

M - P a c t - C M P R S / V S E

CICS 3270 DATA COMPRESSION FACILITY

PROGRAM DESCRIPTION AND OPERATIONS MANUAL

Release 3.1

(COPYRIGHT © 2003, CSI INTERNATIONAL, INC.)

M-Pact-CMPRS is a proprietary product of CSI International, Inc. It cannot be reproduced, changed, copied, or stored in any form (including, but not limited to, copies on magnetic media) without the express prior written permission.

Original Printing11/18/2003
Last Revised11/18/2003

TABLE OF CONTENTS

GETTING STARTED	1
Introduction	3
Migration Requirements	4
System Requirements	5
Installation.....	6
Cataloging Programs from Distribution Tape	7
CICS Table Additions	8
Selection and Assembly of CSICXDEF Option Table.....	9
Inbound vs Outbound Compression Technique	12
Inbound Compression Storage Use	13
USING M-Pact-CMPRS	15
CSICXSTA Operation	17
CSICXENA Operation	19
Product Use Notes	21
MESSAGES	23

GETTING STARTED

Introduction

M-Pact-CMPRS is a program product which compresses 3270 terminal output by removing repetitive characters, and removing all data currently on the screen. This improves transaction response time by reducing transmission time and also by reducing contention between terminals on the same line. Reduction typically varies between 15 and 75 percent, depending on the transmitting application program and data entered by terminal operators.

The data compression occurs within the CICS system, transparent to the user. No user involvement is required, except for product installation, which is quite simple.

Two compression techniques are employed to accomplish this reduction in transmission. The first is referred to as OUTBOUND, which simply combines repetitive characters into a 3270 Repeat to Address (RTA) order. The second compression technique is referred to as INBOUND, which compares the 3270 data stream to the current screen image, and removes all matching data already on the screen.

Two CRT transactions are provided with M-Pact-CMPRS. One displays statistics on compression effectiveness during product use. The other is used to turn M-Pact-CMPRS off or on entirely, (this is normally done automatically during CICS startup), or to turn it off or on for specific terminals, or to clear entries in the statistics table.

M-Pact-CMPRS consists of four CICS programs and a macro used to generate an option table:

CSICXTCP	is a CICS exit enabled by CSICXENA to capture all terminal output and pass it to the compression module CSICXRES.
CSICXRES	is the main program which compresses the terminal data.
CSICXENA	is a program provided to enable and disable data compression. CSICXENA is usually included in the CICS DFHPLT table so that compression is activated automatically when CICS is started. It may also be used to add or delete terminal id's from the exclude list or reset terminal statistics entries.
CSICXSTA	displays the statistics gathered by CSICXRES.

Migration Requirements

The following sections cover the changes in the installation of M-Pact-CMPRS that may be required if you are migrating from an earlier release. The changes are grouped by each release level. You will not need to consider the changes for releases older than the one you are currently on.

Changes from Release 2.4

- The CSICXDEF macro has new parameters; COMP=, UCTRAN=, and TRACE=. Refer to the macro definition section of this manual for values and defaults.
- Partition/Region Virtual Storage requirements will increase if INBOUND compression is used.

System Requirements

M-Pact-CMPRS is not expected to be either VSE or CICS release-dependent. Release 3.0 was developed and tested on systems using:

- VSE/ESA Releases 2.7
- CICS Release 2.3 and Transaction Server 1.1
- BTAM, VTAM/BSC, and VTAM/SDLC communication protocols.

M-Pact-CMPRS should also function on CICS Release 1.7.

M-Pact-CMPRS fully supports all 3270 terminal sizes, including 132-character wide model 5's.

Installation

M-Pact-CMPRS installation consists of three simple steps:

- Cataloging programs from distribution tape.
- CICS table additions, or CEDA Install.
- Selection and assembly of CSICXDEF option table, if selected options are other than the supplied defaults.

Cataloging Programs from Distribution Tape

M-Pact-CMPRS/VSE is distributed on a LIBR BACKUP cartridge consisting a sublibrary, named CSIDIST.CSICMPRS containing phases CSICXTCP, CSICXRES, CSICXENA, CSICXDEF, and CSICXSTA, and macro CSICXDEF.A.

Installation Step 1.

