VSE/ESA and the Year 2000

Contents

VSE/ESA Year 2000 Support

The following pages describe the VSE/ESA Year 2000 support as of **June 1996**. This support is made available through PTFs to be installed on your current VSE/ESA 2.1 system. The information provided here applies to the base program VSE/ESA Central Functions 6.1.

Before providing VSE/ESA Year 2000 details, a summary of the Year 2000 problem is given.

The Year 2000 Problem

For more than four decades industry and businesses have designed many of their computer programs and databases with dates represented by only two digit years (for example, 96 versus 1996). However popular this method was, and is, customers′ system and application programs may yield incorrect results when the date approaches the year 2000. This is because programs have to deal with a switch from 99 to 00 in case of a two-digit representation and are not able to recognize that 2000 is greater than 1999.

Customers whose businesses typically rely on applications which make forecasts, projections, comparisons, or arithmetic operations are encouraged to start their preparations for the transition into the year 2000 and beyond right now.

The difficulty for many businesses comes in assessing what applications have date-sensitive programs; how many need to be altered; what it takes to actually make the required changes to the source code and data files; and finally, running tests to ensure that all is operating properly. IBM′s Year 2000 services, tools, and support will assist customers with this process.

IBM is making available to everyone a comprehensive Year 2000 resource guide, at no charge. The guide explains Year 2000 issues and helps users, vendors, and customers successfully plan and implement Year 2000 transitions. The document, entitled *The Year 2000 and 2-Digit Dates: A Guide for Planning and Implementation*, GC28-1251, is available on the World Wide Web through the IBM Software Home Page, at *http://www.software.ibm.com*. Customers can also obtain the guide from their IBM marketing representative.

Summary of Changes of VSE/ESA Year 2000 PTFs (Status June 1996)

The PTFs available for VSE/ESA in June 1996 provide Year 2000 support in the following areas:

IPL
The SET command is extended to allow the specification of a 4-digit year in the DATE operand.

Attention Routine
Date information in the responses to AUTOIPL, SIR, and TIME commands is extended to a 4-digit year.

Job Control
Dates with a 2-digit year on DLBL and TLBL statements are interpreted by using a sliding century window. An extended format of the // DATE statement with a 4-digit year is supported. Date information in the start and end-of-job messages is extended to a 4-digit year.

Linkage Editor
The date information in the header lines of Linkage Editor printouts is extended from a 2-digit to a 4-digit year.

Basic Access Methods (SAM, DAM, and ISAM)
The file expiration logic is modified to account for century information in the file labels. Logic is added to handle files with an expiration date of 99/366, and files created prior to January 1, 1999 and an expiration date of 99/365, as never expiring.

System Utilities
The file expiration logic is modified to account for century information in the file labels. Extended date information is provided in messages and listings. The changes concern the VSE/Fast Copy online program, the LVTOC utility, and standalone JCL.

Problem Determination
Date information in the dump directory lists and heading lines is extended to a 4-digit year. The changes concern dump services, the Info Analysis, and the SDAID program.

In addition, a new **system macro**, named YEAR224, is added. It complements a 2-digit year with the century information, using a sliding window with specified boundaries.

SUBSID Macro Information

The level of the Year 2000 support described here is reflected in the supervisor information retrieved with SUBSID INQUIRY,NAME=SUP and mapped with MAPSSID by field IJBSMOD set to 2. The combination of fields IJBSVERS, IJBSREL, and IJBSMOD becomes therefore 612.

Note that IJBSMOD indicates a functional modification level, as opposed to the release level maintained in the SGSRVLVL supervisor generation macro. This release level is determined by the VSE/ESA release installed, with 61x corresponding to VSE/ESA 2.1.x.

Migration Considerations

The decision to ship these changes through PTFs within the normal VSE/ESA 2.1 service support implies that no migration hits are anticipated.

- Existing date information in file labels, libraries, system files and symptom records is not affected, and continues to be processed as is. Century information, however is taken into account where available or inferred from a century window.
- Existing system interfaces and control blocks are unchanged and provide already access to century information.
- Date specifications with a 2-digit year in system control statements continue to be accepted, based on a century window, while support for specifications with a 4-digit year is added as an option, if not yet available.

