95

- FULldate

  00:00:00 HCPMID6001I TIME IS 00:00:00 EDT SATURDAY 09/09/1995

- ISOdate

  00:00:00 HCPMID6001I TIME IS 00:00:00 EDT SATURDAY 1995-09-09

SPXTAPE Log Files

Command Summary Logs

Date displays in SPXTAPE Command Summary Logs will be changed to display the date according to the user's default date format setting.

- SHOrtdate (same as current response)

```
09/08/95 11:22:22 OPERATOR SPXTAPE DUMP 181 USER * RDR ALL REW
SPXTAPE DUMP    INITIATED ON VDEV 0181
SPXTAPE DUMP COMMAND COMPLETED   ON VDEV 0181

TIME STARTED:        11:22:22
TIME ENDED:          11:22:26

TAPE COUNT:               001
FILES PROCESSED:           11
SPOOL PAGES:               51
```

- FULldate

```
09/08/1995 11:22:22 OPERATOR SPXTAPE DUMP 181 USER * RDR ALL REW
SPXTAPE DUMP    INITIATED ON VDEV 0181
SPXTAPE DUMP COMMAND COMPLETED   ON VDEV 0181

TIME STARTED:        11:22:22
TIME ENDED:          11:22:26

TAPE COUNT:               001
FILES PROCESSED:           11
SPOOL PAGES:               51
```

- ISOdate

```
1995-09-08 11:22:22 OPERATOR SPXTAPE DUMP 181 USER * RDR ALL REW
SPXTAPE DUMP    INITIATED ON VDEV 0181
SPXTAPE DUMP COMMAND COMPLETED   ON VDEV 0181

TIME STARTED:        11:22:22
TIME ENDED:          11:22:26

TAPE COUNT:               001
FILES PROCESSED:           11
SPOOL PAGES:               51
```

Volume Logs

Date displays in SPXTAPE Volume Logs will be changed to display the date according to the user's default date format setting. This includes summary information as well as the information displayed for each file that was processed.

- SHOrtdate (same as current response)

```
09/08/95 11:22:22 OPERATOR SPXTAPE DUMP 181 USER * RDR ALL REW
SPXTAPE DUMP COMPLETED   ON VDEV 0181

TAPE NUMBER:          0181-001
FILES PROCESSED:            11
SPOOL PAGES:                51

USERID   FILE QUEUE FILENAME FILETYPE OPENDATE OPENTIME ORIGINID SIZE     SEG_STAT HOLDSTAT RECCOUNT C FORM     DEST     LASTPAGE
OPERATOR 0002 RDR   MYSAL    EXEC     09/08/95 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000016 A STANDARD OFF      00000001
OPERATOR 0003 RDR   SYSTEM   LOGMSG   09/08/95 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000013 A STANDARD OFF      00000001
OPERATOR 0004 RDR   EDLE0    EXEC     09/08/95 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000007 A STANDARD OFF      00000001
OPERATOR 0006 RDR   XNEW     EXEC     09/08/95 11:21:50 OPERATOR 00000001 COMPLETE NONE     00000004 A STANDARD OFF      00000001
OPERATOR 0005 RDR   XNEW     EXEC     09/08/95 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000004 A STANDARD OFF      00000001
OPERATOR 0009 RDR   HCPSYS   TXTBE0   09/08/95 11:21:51 OPERATOR 00000019 COMPLETE NONE     00000784 A STANDARD OFF      00000019
OPERATOR 0007 RDR   JAF1     NETLOG   09/08/95 11:21:50 OPERATOR 00000007 COMPLETE NONE     00000271 A STANDARD OFF      00000007
OPERATOR 0008 RDR   HCPRIOCP TXTBE0   09/08/95 11:21:51 OPERATOR 00000002 COMPLETE NONE     00000066 A STANDARD OFF      00000002
OPERATOR 0010 RDR   SYSTEM   CONFIG   09/08/95 11:21:51 OPERATOR 00000005 COMPLETE NONE     00000210 A STANDARD OFF      00000005
OPERATOR 0011 RDR   CPLISTF  FILE     09/08/95 11:21:51 OPERATOR 00000001 COMPLETE NONE     00000015 A STANDARD OFF      00000001
OPERATOR 0012 RDR   SCANMES  EXEC     09/08/95 11:21:52 OPERATOR 00000001 COMPLETE NONE     00000011 A STANDARD OFF      00000001
```