Use a job similar to the following one to restore the sublibrary from the installation tape:

```
* $$ JOB JNM=INSTALL
// JOB      INSTALL
// ASSGN   SYS006, CUU                INSTALL TAPE
// DLBL    USRLIB1  etc.
// EXTENT          etc.
// EXEC    PGM=LIBR, SIZE=256K
RESTORE SUBLIB=CSIDIST.CSICMPRS:USRLIB1.CSICMPRS TAPE=SYS006
/*****/
/* Optional step to move members to a permanent */
/* sublibrary and delete sublibrary created above. */
/*****/
CONNECT SUBLIB=USRLIB1.CSICMPRS:USRLIB.PROD
MOVE *.* LIST=YES REPLACE=YES
DELETE SUBLIB=USRLIB1.CSICMPRS
/*****/
/*
/&
* $$ EOJ
```

CICS Table Additions

The following entries are made in CICS:

```
DEFINE PROGRAM(CSICXDEF) GROUP(MPACT)
    LANGUAGE(ASSEMBLER) RELOAD(NO) RESIDENT(YES)
    DATALOCATION(ANY) EXECKEY(USER)
DEFINE PROGRAM(CSICXENA) GROUP(MPACT)
    LANGUAGE(ASSEMBLER) RELOAD(NO) RESIDENT(NO)
    DATALOCATION(ANY) EXECKEY(CICS)
DEFINE PROGRAM(CSICXRES) GROUP(MPACT)
    LANGUAGE(ASSEMBLER) RELOAD(NO) RESIDENT(YES)
    DATALOCATION(ANY) EXECKEY(CICS)
DEFINE PROGRAM(CSICXSTA) GROUP(MPACT)
    LANGUAGE(ASSEMBLER) RELOAD(NO) RESIDENT(NO)
    DATALOCATION(ANY) EXECKEY(USER)
DEFINE PROGRAM(CSICXTCP) GROUP(MPACT)
    LANGUAGE(ASSEMBLER) RELOAD(NO) RESIDENT(NO)
    DATALOCATION(ANY) EXECKEY(CICS)
DEFINE TRANSACTION(CSIT) GROUP(MPACT)
    PROGRAM(CSICXSTA) TWASIZE(0)
    TASKDATALOC(ANY) TASKDATAKEY(USER)
DEFINE TRANSACTION(CSIC) GROUP(MPACT)
    PROGRAM(CSICXENA) TWASIZE(0)
    TASKDATALOC(ANY) TASKDATAKEY(CICS)
```

The following entry must be added to your PLTPI for system initialization.

```
DFHPLT TYPE=ENTRY, PROGRAM=CSICXENA
```

Installers not familiar with PLTPI's should refer to the CICS System Reference Guide index, under 'PLTPI' and 'DFHPLT'. In particular, it should be noted that the name of each PLT table, for example, DFHPLTBM, as well as the programs referred to by the table, in this case CSICXENA, must be present in the CICS DFHPPT table.

Selection and Assembly of CSICXDEF Option Table

M-Pact-CMPRS provides user options via a table prepared using the CSICXDEF macro. The table is required. It is used to specify terminals to be excluded from compression. Exclusion is rarely necessary, but there are some unusual cases which M-Pact-CMPRS cannot support. A terminal example which has occurred involves a device connected to a "protocol converter" to effect 3270-compatibility (almost). To be supported by M-Pact-CMPRS, a 3270 terminal must support the "repeat-to-address" (RTA) sequence. Since this sequence may be properly issued by an application program (although it rarely is), nearly all 3270-compatible devices support the RTA sequence.

Most users will never need to exclude any terminals from compression, but the table is provided just in case. The exclude lists in the table are generated with some empty entries, so that entries may be added dynamically using the CSIC transaction, if problems are suspected with a specific terminal due to use of M-Pact-CMPRS.

The CSICXDEF table is generated and cataloged to a Load Library with a job stream similar to the following:

```
// OPTION CATAL
  PHASE CSICXDEF
// EXEC ASSEMBLY
      CSICXDEF TYPE=INITIAL,COMP=FULL,EXTERM=EXCLUDE,UCTRAN=YES
      CSICXDEF TYPE=ENTRY,COMP=INBOUND
      CSICXDEF TYPE=ENTRY,EXTERM=(YYYY,YYYY,YYYY),COMP=FULL
      CSICXDEF TYPE=FINAL
      END
/*
// EXEC LNKEDT
```

The parameters and their default values are:

TYPE=INITIAL

SKIP (BTAM only) specifies a group of terminals for which compression is not to take place. Specify SKIP=LOCAL to skip compression for locally attached terminals. Specify SKIP=REMOTE to skip compression for remotely attached terminals. Omit the SKIP parameter altogether if compression is to take place for both locally and remotely attached terminals.