The only exception to full compatibility concerns the extended date information in messages and formatted output. Although this information is primarily intended for human viewers, it may also be processed by tools and a format change is then a potential source of failure. For this reason, each extended date format is shown under “Extended Dates in VSE/ESA Messages, Displays and Listings” on page 15.

Testing for the Year 2000

The intent of an early, Year 2000-enabled VSE/ESA system is to allow customers and vendors to develop and test their own changes, with the appropriate system interfaces in place. To IPL the system with a date referring to the year 2000 or beyond is thus made easy, and to do it just to see ″what happens″ is a tempting idea. However, there are some risks involved in such an experiment as outlined below:

- All your existing data with expiration dates before 99/365 is considered expired and may be overwritten without warning. This risk is unique to the enabled system. On a non-enabled system, century information is not considered and therefore all such data is considered unexpired.
- All your logs, in particular those that safeguard the integrity of your databases, may get polluted by entries out of time sequence, making any subsequent recovery difficult or impossible. The interpretation of such data for auditing purposes is also in question. Similar problems may be expected with any accounting data you collect.
- If your system is connected to a network, date inconsistencies may be propagated to other systems and extend the scope of potential damage.

In addition to such foreseeable effects, you must be prepared for unpredictable results produced by applications, that have not yet been adapted.

Even a more controlled form of exploitation requires a careful consideration of the overall environment:

- With a Year 2000-enabled VSE/ESA system it is safe to use expiration dates beyond 99/365, since century information is taken into account. However, if you are sharing data with a non-enabled system, such data is again exposed to be overwritten without warning, since that system will consider all such data as expired.

This is not meant to discourage the use of an enabled system for the purpose it is intended for, but rather to point out that careful testing for the year 2000 requires isolation and dedicated resources. This is most easily achieved under VM, where subsetting of resources is most flexible. LPAR exploitation is the solution of choice for a native system. If none of these solutions is available, an additional inexpensive S/390 configuration, like a PC Server 500 S/390, might be a viable alternative.

Working with 2-Digit Year Fields

The fact that the last two digits uniquely identify the year of a date, if the range of possible dates is within 100 years, does not suddenly change when approaching the year 2000. What changes is the fact that the century cannot any more be assumed to be a constant of ″19″ (for 1900), but must be determined by defining a 100-year window that crosses into the year 2000 and beyond. This can be done by using one of the techniques outlined next.

Fixed-Window Technique

With this technique, the boundaries of the window are fixed. For example, the window (1950, 2049) provides the following range of valid dates from 19xx to 20xx:

19xx where xx = **50** to **99**
20xx where xx = **00** to **49**

Sliding-Window Technique

With this technique, the boundaries of the window are defined relative to the current year. For example, the window (-79, +20) relative to the current year (1996) provides the following range of valid dates from 19xx to 20xx:

19xx where xx = **17** to **99**
20xx where xx = **00** to **16**

This means that the resulting 100-year window ranges from 1917 to 2016.

Sliding Windows and Expiration Dates

Following is a list of rules which should be followed across VSE/ESA and its components when handling 2-digit years and expiration dates. The rules are based on the use of the **sliding-window technique**. These rules are also intended to create awareness and ensure compliance among external program owners and vendors.

1. Most dates in VSE/ESA relate to past events. For example: file creation date, date of last update, date when a fix was applied, or date of a log entry. If only a 2-digit year is available for such dates (supplied as input or stored), a sliding window (ranging from -79 to +20) is used to obtain a date with a 4-digit year. This is also the default of the YEAR224 macro support.

   Background information:

   Since the distribution of past VSE-dates is certainly centered around a particular date in the past, an asymmetric window has a better chance to keep the window boundaries away from the actual dates. The boundaries of the (-79,+20) window will stay 20 years away from actual dates for at least another 30 years.

2. File expiration dates are future-oriented and need special handling:

   a. Whenever a file expiration date is defined with a 2-digit year (JCL or VSE/VSAM), a sliding window (0,+99) is used to complement the date with a century.

   b. Whenever a file expiration date is stored with a 2-digit year (VSE/VSAM and Diskette), a fixed window with creation date as the lower boundary is used to determine century (the creation date is determined as described under 1.).

      This method ensures a consistent interpretation of file creation and expiration dates at all times.