- FULldate

```
09/08/1995 11:22:22 OPERATOR SPXTAPE DUMP 181 USER * RDR ALL REW
SPXTAPE DUMP COMPLETED   ON VDEV 0181

TAPE NUMBER:          0181-001
FILES PROCESSED:            11
SPOOL PAGES:                51

USERID   FILE QUEUE FILENAME FILETYPE OPENDATE   OPENTIME ORIGINID SIZE     SEG_STAT HOLDSTAT RECCOUNT C FORM     DEST     LASTPAGE
OPERATOR 0002 RDR   MYSAL    EXEC     09/08/1995 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000016 A STANDARD OFF      00000001
OPERATOR 0003 RDR   SYSTEM   LOGMSG   09/08/1995 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000013 A STANDARD OFF      00000001
OPERATOR 0004 RDR   EDLE0    EXEC     09/08/1995 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000007 A STANDARD OFF      00000001
OPERATOR 0006 RDR   XNEW     EXEC     09/08/1995 11:21:50 OPERATOR 00000001 COMPLETE NONE     00000004 A STANDARD OFF      00000001
OPERATOR 0005 RDR   XNEW     EXEC     09/08/1995 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000004 A STANDARD OFF      00000001
OPERATOR 0009 RDR   HCPSYS   TXTBE0   09/08/1995 11:21:51 OPERATOR 00000019 COMPLETE NONE     00000784 A STANDARD OFF      00000019
OPERATOR 0007 RDR   JAF1     NETLOG   09/08/1995 11:21:50 OPERATOR 00000007 COMPLETE NONE     00000271 A STANDARD OFF      00000007
OPERATOR 0008 RDR   HCPRIOCP TXTBE0   09/08/1995 11:21:51 OPERATOR 00000002 COMPLETE NONE     00000066 A STANDARD OFF      00000002
OPERATOR 0010 RDR   SYSTEM   CONFIG   09/08/1995 11:21:51 OPERATOR 00000005 COMPLETE NONE     00000210 A STANDARD OFF      00000005
OPERATOR 0011 RDR   CPLISTF  FILE     09/08/1995 11:21:51 OPERATOR 00000001 COMPLETE NONE     00000015 A STANDARD OFF      00000001
OPERATOR 0012 RDR   SCANMES  EXEC     09/08/1995 11:21:52 OPERATOR 00000001 COMPLETE NONE     00000011 A STANDARD OFF      00000001
```

- ISOdate

```
1995-09-08 11:22:22 OPERATOR SPXTAPE DUMP 181 USER * RDR ALL REW
SPXTAPE DUMP COMPLETED   ON VDEV 0181

TAPE NUMBER:          0181-001
FILES PROCESSED:            11
SPOOL PAGES:                51

USERID   FILE QUEUE FILENAME FILETYPE OPENDATE   OPENTIME ORIGINID SIZE     SEG_STAT HOLDSTAT RECCOUNT C FORM     DEST     LASTPAGE
OPERATOR 0002 RDR   MYSAL    EXEC     1995-09-08 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000016 A STANDARD OFF      00000001
OPERATOR 0003 RDR   SYSTEM   LOGMSG   1995-09-08 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000013 A STANDARD OFF      00000001
OPERATOR 0004 RDR   EDLE0    EXEC     1995-09-08 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000007 A STANDARD OFF      00000001
OPERATOR 0006 RDR   XNEW     EXEC     1995-09-08 11:21:50 OPERATOR 00000001 COMPLETE NONE     00000004 A STANDARD OFF      00000001
OPERATOR 0005 RDR   XNEW     EXEC     1995-09-08 11:21:26 OPERATOR 00000001 COMPLETE NONE     00000004 A STANDARD OFF      00000001
OPERATOR 0009 RDR   HCPSYS   TXTBE0   1995-09-08 11:21:51 OPERATOR 00000019 COMPLETE NONE     00000784 A STANDARD OFF      00000019
OPERATOR 0007 RDR   JAF1     NETLOG   1995-09-08 11:21:50 OPERATOR 00000007 COMPLETE NONE     00000271 A STANDARD OFF      00000007
OPERATOR 0008 RDR   HCPRIOCP TXTBE0   1995-09-08 11:21:51 OPERATOR 00000002 COMPLETE NONE     00000066 A STANDARD OFF      00000002
OPERATOR 0010 RDR   SYSTEM   CONFIG   1995-09-08 11:21:51 OPERATOR 00000005 COMPLETE NONE     00000210 A STANDARD OFF      00000005
OPERATOR 0011 RDR   CPLISTF  FILE     1995-09-08 11:21:51 OPERATOR 00000001 COMPLETE NONE     00000015 A STANDARD OFF      00000001
OPERATOR 0012 RDR   SCANMES  EXEC     1995-09-08 11:21:52 OPERATOR 00000001 COMPLETE NONE     00000011 A STANDARD OFF      00000001
```

Printer Separator Pages

Date displays on printer separator pages will be changed to display the date according to the system-wide default setting.