EXTERM EXCLUDE or INCLUDE, the default being EXCLUDE. This operand reverses the effect of the terminal exclude table for EXTERM=INCLUDE (see TYPE=ENTRY). It also reverses the effect of the 'CSIC ON,TERMID=xxxx' and 'CSIC OFF,TERMID=xxxx' transactions. This allows you to turn compression on for just a select group of terminals, instead of the default, which is to turn it on for all terminals, except a select group.

COMP specifies the type of compression that should be used:

INBOUND	Inbound compression only.
OUTBOUND	Outbound compression only.
FULL	Both Inbound and Outbound compression.
OFF	No compression until CSIC ON transaction is used.

The default is **COMP=FULL**

UCTRAN YES or NO, the default is YES. This operand pertains to INBOUND compression.

M-Pact-CMPRS uses standard CICS Global Exit facilities to perform inbound compression. If any of your terminals have the UCTRAN feature, the terminal input is translated from lower case to upper case before CICS passes control to the exit. This prevents M-Pact-CMPRS from correctly reflecting what is actually on the terminal screen.

When UCTRAN=YES is specified, or allowed to default, M-Pact-CMPRS assumes all input was keyed in lower case, and will pass all upper case data back to the terminal, maintaining the proper screen contents, but with reduced compression levels.

When UCTRAN=NO is specified, the lower case characters on the terminal will remain lower case until they are changed by the transaction, even though the data is being processed by the transaction in upper case. This option maintains the maximum compression level possible, but can result in some unusual looking screens of upper and lower case letters.

TRACE nnn, the default is 50. The amount of storage in (K) to reserve when the trace facility is activated. The trace facility is used by the CSI technical staff to collect information for problem resolution.

TYPE=ENTRY

EXTERM string of 1-4 character terminal identifications separated by commas. The entire string must be placed within parentheses. If the terminal on which a transaction is entered is found in this table, compression will be bypassed for the specified **COMP**.

Note: A generic exclusion can be accomplished by using the character '?' in the terminal ID or Tran ID.

EXTERM=Q1?? will exclude all terminals that begin with 'Q1'.

COMP specifies the type of compression that should be excluded:

FULL exclude all compression.
INBOUND exclude Inbound compression.
OUTBOUND exclude Outbound compression.

Multiple TYPE=ENTRY statements can be used to exclude terminals. If there are no exclusions, then only the TYPE=INITIAL and TYPE=FINAL statements are necessary.

Inbound vs Outbound Compression Technique

M-Pact-CMPRS has two general techniques which can be activated via the definition module CSICXDEF. The first technique which we call Outbound, looks at the terminal data stream and changes repeated characters to RTA (Repeat to Address) orders.

The second technique, which we call Inbound, keeps a copy of the terminal screen image in memory, compares the outbound terminal data stream to it, and removes characters found to be already on the screen. ("Inbound" is somewhat misleading, it reduces data to be sent to the terminal, but based on information which came "in" from the terminal previously.)

INBOUND, OUTBOUND, or FULL (both), can be used to compress terminal traffic. The actual percent saved will depend on the actual data being sent to your terminals. To determine which technique or mixture to use, you will want to get test results using all of the possibilities. Try INBOUND for a day, then OUTBOUND for a day, and finally try FULL for a day. Each time, print the BCST screen at the end of each day. Compare the total savings for each of the three days. From this you should be able to decide which technique will give you the most savings.

INBOUND compression requires a significant amount of CPU and memory. Unless the percentage of savings with INBOUND turned on is significantly larger than with it turned off, you will probably be better off, resource wise, to only use OUTBOUND compression.

For those terminals that have a low percent of savings, it would be wise to EXCLUDE them from compression. This will save memory and CPU time if Inbound is used, and CPU time if Outbound is used.

The goal is to use the best compression mix, just where it is needed, trading machine resources for better response time.

Inbound Compression Storage Use

The INBOUND compression feature of M-Pact-CMPRS requires keeping an image of the terminal buffer in storage (GETVIS). The amount of storage required is dependent on the number of terminals being compressed, and the models of the terminals you are using.

To get an idea of the amount of storage that will be required, use the following formula:

# of Mod 1 terminals	*	2048
# of Mod 2 terminals	*	4096
# of Mod 3 terminals	*	5376
# of Mod 4 terminals	*	6912
# of Mod 5 terminals	*	7168

Take the sum of the above calculations, divide by 1024, and then add 1K.