3. Files with an expiration date of 1999/nnn, with nnn > 365, are always considered unexpired.

   Such date specifications are supported both by JCL and VSE/VSAM (JCL with nnn=366 only) and are used for files that should never expire.

4. Files with an expiration date of 1999/365 are always considered unexpired, if their creation date is before January 1, 1999. Otherwise, these files expire on 1999/365.

   Background information:

This date is currently used also for files that should never expire, but may also be generated by JCL via a retention period. Treating such files unconditionally as unexpired may cause many undesirable messages, with a serious impact on unattended systems. Timely announcement of the proposed convention allows users to change their JCL by December 31, 1998, for never expiring files created after this date.

YEAR224 Macro

This macro can be used to complement a 2-digit year field, supplied as input, with a 2-digit century field, depending on a specified 100 year window relative to the current year. The format is as follows:

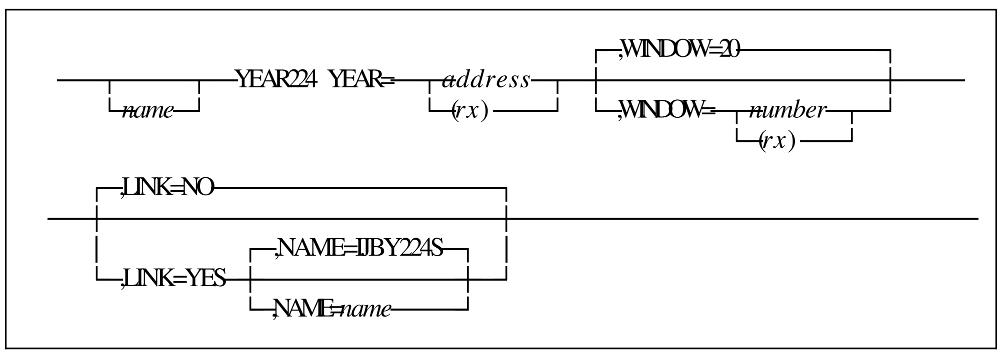

Figure 1. Syntax of New YEAR224 Macro

Requirements for the caller:

AMODE: 24 or 31
RMODE: ANY
ASC Mode: Primary

Register usage convention:

(rx) For register notation (YEAR and WINDOW parameter) any general register from 2 to 12 can be used.

Register 0 Is used for input to pass the WINDOW parameter and returns one of the following reason codes:

- **0** No errors (register 15 contains also 0).
- **1** YEAR input is not numeric.
- **2** WINDOW is invalid (negative or larger than 99).

Register 1 Is used for input to pass the YEAR parameter.

Register 13 Is assumed to contain the address of a 72-byte save area.

Register 14 Is used as link register.

Register 15 Is used at input for the address of the service routine, and returns one of the following return codes:

- **0** No errors.
- **8** Input is invalid, as indicated by the reason code in register 0.

Input Parameters:

YEAR=address|(rx)

Specifies the address of a 4-byte area containing the 2-digit year input in the form ″..yy″. The content of substring ″..″ is ignored on input and is replaced by the century on output, resulting in a 4-digit year ″yyyy″. For register notation (rx), register 2 through 12 can be used.

WINDOW=number|20|(rx)

Specifies a number between 0 and 99, that is interpreted as the forward width of a 100 year window relative to the current year. The default is 20. For register notation (rx), register 2 through 12 can be used.

LINK=YES|NO

Determines how the service routine is invoked. With the default LINK=NO, SVA phase $IJBY224 is invoked. When LINK=YES is specified, the call sequence generates an external reference to the entry point of a service routine, causing it to be linked with the calling program.

NAME=name|IJBY224S

Applies to LINK=YES only and specifies the CSECT name of the service routine to be invoked.

The macro expansion and service routines are both reentrant. The service routine uses the GETIME macro and references the COMREG field SYSDATE to obtain the current date and is therefore VSE-dependent. It may also be used under CMS in a VM environment provided that the COMREG field SYSDATE is correctly maintained in that environment.

Example:

```
         YEAR224  YEAR=yyyy
         ...
yyyy     DC    '..02'
```

In the above example, the macro complements field yyyy to 2002, since 2002 is the year ending with 02 in the default window (1996-79, 1996+20) = (1917, 2016). Refer to “Sliding Windows and Expiration Dates” on page 4 for further details about the default window used.