- SHOrtdate (current)

```
**********************************************************************************************************************************
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 -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
**********************************************************************************************************************************
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** VM/ESA V2 R1.0 SERVICE LEVEL 0000 ** JOHN1 ** 09/08/95 ** 11:35:12 ** PRINTER 000E ** CPU SERIAL 10826 CPU MODEL 9021 **
35H:0253 OPERATOR FILE NAME/TYPE=  PROFILE  EXEC      ORIGINID= OPERATOR          VV          VV MM          MM
35H:0253 OPERATOR                                                                 VV          VV MMM        MMM
35H:0253 OPERATOR CREATION DATE/TIME= 09/08/95 11:35:11  SYSID=  JOHN1            VV          VV MMMM      M MM
35H:0253 OPERATOR                                                                 VV          VV MM M     M MM
35H:0253 OPERATOR COPY=  001  RECS= 0095    00000     00000     2222222            VV        VV  MM  M M   MM
35H:0253 OPERATOR                          0000000   0000000   222222222            VV      VV   MM   M    MM
35H:0253 OPERATOR CLASS= A    SPID= 0015  00     00 00     00 22      22             VV    VV    MM        MM
35H:0253 OPERATOR                         00     00 00     00        22      EEEEEEEEEEEEEV VSSSSSSSSSSS   MAAAAA
35H:0253 OPERATOR FORM=  STANDARD         00     00 00     00       22       EE          VVSS    MM SS   AA   AA
35H:0253 OPERATOR                         00     00 00     00      22        EE           VSS    MM      AAM   AA
35H:0253 OPERATOR DEST=  OFF              00     00 00     00     22         EE            SS           AA      AA
35H:0253 OPERATOR                         00     00 00     00    22          EEEEEEEEEEE   SSSSSSSSSSS AAAAAAAAAAAA
35H:0253 OPERATOR CHAR=                    0000000   0000000   22222222      EE                     SS AA       AA
35H:0253 OPERATOR                           00000     00000    222222222     EE                     SS AA       AA
35H:0253 OPERATOR                                                            EE            SS       SS AA       AA
35H:0253 OPERATOR TITLE:                                                     EEEEEEEEEEEEE  SSSSSSSSSSS AA       AA


TAG DATA:

 OOOOOOO    PPPPPPPP   EEEEEEEEE  RRRRRRRR      AAA      TTTTTTTT    OOOOOOO   RRRRRRRR
OOOOOOOOO   PPPPPPPPP  EEEEEEEEE  RRRRRRRRR    AAAAA     TTTTTTTT   OOOOOOOOO  RRRRRRRRR
OO      OO  PP      PP EE         RR      RR  AA   AA       TT      OO      OO RR      RR
OO      OO  PP      PP EE         RR      RR AA     AA      TT      OO      OO RR      RR
OO      OO  PPPPPPPPP  EEEEEE     RRRRRRRRR  AA     AA      TT      OO      OO RRRRRRRRR
OO      OO  PPPPPPPP   EEEEEE     RRRRRRRR   AAAAAAAAA      TT      OO      OO RRRRRRRR
OO      OO  PP         EE         RR   RR    AAAAAAAAA      TT      OO      OO RR   RR
OO      OO  PP         EE         RR    RR   AA     AA      TT      OO      OO RR    RR
OOOOOOOOO   PP         EEEEEEEEE  RR     RR  AA     AA      TT      OOOOOOOOO  RR     RR
 OOOOOOO    PP         EEEEEEEEE  RR      RR AA     AA      TT       OOOOOOO   RR      RR
PPPPPPPP   RRRRRRRR    OOOOOOO    FFFFFFFFF   IIIIII    LL          EEEEEEEEE
PPPPPPPPP  RRRRRRRRR  OOOOOOOOO   FFFFFFFFF   IIIIII    LL          EEEEEEEEE
PP      PP RR      RR OO      OO  FF            II      LL          EE
PP      PP RR      RR OO      OO  FF            II      LL          EE
PPPPPPPPP  RRRRRRRRR  OO      OO  FFFFFF        II      LL          EEEEEE
PPPPPPPP   RRRRRRRR   OO      OO  FFFFFF        II      LL          EEEEEE
PP         RR   RR    OO      OO  FF            II      LL          EE
PP         RR    RR   OO      OO  FF            II      LL          EE
PP         RR     RR  OOOOOOOOO   FF          IIIIII    LLLLLLLLL   EEEEEEEEE
PP         RR      RR  OOOOOOO    FF          IIIIII    LLLLLLLLL   EEEEEEEEE
333333333  555555555  HH      HH             00000     2222222     555555555  333333333
333333333  555555555  HH      HH            0000000   222222222    555555555  333333333
33      33 55          HH      HH    :::    00     00 22      22   55         33      33
       33   55555555   HH      HH    :::    00     00        22    55555555         33
    3333     55555555  HHHHHHHHH            00     00       22      55555555     3333
  333333           55  HHHHHHHHH            00     00      22             55   333333
       33          55  HH      HH    :::    00     00     22              55        33
33      33 55      55  HH      HH    :::    00     00    22        55     55 33      33
333333333  555555555  HH      HH            0000000    22222222    555555555  333333333
 3333333    5555555    HH      HH             00000    222222222    5555555    3333333
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- FULldate

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  -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -   -
*************************************************************************************************************************************
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**   VM/ESA    V2 R1.0 SERVICE LEVEL 0000 ** JOHN1      ** 09/08/1995   11:35:12 ** PRINTER 000E ** CPU SERIAL   10826   CPU MODEL   9021 **
