CH15: The CICS Time Machine
Version 1.6

User Guide

Document:	CH15 SCRIPT
Issued:	6th March 1997
Revision Date:	3rd October 2001
Previous Revision Date:	11th January 2000
Next Review:	As required

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Sixth Edition, October 2001

This edition applies to Version 1.6 of SupportPac CH15 (The CICS Time Machine) and to all subsequent releases and modifications until otherwise indicated in new editions.

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The CICS Time Machine

Overview

The CICS Time Machine is a tool which makes it easier for you to test time dependent CICS applications. It gives you the ability to change the time and date used by your CICS application programs, enabling you to test how the applications will behave at particular times or dates, in the future or past. The date and time can be set to specific values or the time can be adjusted by a positive or negative delta.

Situations where the Time Machine could be useful include:

- Testing function that executes at an unsociable time of day.
- Testing applications whose operation will change on a certain date because of new legal regulations.
- Testing an application's ability to handle the year 2000.
- Testing the effect of communications between CICS systems in different time zones.

The CICS Time Machine uses XEIIN, XEIOUT and XPCFTCH, Global User Exit programs to create a virtual 'application' time zone for applications within a CICS/ESA region, while the rest of the MVS image and the CICS software itself still use the real 'system' time. The exit programs provide conversion between the two time zones where times are passed from CICS to the application and vice-versa.

The Time Machine only has to take action for a small subset of the CICS API. The commands that are modified fall into two categories, depending on whether the time parameter is passed in to CICS from the application or is passed out of CICS back to the application.

The *TIME IN* commands are:

```
EXEC CICS START TRANSID(trn) TIME(hhmmss)...
EXEC CICS START TRANSID(trn) AT...
EXEC CICS DELAY TIME(hhmmss)...
EXEC CICS DELAY UNTIL...
EXEC CICS POST TIME(hhmmss)...
EXEC CICS POST AT...
EXEC CICS ROUTE TIME(hhmmss)...
EXEC CICS ROUTE AT...
```

For each of these commands the Time Machine modifies the supplied time so that the event is scheduled to occur at the supplied time within the 'application' time zone rather than at that time in the 'system' time zone.

The *TIME OUT* commands are:

For all supported CICS releases

```
EXEC CICS ASKTIME
EXEC CICS ASKTIME ABSTIME(time)
```

For each of these commands the Time Machine updates the EIBTIME and EIBDATE fields with the current time and date in the 'application' time zone. If the ABSTIME argument has been specified on the command, the Time Machine returns a value which represents the absolute time in the 'application' time zone.

For all releases other than CICS/ESA 3.3

```
EXEC CICS INQUIRE REQID TIME() ...
EXEC CICS INQUIRE REQID AT HOURS() MINUTES() SECONDS() ...
```

For these commands the Time Machine adjusts the returned time values to show the time in the 'application' time zone at which the ICE is scheduled to expire.

The Time Machine runs under the following releases of CICS:

- CICS/ESA 3.3
- CICS/ESA 4.1
- CICS Transaction Server for OS/390 Release 1 (CICS TS 1.1)
- CICS Transaction Server for OS/390 Release 2 (CICS TS 1.2)
- CICS Transaction Server for OS/390 Release 3 (CICS TS 1.3)
- CICS Transaction Server for OS/390 Version 2 Release 1 (CICS TS 2.1)

Prerequisites

APAR PN86734 must be applied to CICS/ESA 4.1. If this APAR is not applied, the initial values in EIBDATE and EIBTIME when a transaction is initiated will always be the 'system' time zone values rather than the 'application' time zone values.

Installation

All the files which make up the SupportPac are shipped in the file **CH15.ZIP**. This is a compressed file which should be uncompressed on a PC using one of INFOZIPs unzip programs (e.g. UNZIP.EXE for OS/2).

On the PC workstation:

- Use the approriate **INFOZIP** unzip program to unpack the **CH15.ZIP** file.

  The following files should be produced:

readme.txt	Brief introduction
ch15.loa	Load library
ch15.sam	Sample library
ch15.ps	Postscript version of User Guide (this document)

- The library files need to be transferred to the destination TSO system as sequential binary files with a record format of FB 80. Use one of the following methods to accomplish this:

  To send them directly from a PC running OS/2, use the following Communications Manager/2 **SEND** commands:

  send ch15.loa A:ch15.loadseq

  send ch15.sam A:ch15.sampseq

  where **A** is the TSO session ID.