VSE/ESA Functions Enhanced for Year 2000 Support (Status June 1996)

In the following support description, for each item two headings are used ″Current Support″ and ″Enhanced Support″. The ″Enhanced Support″ describes the Year 2000 enhancements available after installing the corresponding PTFs on a VSE/ESA 2.1 system. ″Current Support″ describes the Year 2000 handling of a VSE/ESA system that does not have the PTFs installed.

Initial Program Load (IPL)

Current Support

During IPL the date is displayed in message 0I30I, and the system date in the supervisor is initialized. The message displays the date in the format mm/dd/yy, where ″yy″ represents the last two digits of the year.

In case the time-of-day clock has not been set yet, because of POWER ON, for example, this is done by the IPL SET DATE= ,CLOCK= command. This command also causes the system date to be initialized. The DATE operand has the format mm/dd/yy. For ″yy″ the last two digits of the year have to be entered and 19yy is assumed.

When the clock is in set state, and the IPL SET command is used for ZONE correction only (SET ZONE=), no problem occurs when crossing the year 2000. The date is correctly displayed and the system date is correctly set by current VSE/ESA systems. A date of 01/02/00 is to be interpreted as January 2, 2000.

The date, however, cannot be initialized or corrected by the IPL SET command after 12/31/99 midnight. The command

```
SET DATE=01/02/00,CLOCK=12/30/12
```

would initialize the clock and system date to January 2, 1900 on a current VSE/ESA system.

Enhanced Support

The **IPL SET** command is extended to allow the specification of the year including the century. For compatibility reasons, the specification of only the last two digits of the year is still accepted. The syntax is as follows:

```
──SET(1)───────┬──────────────────────────────────┬──────────────────────
               ├─DATE=mm/dd/yy,CLOCK=hh/mm/ss─────┤
               └─DATE=mm/dd/yyyy,CLOCK=hh/mm/ss───┘

──┬──────────────────────────┬───────────────────────────────────────────
  └─,ZONE=─┬─EAST─┬─/hh/mm───┘
           └─WEST─┘

Note:
1  At least one operand must be specified.
```

Figure 2. Syntax of Changed IPL SET Command

If the DATE format mm/dd/yy is chosen, the last two digits of the year have to be specified, where a number above 50 is interpreted as 19yy and a number below or equal 50 as 20yy.

The highest DATE and CLOCK value that can be specified is:

```
SET DATE=09/17/2042,CLOCK=23/53/47
```

Any higher value causes a TOD clock overflow and is rejected.

Messages 0I30I, 0I31I, and 0I32A have been changed to show the century of a year (yyyy instead of yy).

Attention Routine Commands

Current Support

The date output fields of the AR commands AUTOIPL, SIR and TIME are displayed with a 2-digit year.

The TIME command supports only dates up to December 31, 1999.

Enhanced Support

The date output fields of the AR commands AUTOIPL, SIR and TIME are displayed with a 4-digit year.

The TIME command is changed to accept both, a date with a 2-digit year or a 4-digit year. When a 2-digit year is specified, a number above 50 is interpreted as 19yy and a number below or equal 50 as 20yy.

Job Control

The following JCL statements have been enhanced for Year 2000 support and are described on the following pages:

JOB, /&, DATE, SET, DLBL, and TLBL.

In addition, Year 2000 considerations for **job accounting** are discussed.

JOB and /& Job Control Statement

The output of the JOB and /& (EOJ) statement on SYSLOG and SYSLST has been changed and shows a 4-digit year in the date field (instead of a 2-digit year).

If, however, a DATE statement with an operand length of 8 has been specified in a job, the EOJ date is shown in the old format (for compatibility reasons).

DATE Job Control Statement

Current Support

Currently, job control does not check the operands of the DATE statement except for a length of eight characters. Hence, any character string with a length of 8, that does not contain any of the characters *blank*, *comma*, or *equal* is considered to be a valid date.