35H:0253   OPERATOR   FILE NAME/TYPE=        PROFILE    EXEC            ORIGINID= OPERATOR             VV            VV MM           MM
35H:0253   OPERATOR                                                                                  VV            VV MMM          MMM
35H:0253   OPERATOR   CREATION DATE/TIME= 09/08/1995   11:35:11    SYSID=      JOHN1                 VV            VV MMM       M MM
35H:0253   OPERATOR                                                                                  VV            VV MM M    M MM
35H:0253   OPERATOR   COPY=    001     RECS= 0095         00000        00000       2222222            VV         VV  MM    M M    MM
35H:0253   OPERATOR                                      0000000      0000000     222222222             VV      VV    MM     M    MM
35H:0253   OPERATOR   CLASS=   A       SPID= 0015       00       00   00       00   22       22           VV   VV     MM            MM
35H:0253   OPERATOR                                     00       00   00       00            22    EEEEEEEEEEEEEV VSSSSSSSSSSS       MAAAAA
35H:0253   OPERATOR   FORM=    STANDARD                 00       00   00       00           22      EE            VVSS      MM  SS      AA    AA
35H:0253   OPERATOR                                     00       00   00       00          22       EE             VSS      MM          AAM      AA
35H:0253   OPERATOR   DEST=    OFF                      00       00   00       00        22         EE              SS                  AA          AA
35H:0253   OPERATOR                                     00       00   00       00       22          EEEEEEEEEEE      SSSSSSSSSSS    AAAAAAAAAAAA
35H:0253   OPERATOR   CHAR=                              0000000      0000000       22222222        EE                          SS  AA            AA
35H:0253   OPERATOR                                       00000        00000       222222222        EE                          SS  AA            AA
35H:0253   OPERATOR                                                                                 EE              SS          SS  AA            AA
35H:0253   OPERATOR   TITLE:                                                                        EEEEEEEEEEEEE    SSSSSSSSSSS    AA            AA
```

```
TAG DATA:

 OOOOOOO     PPPPPPPP     EEEEEEEEE   RRRRRRRR        AAA       TTTTTTTT      OOOOOOO     RRRRRRRR
OOOOOOOOO   PPPPPPPPP    EEEEEEEEE   RRRRRRRRR       AAAAA      TTTTTTTT     OOOOOOOOO   RRRRRRRRR
OO       OO   PP        PP   EE               RR        RR    AA     AA        TT          OO       OO   RR       RR
OO       OO   PP        PP   EE               RR        RR   AA       AA       TT          OO       OO   RR       RR
OO       OO   PPPPPPPPP   EEEEEE          RRRRRRRRR   AA       AA       TT          OO       OO   RRRRRRRRR
OO       OO   PPPPPPPP    EEEEEE          RRRRRRRR    AAAAAAAAA       TT          OO       OO   RRRRRRRR
OO       OO   PP              EE              RR    RR       AAAAAAAAA       TT          OO       OO   RR    RR
OO       OO   PP              EE              RR      RR     AA       AA       TT          OO       OO   RR      RR
OOOOOOOOO   PP              EEEEEEEEE   RR        RR   AA       AA       TT          OOOOOOOOO   RR       RR
 OOOOOOO    PP              EEEEEEEEE   RR        RR   AA       AA       TT           OOOOOOO    RR       RR
PPPPPPPP     RRRRRRRR      OOOOOOO      FFFFFFFFF    IIIIII      LL             EEEEEEEEE
PPPPPPPPP   RRRRRRRRR    OOOOOOOOO    FFFFFFFFF    IIIIII      LL             EEEEEEEEE
PP        PP   RR        RR   OO       OO   FF                    II        LL             EE
PP        PP   RR        RR   OO       OO   FF                    II        LL             EE
PPPPPPPPP   RRRRRRRRR   OO       OO   FFFFFF               II        LL             EEEEEE
PPPPPPPP    RRRRRRRR    OO       OO   FFFFFF               II        LL             EEEEEE
PP              RR    RR       OO       OO   FF                    II        LL             EE
PP              RR      RR     OO       OO   FF                    II        LL             EE
PP              RR        RR   OOOOOOOOO   FF                 IIIIII      LLLLLLLLL   EEEEEEEEE
PP              RR        RR    OOOOOOO    FF                 IIIIII      LLLLLLLLL   EEEEEEEEE
333333333   555555555   HH        HH                       00000        2222222     555555555   333333333
333333333   555555555   HH        HH                     0000000     222222222   555555555   333333333
33       33   55               HH        HH      :::     00       00   22        22   55              33       33
       33     55555555    HH        HH      :::     00       00            22   55555555            33
     3333      55555555   HHHHHHHHH                00       00          22       55555555          3333
   333333               55   HHHHHHHHH                00       00        22                    55      333333
       33              55   HH        HH      :::     00       00      22                      55             33
33       33   55       55   HH        HH      :::     00       00    22            55       55   33       33