  To send them via ftp ensure the **BINARY** option is set then use the following commands:

  site fixrecfm 80

  put ch15.loa ch15.loadseq

  put ch15.sam ch15.sampseq

To send to TSO using IBM Personal Communications, use the **Send Files to Host** option under the **Transfer** menu item

PC File **ch15.loa etc**
Host File **ch15.loadseq etc**
Transfer Type **pdslib**

The Transfer type of **pdslib** will need to be correctly setup. To do this, use the **Setup.Define Transfer Types** option under the Transfer menu item and create the **pdslib** type with the **Ascii**, **CRLF** and **Append** checkboxes all unselected, the **Fixed** radio button selected and the **LRECL** set to **80**.

On TSO, issue the following commands to unload these sequential files into TSO partitioned datasets:

- **receive indsname(ch15.loadseq)**

  when prompted for a filename, reply

  dsn(tmc.load)

- **receive indsname(ch15.sampseq)**

  when prompted for a filename, reply

  dsn(tmc.samp)

Two datasets should be generated as follows:

TMC.LOAD - containing the following 19 members:

- TMCCNTL - Time Machine Control Program
- TMCXIN33 - XEIIN exit program for CICS/ESA 3.3
- TMCXOU33 - XEIOUT exit program for CICS/ESA 3.3
- TMCXIN41 - XEIIN exit program for CICS/ESA 4.1
- TMCXOU41 - XEIOUT exit program for CICS/ESA 4.1
- TMCXPC41 - XPCFTCH exit program for CICS/ESA 4.1
- TMCXIN51 - XEIIN exit program for CICS TS 1.1
- TMCXOU51 - XEIOUT exit program for CICS TS 1.1
- TMCXPC51 - XPCFTCH exit program for CICS TS 1.1
- TMCXIN52 - XEIIN exit program for CICS TS 1.2
- TMCXOU52 - XEIOUT exit program for CICS TS 1.2
- TMCXPC52 - XPCFTCH exit program for CICS TS 1.2
- TMCXIN53 - XEIIN exit program for CICS TS 1.3 and CICS TS 2.1
- TMCXOU53 - XEIOUT exit program for CICS TS 1.3 and CICS TS 2.1
- TMCXPC53 - XPCFTCH exit program for CICS TS 1.3 and CICS TS 2.1
- TMCSCRN - Program for CTMC transaction
- TMCMAP1 - BMS map for CTMC transaction
- TMCDELTA - PLT program to apply time delta
- TMCNEWDT - PLT program to change date

TMC.SAMP - containing the following two members:

- TMCDEFNS - Sample CICS resource definitions
- TMCCOMMA - Assembler copybook for TMCCNTL commarea

The member TMCDEFNS in TMC.SAMP contains DFHCSDUP control statements for adding the Time Machine resource definitions to your CICS System Definition data set (CSD). You only need to add definitions for the exit programs appropriate to the level of CICS on which you will be running the Time Machine, so you can comment out, or delete, from TMCDEFNS the control statements for the versions of TMCXINxx, TMCXOUxx and

TMCXPCxx that you will not be using. You will also need to modify the list name in the ADD statement in TMCDEFNS so that the TMCGRP resource definition group is added to the group list used by your CICS at system initialization. After you have edited TMCDEFNS, you should use it as input to DFHCSDUP to update your CSD.

You may optionally define a transient data destination called CTMC in the DCT used by your CICS system. The TMCCNTL program attempts to write a message to this TD queue whenever it is invoked to change the date and time. If CTMC is not defined in the DCT, TMCCNTL continues processing and the message is lost.

To make the Time Machine programs available to your CICS system you must either add a DD statement for the Time Machine load library to the DFHRPL concatenation in your CICS startup JCL or copy the Time Machine programs to a library which is already defined in the DFHRPL concatenation.

Operation

The CICS Time Machine basically consists of three programs for CICS/ESA 3.3 and four programs for the other supported releases of CICS. The control program, TMCCNTL, is common for all CICS releases. For CICS/ESA 3.3 there are two exit programs, TMCXIN33 and TMCXOU33, which run at the CICS XEIIN and XEIOUT Global User Exit points. For the other supported releases, however, as well as the XEIIN and XEIOUT exit programs there is a third exit program, TMCXPCxx, which runs at the XPCFTCH exit point.