Enhanced Support

DATE statement processing has been extended to support 4-digit years.

```
──// DATE──┬─mm/dd/yyyy─┬(1)──────────────────────────
           └─dd/mm/yyyy─┘
```

Note:

1 The DATE option of the STDOPT statement indicates whether the first or the second format is actually in use.

Figure 3. Syntax of Changed DATE Statement

The new statement accepts operands with a length of 8 characters (for compatibility reasons) and with a length of 10 characters (new format). Syntax and validity checking is done for the new format only.

COMREG field JOBDATE is used as today to store the DATE specification in the old format. The new format of DATE is reflected in COMREG field JOBDATWC, which appends the century to JOBDATE. The existing COMREG flag DATEBIT is on when a DATE statement is effective for the partition. An additional flag IJBDATEO in JCSW9 is set to on to indicate that the old DATE format was used.

SET DATE Job Control Statement

SET DATE accepts the formats mm/dd/yy and dd/mm/yy; it does not support the Year 2000.

In addition, the current description of SET DATE in the *VSE/ESA System Control Statements* manual is technically not correct. The statement ″sets the system date permanently to the specified value″ is no longer valid. Specific situations require the system to update the system date and overwrite the SET DATE value.

It is therefore recommended not to use the SET DATE statement in future.

DLBL and TLBL Job Control Statements

Current Support

Both, DLBL and TLBL, have a number of positional parameters, one of them is the DATE operand. The DATE operand can be omitted or can be supplied in two different formats as shown below.

- *Retention period format* which can be specified as a:
  1. Decimal number dddd (from 0-9999) with an operand length of 1 to 4.
  2. Decimal number in the form 00/dddd (0-9999) with an operand length of 4 to 7.
- *Date format* which can be specified as:
  1. yy/ddd (with an operand length of 6) with yy not equal to 00, which is the same as if specifying 19yy/ddd.
  2. 19yy/ddd with an operand length of 8.
  3. 20yy/ddd with an operand length of 8.

Enhanced Support

There are no changes to DLBL and TLBL processing if the:

1. DATE operand has been omitted or if the DATE operand has been specified in the retention period format.
2. DATE operand has been specified in the 19yy/ddd or 20yy/ddd format.

However, DLBL and TLBL processing has been **changed** if the DATE operand is specified in the yy/ddd format (with yy not equal to 00). The specification of yy/ddd is complemented by the YEAR224 macro to ccyy/ddd. The century information cc supplied by the YEAR224 macro depends on:

- The date yy/ddd to be complemented.
- The current date.
- The WINDOW operand specified for the YEAR224 macro.

In the context of expiration dates, WINDOW=99 (YEAR224 macro) is used to complement yy/ddd. This is because expiration dates are future-oriented.

In the context of creation dates, however, WINDOW=20 (YEAR224 macro) is used to complement yy/ddd. This is because creation dates are past-oriented.

Examples:

1. In the year 1996 the expiration date 98/180 is interpreted as 1998/180, since 1998 is the year ending with 98 in the window (1996-0,1996+99) = (1996,2095). The expiration date 95/180 is interpreted as 2095/180, whereas the creation date 95/180 is interpreted as 1995/180.
2. In the year 1999 the expiration date 98/180 is interpreted as 2098/180, since 2098 is the year ending with 98 in the window (1999-0,1999+99) = (1999,2098). The creation date 98/180 is interpreted as 1998/180, since 1998 is the year ending with 98 in the window (1999-79,1999+20) = (1920,2019).

Job Accounting

Current Support

Whenever a job step is completed, job control invokes the user accounting routine $JOBACCT. Accounting data is passed to the user in the accounting table ACCTABLE, the address of which is provided by pointer JAPART in the partition COMREG. See also Figure 69 in *Guide to System Functions* which shows at displacement 28-35 (field ACCTDATE) the date (mm/dd/yy or dd/mm/yy, depending on the STDOPT DATE option) when the job step ended.

There are no changes to the current support and it is up to the user to retrieve the century from the partition COMREG field SYSCENT as needed.

Linkage Editor

Current Support

The linkage editor prints a date on two header lines of its printout on SYSLST. This date has the format mm/dd/yy or dd/mm/yy using 2 digits for the year.

Enhanced Support

The linkage editor extends the year representation to 4 digits (retrieved from field JOBDATE in partition COMREG). Programs scanning the printout of the linkage editor may have to be adapted because of the new date format.