333333333   555555555   HH        HH                     0000000     22222222    555555555   333333333
 3333333     5555555    HH        HH                      00000      222222222    5555555     3333333
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- ISOdate

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 -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -
************************************************************************************************************************************
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************************************************************************************************************************************
**  VM/ESA   V2 R1.0 SERVICE LEVEL 0000 ** JOHN1     ** 1995-09-08   11:35:12 ** PRINTER 000E ** CPU SERIAL  10826  CPU MODEL  9021 **
35H:0253  OPERATOR  FILE NAME/TYPE=     PROFILE   EXEC          ORIGINID= OPERATOR         VV         VV MM         MM
35H:0253  OPERATOR                                                                         VV         VV MMM       MMM
35H:0253  OPERATOR  CREATION DATE/TIME= 1995-09-08   11:35:11   SYSID=     JOHN1           VV         VV MMMM     M MM
35H:0253  OPERATOR                                                                         VV         VV MM M   M MM
35H:0253  OPERATOR  COPY=    001   RECS= 0095      00000      00000     2222222             VV       VV  MM   M M   MM
35H:0253  OPERATOR                                0000000    0000000   222222222             VV     VV   MM    M    MM
35H:0253  OPERATOR  CLASS=  A      SPID= 0015    00     00 00     00  22      22              VV   VV    MM         MM
35H:0253  OPERATOR                               00     00 00     00         22        EEEEEEEEEEEEEV VSSSSSSSSSSS     MAAAAA
35H:0253  OPERATOR  FORM=    STANDARD            00     00 00     00        22         EE          VVSS      MM  SS     AA   AA
35H:0253  OPERATOR                               00     00 00     00       22          EE           VSS      MM        AAM    AA
35H:0253  OPERATOR  DEST=    OFF                 00     00 00     00      22           EE           SS               AA       AA
35H:0253  OPERATOR                               00     00 00     00     22            EEEEEEEEEEE   SSSSSSSSSSS  AAAAAAAAAAAA
35H:0253  OPERATOR  CHAR=                         0000000    0000000   22222222        EE                    SS  AA           AA
35H:0253  OPERATOR                                 00000      00000    222222222       EE                    SS  AA           AA
35H:0253  OPERATOR                                                                     EE           SS       SS  AA           AA
35H:0253  OPERATOR  TITLE:                                                             EEEEEEEEEEEEE  SSSSSSSSSSS  AA           AA


TAG DATA:

 OOOOOOO   PPPPPPPP   EEEEEEEEE  RRRRRRRR       AAA      TTTTTTTT    OOOOOOO   RRRRRRRR
OOOOOOOOO  PPPPPPPPP  EEEEEEEEE  RRRRRRRRR     AAAAA     TTTTTTTT   OOOOOOOOO  RRRRRRRRR
OO     OO  PP     PP  EE         RR     RR   AA   AA        TT      OO     OO  RR     RR
OO     OO  PP     PP  EE         RR     RR  AA     AA       TT      OO     OO  RR     RR
OO     OO  PPPPPPPPP  EEEEEE     RRRRRRRRR  AA     AA       TT      OO     OO  RRRRRRRRR
OO     OO  PPPPPPPP   EEEEEE     RRRRRRRR   AAAAAAAAA       TT      OO     OO  RRRRRRRR
OO     OO  PP         EE         RR  RR     AAAAAAAAA       TT      OO     OO  RR  RR
OO     OO  PP         EE         RR   RR    AA     AA       TT      OO     OO  RR   RR
OOOOOOOOO  PP         EEEEEEEEE  RR    RR   AA     AA       TT      OOOOOOOOO  RR    RR
 OOOOOOO   PP         EEEEEEEEE  RR     RR  AA     AA       TT       OOOOOOO   RR     RR
PPPPPPPP   RRRRRRRR    OOOOOOO   FFFFFFFFF  IIIIII     LL          EEEEEEEEE
PPPPPPPPP  RRRRRRRRR  OOOOOOOOO  FFFFFFFFF  IIIIII     LL          EEEEEEEEE
PP     PP  RR     RR  OO     OO  FF           II       LL          EE
PP     PP  RR     RR  OO     OO  FF           II       LL          EE
PPPPPPPPP  RRRRRRRRR  OO     OO  FFFFFF       II       LL          EEEEEE
PPPPPPPP   RRRRRRRR   OO     OO  FFFFFF       II       LL          EEEEEE
PP         RR  RR     OO     OO  FF           II       LL          EE
PP         RR   RR    OO     OO  FF           II       LL          EE
PP         RR    RR   OOOOOOOOO  FF         IIIIII     LLLLLLLLL   EEEEEEEEE
PP         RR     RR   OOOOOOO   FF         IIIIII     LLLLLLLLL   EEEEEEEEE
333333333  555555555  HH     HH             00000     2222222    555555555  333333333
333333333  555555555  HH     HH            0000000   222222222   555555555  333333333
33     33  55         HH     HH   :::     00     00  22     22   55         33     33
      33   55555555   HH     HH   :::     00     00        22    55555555          33
    3333    55555555  HHHHHHHHH           00     00       22      55555555       3333
  333333          55  HHHHHHHHH           00     00      22             55     333333
      33          55  HH     HH   :::     00     00     22              55         33
33     33  55     55  HH     HH   :::     00     00    22        55     55  33     33
333333333  555555555  HH     HH            0000000    22222222   555555555  333333333
 3333333    5555555   HH     HH             00000    222222222    5555555    3333333
```