TMCCNTL is linked to by a program which passes it data in a commarea. This data consists of a time and date to be used in the 'application' time zone, a time offset and offset direction indicator, or a value which indicates that applications should resume using the 'system' time and date. TMCCNTL enables the exit programs at the appropriate exit points when the date/time is to be changed and disables the exit programs to make applications resume using the 'system' date/time. TMCCNTL dynamically determines which exit programs to enable/disable according to the CICS release under which it is running.

For CICS/ESA 3.3, while the exit programs are enabled, times specified on EXEC CICS START, DELAY, POST and ROUTE commands are modified by the TMCXIN33 program and the EIBTIME, EIBDATE and returned absolute time values are modified by the TMCXOU33 program whenever an EXEC CICS ASKTIME command is executed.

For CICS/ESA 4.1, CICS TS 1.1, CICS TS 1.2, CICS TS 1.3 and CICS TS 2.1, TMCXINxx and TMCXOUxx perform the same functions as in CICS/ESA 3.3, with the addition that TMCXOUxx also modifies the times returned by EXEC CICS INQUIRE REQID commands. Also, TMCXPCxx modifies EIBTIME and EIBDATE at transaction initiation before control is given to the first application program of a task.

Invoking the Time Machine

As well as the basic Time Machine programs, TMCCNTL and the exit programs, the Time Machine package also includes the following simple applications to enable/disable the Time Machine.

1. TMCDELTA - a program to adjust the time by a given delta at CICS initialization.
2. TMCNEWDT - a program to set the date to a given value at CICS initialization.
3. CTMC - a transaction to set the date and time to any valid value or to resume use of system date and time.

Using TMCDELTA to adjust the time at CICS initialization

The TMCDELTA program is designed to be invoked during the third phase of CICS Post Initialization processing. It allows you to change the time in your CICS system by a specified offset as soon as the CICS system is started.

To use TMCDELTA you need to specify an entry for it in the PI PLT used by your CICS system. The time offset is specified via the INITPARM CICS system initialization parameter and has the form, *INITPARM=('TMCDELTA=shhmm')*, where 's' is '+' or '-' indicating the direction of time shift, and 'hhmm' is the interval by which the time is to be offset in hours and minutes. If the data passed to TMCDELTA via the INITPARM is invalid, or if TMCDELTA receives a non-zero return code from TMCCNTL, TMCDELTA writes a message to the system console to notify you of the error.

Using TMCNEWDT to adjust the date at CICS initialization

The TMCNEWDT program is designed to be invoked during the third phase of CICS Post Initialization processing. Its function is to change the date without changing the time of day.

To use TMCNEWDT you need to specify an entry for it in the PI PLT used by your CICS system. The date is specified via the INITPARM system initialization parameter and has the form, *INITPARM=('TMCNEWDT=ddmmyyyy')*. If the data passed to TMCNEWDT via the INITPARM is invalid, or if TMCNEWDT receives a non-zero return code from TMCCNTL, TMCNEWDT writes a message to the system console to notify you of the error.

Using the CTMC transaction

This transaction is designed be run from a 3270 type terminal with a 24x80 screen. It provides a very simple method of changing the date and time. To use the transaction just type the transaction identifier CTMC then press Enter. In response, a panel similar to that shown in Figure 1 on page 6 is displayed.

To change the date and/or time, simply modify the relevant input fields and press Enter. If a valid date and time are entered, the display will change to show 'System is using MODIFIED date/time'. If any of the fields are invalid, the fields in error will be highlighted and an error message will be displayed.

To resume using the current (i.e. system) date and time in your CICS system, press PF6. The display will change to show 'System is using CURRENT date/time'.

```
CTMC   Version 1.3           CICS Time Machine              Applid IYKEKAU1


  Modify date and/or time, then press Enter to make change.

                         Date
                           Day  :   04  (01-31)
                           Month:   11  (01-12)
                           Year : 1997  (1900-2099)

                         Time
                           Hours  : 14  (00-23)
                           Minutes: 30  (00-59)


  System is using CURRENT  date/time.

  Press PF6 to restore current date and time.



F3=Exit  F6=Restore
```

Figure 1. CTMC screen

Writing your own interface to the Time Machine

As well as using the supplied sample programs to invoke the Time Machine, you can write your own interface to TMCCNTL. TMCCNTL can be invoked by EXEC CICS LINK from an application program written in any language supported by CICS/ESA. It must be passed a commarea of at least 16 bytes. The data passed in the commarea determines the function TMCCNTL is to perform.