The following changes apply:

1. One header line is printed on each new page on SYSLST when reading input from SYSLNK and printing input statements on SYSLST. This header line contains the date with a 4-digit year, instead of 2 digits followed by 2 blanks. The rest of the header line and all the following lines remain unchanged.
2. One header line is printed on each new page on SYSLST when printing the linkage editor map, displaying phase names, CSECT names, linked module names and so on. In this header line, the date is contained in the very first 8 bytes (digits and slashes), followed by just one blank before the next header text (PHASE) begins.

   If 4 digits are displayed for the year, the date is displayed using 10 bytes instead of 8 bytes. All header information following the date is moved by 2 bytes to the right.

The header text (PHASE) following the date serves as a ″header for a column″, which means all lines after the header line contain information which is displayed adjusted below the appropriate header information. If 4 digits are used for the year, all lines following the header line are moved by 2 bytes to the right.

Refer to “Changed Displays and Listings” on page 16 for a printout example.

Basic Access Methods (SAM, DAM, ISAM)

The following description uses for the term Basic Access Methods the abbreviation BAM.

Current Support

For **Tape Files** (using DTFMT or DTFPH), the following applies:

- Data files or standard labeled work files may be overwritten on December 31, 1999, whenever an expiration date of 99/365 was specified in the TLBL statement or when the retention period from the TLBL statement plus the current date yields 99/365.
- Standard labeled files with an expiration date > 99/365 will never expire.
- Standard labeled work files or standard labeled data files for extension will not be overwritten or extended on December 31, 1999, if an expiration date of 99/365 is specified in the TLBL statement, or when the retention period from the TLBL statement plus the current date yields 99/365. BAM always uses ″19″ as the century for the current date and also when calculating the expiration date if a retention period is specified in the TLBL statement.

For **Disk Files** (using DTFSD,DTFDI,DTFCP,DTFDA,DTFIS,or DTFPH), the following applies:

- Standard labeled disk files may be overwritten on December 31, 1999, whenever 99/365 was specified in the DLBL statement as expiration date, or when the retention period from DLBL statement plus the current date yields 99/365.
- Standard labeled disk files with an expiration date > 99/365 will never expire.

For **Unit Record Files** (using DTFCP or DTFDI where LU is assigned to tape), the following applies:

- Standard labeled files may be overwritten on December 31, 1999, whenever 99/365 was specified in the TLBL statement as expiration date, or when the retention period from the TLBL statement plus the current date yields 99/365.
- Standard labeled files with an expiration date > 99/365 will never expire. BAM always uses ″19″ as the century for the current date and also when calculating the expiration date if a retention period is specified in the TLBL statement.

For **Unit Record Files** (using DTFDU for 3540 diskette), the following applies:

- If using DTFDU for a 3540 device, files may be overwritten whenever an expiration date of > 99/365 was specified. Also, all files will be overwritten when reaching the year 2000.

Enhanced Support

For all types of files previously mentioned under ″Current Support″, BAM processing has been modified to account for century information in file labels. For this purpose, BAM uses the content of fields SYSDATE and SYSCENT in the partition COMREG. Expiration dates are treated according to the following rules:

- A file with an expiration date of 1999/365 will **never** expire if its creation date is < 99/001.
- Files with an expiration date of 1999/nnn, where nnn > 365, will **never** expire.

System Utilities

The following system utilities have been enhanced for Year 2000 support: VSE/Fast Copy online program, LVTOC utility, and standalone JCL.

VSE/Fast Copy Online Program

Current Support

The current support is as follows:

1. Stored and displayed information about the backup creation time.

   When creating a backup with VSE/Fast Copy (DUMP FASTCOPY control statement, for example), the date when the dump was taken is stored on tape. VSE/FAST Copy uses the JOBDATE from the partition COMREG without the century specification.

   For RESTORE of a FASTCOPY backup, the stored information about the time when the dump was taken is displayed (message 8F56I) in the form mm/dd/yy.

2. System date for checking file expiration.

   The system date from the partition COMREG is used to compare the file expiration date. VSE/Fast Copy uses the system date without any century considerations (0-99), whereas the actual year of the expiration date in the FORMAT 1 label can be calculated by adding yy to 1900.