Example: 50 Mod-2 terminals and 20 Mod-4 terminals

50	*	4096	=	204,800
20	*	6912	=	138,240

				343,040
divide by 1024	=			335
plus 1	=			336K

USING M-Pact-CMPRS

CSICXSTA Operation

The CSICXSTA program is initiated by a 4-character CICS transaction id of 'CSIT'. the following information is displayed.

Terminal	Bytes_In	Inbound	%	Outbound	%	%Saved	_#Writes	_#Skipped
-TOTAL-	28,894,434	26,698,661	7.5	26,281,274	1.5	9.0	14,978	0
Q003	262,503	228,942	12.7	211,907	7.4	19.2	235	0
Q005	525,818	402,747	23.4	368,147	8.5	29.9	356	0
TN32	325,658	192,271	40.9	191,736	.2	41.1	129	0
TN42	153,584	128,041	16.6	123,940	3.2	19.3	66	0
TN44	650,087	557,955	14.1	556,624	.2	14.3	278	0
Q001	1,667,662	1,373,861	17.6	1,305,793	4.9	21.6	1,247	0
TN47	13,940	13,940	.0	10,263	26.3	26.3	19	0
TN04	1,379,645	1,085,494	21.3	1,078,267	.6	21.8	628	0
Q007	1,042,790	861,893	17.3	788,700	8.4	24.3	659	0
TN05	660,815	582,780	11.8	579,825	.5	12.2	301	0
TN33	126,661	108,026	14.7	107,257	.7	15.3	57	0
Q006	679,534	531,339	21.8	499,960	5.9	26.4	455	0
TN01	368,001	158,800	56.8	155,085	2.3	57.8	121	0
Q008	240,388	201,727	16.0	192,823	4.4	19.7	141	0
Q009	17,804,205	17,783,982	.1	17,781,206	.0	.1	8,576	0
Q010	59,523	47,664	19.9	36,211	24.0	39.1	88	0
Q011	334,973	298,156	10.9	289,054	3.0	13.7	214	0
TN48	203,871	182,377	10.5	181,839	.2	10.8	90	0
TN43	41,551	26,266	36.7	23,409	10.8	43.6	28	0
Q002	401,969	370,653	7.7	337,297	8.9	16.0	236	0
TN02	6,428	5,958	7.3	5,423	8.9	15.6	8	0
TN39	60,655	55,381	8.6	52,810	4.6	12.9	41	0
Q004	1,577,922	1,270,645	19.4	1,189,953	6.3	24.5	828	0
TN45	93,054	86,321	7.2	85,786	.6	7.8	44	0
TN06	16,767	15,525	7.4	14,990	3.4	10.5	12	0
TN37	1,319	1,319	.0	589	55.3	55.3	2	0
TN03	42,994	31,376	27.0	25,420	18.9	40.8	34	0
TN40	99,699	77,948	21.8	74,158	4.8	25.6	53	0
TN36	2,878	2,763	3.9	1,835	33.5	36.2	13	0
TN09	49,540	14,511	70.7	10,967	24.4	77.8	19	0
-TOTAL-	28,904,521	26,705,787	7.6	26,288,400	1.5	9.0	14,983	0
(PF3)End	(PF7)Bwd	(PF8)Fwd	(ENTER)Refresh	(*)Off			(C)2003 C S I	

Memory: nnnK

is the amount of virtual storage that has been acquired to hold screen buffers.

(SOS) this indicates that a GETVIS failed and compression for some terminals is not functioning. If this occurs, you can flush all buffers and start over by turning M-Pact-CMPRS off and back on (CSIC OFF then CSIC ON). If this condition occurs frequently, you should consider increasing the storage allocation for the next CICS startup.

Terminal terminal identification of the CICS terminal

Bytes In number of bytes before compression

Inbound	number of bytes after inbound compression. An '*' following this field indicates that inbound compression is currently turned off for the terminal.
%	percent saved with inbound compression
Outbound	number of bytes after outbound compression. An '*' following this field indicates that outbound compression is currently turned off for the terminal.
%	percent saved with outbound compression
%Saved	overall percentage saved with both compression methods
#Writes	number of output data streams sent
#Skipped	number of output data streams bypassed by M-Pact-CMPRS (normally zero)

The first entry displayed is cumulative for all CRT's respectively. All remaining entries will contain the CICS terminal identification.

The '#Skipped' field pertains to unusual circumstances where M-Pact-CMPRS does not compress a terminal buffer. Normally, the #Skipped value is zero.