TMCCNTL can be invoked to perform the following functions:

- Set time and date to specific values
- Adjust time by a specific offset
- Reset to use 'system' time and date

TMCCNTL will fully validate the data passed in the commarea and return a code of 0008 in the commarea if the data is invalid.

If no commarea is passed to TMCCNTL or the passed commarea is less than 16 bytes, TMCCNTL will issue a 'CTMC' transaction abend.

If the CTMC transient data destination has been defined in your CICS system, TMCCNTL will issue one of the following messages as appropriate when the Time Machine exit programs are enabled or disabled.

TMCCNTL01 *date time applid* Date/Time set by user *userid* to *dd/mm/yyyy hh:mm*
TMCCNTL02 *date time applid* Date/Time reset by user *userid* to system values

Setting time and date to specific values

To set the time and date to specific values you must pass TMCCNTL a commarea with the following format:

4 bytes character time (hhmm)
8 bytes character date (ddmmyyyy)
4 bytes character Time Machine return code

The time value should be a valid time in hhmm format in the range 0000-2359.

The date value should be a valid date in ddmmyyyy format in the range 01011900-31122099 (i.e. between 1st January 1900 and 31st December 2099).

Adjusting time by a specific offset

To adjust the time by a positive or negative delta you must pass TMCCNTL a commarea with the following format:

4 bytes character time (hhmm)
1 byte character sign (+ or -)
7 bytes filler
4 bytes character Time Machine return code

The time value should be a valid time in hhmm format in the range 0000-2359.

The sign value should be either '+' or '-' to indicate whether the time offset should be added to or subtracted from the current time.

Resetting to 'system' time and date

To make applications resume using the 'system' time and date you must pass TMCCNTL a commarea with the following format:

4 bytes nulls (X'00000000')
8 bytes filler
4 bytes character Time Machine return code

The first four bytes of the commarea must be set to nulls.

Commarea layout

TMCCOMMA in the TMC.SAMP data set contains the following Assembler language definitions for the TMCCNTL commarea.

```
************************************************************************
** Storage layout for COMMAREA to be passed to CICS Time Machine     **
** control program TMCCNTL.                                          **
************************************************************************
*
TMCCOMM  DS    0CL16               CICS Time Machine COMMAREA
TMCTIME  DS    0CL4                New Time (hhmm)
TMCHOURS DS    CL2
TMCMINS  DS    CL2
TMCSIGN  DS    0CL1                Sign for time delta (+ or -)
TMCDATE  DS    0CL8                New Date (DDMMYYYY)
TMCDAY   DS    CL2
TMCMONTH DS    CL2
TMCYEAR  DS    CL4
TMCRESP  DS    CL4                 Response from Time Machine
```

Return codes

TMCCNTL returns a four byte character code to the calling program in bytes 13-16 of the commarea. The return code values have the following meanings:

0000 - Normal
0004 - CICS release not supported by Time Machine
0008 - Invalid data in commarea
0012 - Another update to Time Machine already in progress
0016 - Exit program not defined to CICS or not in DFHRPL
0020 - Authorization failure
0024 - Error while disabling exit program

Restrictions

The CICS Time Machine operates with the following restrictions:

For all releases of CICS

Events scheduled before time change

Events that have already been scheduled prior to the 'application' time zone being established or altered by the Time Machine will not be rescheduled.

Seconds cannot be modified

The value for seconds cannot be modified and is always the same for both 'application' and 'system' time zones.

For CICS/ESA 3.3 only

EIBDATE and EIBTIME at transaction initiation

Due to limitations of CICS/ESA 3.3, the CICS Time Machine cannot alter EIBDATE and EIBTIME at transaction initiation. Therefore, these fields will contain the 'system' time zone values for the date and time of the start of the transaction until such time as the application issues an EXEC CICS ASKTIME command. When an ASKTIME command is issued, EIBDATE and EIBTIME will be updated to contain values reflecting the date and time in the 'application' time zone. This may be a very severe restriction for applications which reference EIBDATE or EIBTIME prior to issuing an EXEC CICS ASKTIME command.

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