   The expiration date is used to indicate an overlap on unexpired file and also for the NOEXPIRED parameter in the FASTCOPY control statement (NOEXPIRED specifies that all expired files are to be excluded from being dumped or copied).

Enhanced Support

When extracting JOBDATE from the partition COMREG, VSE/Fast Copy considers also the century value stored internally during backup creation.

When issuing message 8F56I and no information about the century is available internally, 1900 is assumed as base for the date to be displayed.

For the evaluation of expired/unexpired files, the century value of the system date is used to calculate the corresponding year. The same rules apply as documented for Basic Access Methods under “Enhanced Support.”

LVTOC Utility

Current Support

The current support is as follows:

1. Display of job date in printout.

   LVTOC displays the job date in the format mm/dd/yy by using the JOBDATE from the partition COMREG without century indication.

2. Display of VSE/VSAM time stamp.

   LVTOC displays the VSE/VSAM time stamp available in the FORMAT 4 label. This time stamp conforms to the time-of-day (TOD) clock.

3. FORMAT 1 creation and expiration dates for files.

   LVTOC displays a four-digit year in the creation and expiration dates for files. The year is calculated from the FORMAT 1 label creation and expiration date by adding the yy value to 1900.

Enhanced Support

The enhanced support is as follows:

1. When extracting JOBDATE from the partition COMREG, the century value is also considered and displayed.
2. No change to the current support.
3. No change to the current support.

Standalone JCL

Current Support

The current support is as follows:

1. Display of job date and change of job date.

   Standalone JCL displays in message SA08D the job date in the format mm/dd/yy. The information is extracted from JOBDATE in the partition COMREG. The message prompts also for a possible new job date in the form mm/dd/yy.

2. Date conversion routines.

   These routines do not consider century information and that year 2000 is a leap year.

3. Tape label creation and expiration dates.

   The century information is not considered in the tape label creation and expiration dates.

Enhanced Support

1. When extracting JOBDATE from the partition COMREG, the century value is also considered and displayed. The old date format (mm/dd/yy) is still accepted, but the century information in the partition COMREG (JOBDATE) will not be updated.

   The new job date format mm/dd/yyyy is also accepted as input.

2. The date conversion routines calculate the file creation and expiration date by considering also the century value and storing it into the corresponding label field. They also consider that the year 2000 is a leap year.

3. The century information is considered for tape label creation and expiration dates. The same rules apply as documented for Basic Access Methods under “Enhanced Support” on page 12.

Problem Determination

Dump services, the Info/Analysis and the SDAID program have been enhanced for Year 2000 support.

Dump Services

Current Support

The current support is as follows:

1. The DUMP command provides a 2-digit year which is printed directly or is saved in the sympton record.

2. The standalone dump saves the 2-digit year in the symptom record.

3. DOSVSDMP retrieves the 2-digit year from the symptom record.

Enhanced Support

The enhanced support is as follows:

1. The DUMP command prints the complete year if the output is directed to a printer.

2. No change to the current support.

3. DOSVSDMP uses the YEAR224 macro to determine the 4-digit year to be printed.

A DOSVSDMP printout example is shown under “Changed Displays and Listings” on page 16.

Info/Analysis Program

Current Support

The Info/Analysis program uses a two byte representation of the year in the date field of the Dump Management file and the symptom record. This causes dump names to be sorted incorrectly since the most recent one is appended to the bottom of the list.

Also, in case a date is in the stored clock format, Info/Analysis does not recognize the year 2000 as a leap year.

Enhanced Support

When sorting the dump names into the Dump Management file, a 4-byte year field is used temporarily to make sure that the dumps are correctly sorted.

The code has been changed to recognize the year 2000 as a leap year

The 2-byte year representation in the printouts has not been changed.

SDAID Program

The date field in the trace TOD line is extended to a 4-digit year. A printout example is shown under “Changed Displays and Listings” on page 16.

Extended Dates in VSE/ESA Messages, Displays and Listings

Year 2000 support for VSE/ESA includes extended date fields with a 4-digit year representation in formatted output. Printout examples are shown in this section. The advantages of 4-digit years are:

- Improved readability of dates:

  01/02/2003 is easier to interpret than 01/02/03.

- Improved support for tools that interpret and process dates in such output.