CMS Commands

There are a significant number of commands in CMS that output dates with 2-digit years to the display or to a file. Some of these commands may be changed to output dates with 4-digit years.

Items Under Investigation

The following items will be investigated for implementation during Phase 2 of VM/ESA Year 2000 Support.

API for Changing DTOLU for a File

Under consideration is the externalization of a CSL routine that will allow you to change the date and time of last update of a file.

Accounting Records

VM/ESA accounting records include the date and time the record was created in format *mmddyyhhmmss*. It would be desirable to include 4-digit years with the date information in accounting records. Since some of the accounting record types already use the entire 80-byte length, the following alternatives need to be investigated:

- Reformatting of the date/time information in the existing fields
- Reformatting of existing accounting record content
- Extension of the current 80-byte record length
- Creation of new record types to contain additional accounting data. The new record types must be able to be associated with the original accounting record (type).

If any of these changes are implemented, care must be taken so both the new and old format of data and/or records are recognized.

Set Virtual Machine Date/Time

As part of customer efforts to migrate their applications to support the Year 2000 and beyond, individual users will need to test applications in various date/time settings. Capability to allow a virtual machine to alter its date/time setting without requiring IPL of an entire VM/ESA system (guest or native) would help facilitate testing of user-written application programs.

Turn off 2-Year Functions

Customers have expressed concern about ″latent″ 2-digit year problems. As an aid to locating problems of this nature, the ability to ″turn off″ all 2-digit year functions in the system has been requested. The feasibility of this, and handling of 2-digit year functions that may be invoked after being turned off, need to be researched.