No option is provided to turn the extended date format on or off. Such an option would help only during a transition period, but could not be easily removed afterwards, causing a permanent complication for tools that need to cope with both formats.

Changed Messages

- IPL message:

```
BG 0000 0I30I DATE=03/11/1996,CLOCK=11/03/15,ZONE=EAST/01/00
BG 0000          THE DATE VALUE FORMAT IS MM/DD/YYYY
```

- JCL start and end-of-job messages:

```
BG 0000 // JOB BGINIT (KEGELER,ECHO=NO)
         DATE 03/11/1996, CLOCK 12/03/44
   . . .
BG 0000 EOJ BGINIT
         DATE 03/11/1996, CLOCK 12/04/00, DURATION    00/00/15
```

- Response to the AUTOIPL command:

```
AR 0015 IPL'D FROM UNIT=120 AT DATE 03/11/1996,CLOCK 12:03:15 BY SYST-
OPERATOR
```

- Response to SIR command:

```
   . . .
AR 0015 PROC-MODE = ESA            IPL(120)      03/11/1996 12:03:15 CET
AR 0015 AF-SYSTEM = VSE/AF         VER. 6 REL. 2.0
AR 0015 SERV.LVL. = WAVE-3         SERV.DATE = 02/12/1996
   . . .
```

- Response to the TIME command:

```
AR 0015 TIME IS: 12:54:19 (GMT + 1  H) DATE 03/11/1996   MONDAY
```

- FASTCOPY RESTORE message:

```
BG 0000 8F55I DUMPED VOLUME = CTS120. FOR MORE INFORMATION SEE MESSAGE 8F56I.
BG 0000 8F56I DATE = 02/16/1996 DEVICE =    3380    CAPACITY =          25
CYLINDERS.
```

- Stand-Alone job start message:

```
BG 0000 SA08D DATE IS 03/15/1996.ACCEPT DATE (ENTER) OR SPECIFY DATE
MM/DD/YYYY
```

Changed Displays and Listings

- Linkage Editor header lines:

```
JOB   CATAL      03/03/1996  5686-066-06-15C-0     LINKAGE EDITOR DIAGNOSTIC OF INPUT
INVOCATION PARAMETERS:   MSHP
ACTION TAKEN    MAP
------------------------------------------------------------
PHASE BXITB0,S+X'000000'
------------------------------------------------------------
   . . .
ENTRY
03/03/1996  PHASE   XFR-AD   LOCORE   HICORE     CSECT/     LOADED     RELOC.   ...
                                                 ENTRY      AT         FACTOR   ...
         ------------------------------------------------------------
         BXITB0     700078   700078   7000B1                                 . . .
         ------------------------------------------------------------
                                                 EXITB0     700078     248000   ...
         ------------------------------------------------------------
   . . .

03/03/1996 COMMON AREAS:                        NAME       LOADED AT       LENGTH
   . . .
03/03/1996 PSEUDOREGISTERS:                     NAME       ORIGIN          LENGTH
   . . .
```

- LVTOC heading line:

```
VTOC DISPLAY UTILITY   DATE - 12/21/1995   TIME - 11:01
```

- SDAID program:

```
START OF SDAID TRACE
I/O       S    AR    UNIT=0009                CSW =0006CFA0 08000000
TOD = 1996.170  10.47.28.229
CCB= 0005FB98   00001500  00002800  0006CF98  2003FF10
CCW= 0006CF98   093F02F7  2000004F  DATA= C1D940F0  F0F1F540                    *AR 0015 4C05I PR*
   . . .
```

- DOSVSDMP program:

```
EXEC DOSVSDMP
03/25/1996                                                     PAGE    1
PRINTOUT OF VSE DUMP TAPE
DIRECTORY OF VSE DUMP TAPE
DUMP FILE   DUMP TYPE   NAME        DATE         DATA DUMPED
---------   ---------   --------    ----------   --------------------------
   001                                           DOES NOT CONTAIN DUMP DATA
   002                                           DOES NOT CONTAIN DUMP DATA
   003      SADUMP                               SUPERVISOR+SVA
   004      SADUMP                  1996/03/25   PMRAS-R
   005      SADUMP                  1996/03/25   PMRAS-00

   006      SADUMP      NO-NAME     1996/03/25   BG-PARTITION
END OF DUMP
```