You can request the statistics for a specific terminal by entering the following command:

```
CSIT TERMID=xxxx
```

Where xxxx is the desired CICS terminal id. You can request the statistics for the terminal making the request by entering the following command:

```
CSIT TERMID=*
```

Function Key Usage

PF3/PF15/CLEAR	Terminates the CSIT transaction.
PF7/PF19	Scrolls to the previous screen of terminal statistics.
PF8/PF20	Scrolls to the next screen of terminal statistics.
ENTER	Refreshes the statistics for the current screen of terminals.

CSICXENA Operation

The CSICXENA program is initiated by a 4-character CICS transaction id of 'CSIC'. The CSIC functions are listed and explained below. There are numerous options provided to control the product use, but in practice they are used mostly during product evaluation to determine the compression effectiveness. The ability to dynamically turn compression off for specific terminals is provided in the unlikely event that compression is suspected of causing problems for those terminals or transactions.

General Format:

```
CSIC | ON | [ , COMP= | INBOUND | ] [ , RESET ] [ , | TERMID=* | ]
      | OFF | | OUTBOUND |
      | | | FULL |
CSIC TRACE= | xxxx |
              | OFF |
              | DUMP |
```

CSIC Operands	EXPLANATIONS
ON OFF	Turn compression 'on' or 'off'
COMP= INBOUND OUTBOUND FULL	Specifies the type of compression to be turned 'on' or 'off'. If omitted, COMP=FULL is assumed
RESET	Resets the values in the statistics table
TERMID=* TERMID=xxxx	Specifies the specific terminal for which this ON/OFF operation is to be performed. If omitted, the ON/OFF operation is performed for the entire system.
	Generic terminal ids can be accomplished by using the character "?":
	T??? starts with a 'T'
	???T ends with a 'T'
	?T?? contains a 'T' in second position.

TERMID=* specifies that the operation is to be performed for the terminal from which the CSIC transaction is entered.

TRACE=

xxxx
OFF
DUMP

Start/Stop/Dump the internal trace facility. This feature is used by the CSI support staff for problem determination. xxxx is a terminal id. Only one trace can be active at a time.

Specific Examples:

CSIC ON , COMP=FULL

Turn full compression 'on' for the entire system.

CSIC OFF , COMP=INBOUND

Turn INBOUND compression 'off' for the entire system.

CSIC ON , RESET , TERMID=xxxx

Turn compression 'on' for a specific terminal and resets the terminal's statistics table entry (if one exists)

CSIC OFF , TERMID=*

Turn all compression 'off' for the terminal issuing the CSIC transaction.

Product Use Notes

The following comments and suggestions may be helpful if you are having problems with M-Pact-CMPRS:

PC File Transfer Performance

It has been noted that in some file transfer environments, compression in CICS will slow down the transfer rates on the PC, due to the 3270 emulator actually taking longer to 'uncompress' the data than the transmit time saved. You may want to exclude these type of terminals from compression, especially if your PCs are locally attached to your host CPU.

CICS MRO/ISC

When using M-Pact-CMPRS in a CICS MRO/ISC environment, you should install M-Pact-CMPRS in the terminal owning region (TOR).

BIMECHO Startup

If you are using the BIMECHO product, make sure it is started before M-Pact-CMPRS by placing its PLT entry prior to the M-Pact-CMPRS PLT entry.

INBOUND Compression Anomalies

M-Pact-CMPRS will emulate ERASE/WRITE operations as part of its INBOUND compression. This can cause problems with certain transactions.

If you have any transactions that transmit imbedded nulls within a screen field that can be input back to the host, these screens will not function properly with INBOUND compression.

If you encounter any of these transactions; change the transaction, exclude the terminal(s) you run these transactions on from INBOUND compression, or remove INBOUND compression totally from CMPRS. See CSICXDEF for options.

BTAM Terminals and INBOUND Compression

M-Pact-CMPRS is currently unable to support INBOUND compression on BTAM terminals. Only OUTBOUND compression will be performed.

MESSAGES

The following messages may result from use of CSICXENA.

xxxx TRAN or TERM.

yyyy the transaction ID or the terminal ID.

CSICXENA01	CSICMPRS 3.1A HAS BEEN TURNED ON
CSICXENA02	CSICMPRS 3.1A HAS BEEN TURNED OFF
CSICXENA03	CSICXTCP PROGRAM NOT FOUND
CSICXENA04	CSICXDEF PROGRAM NOT FOUND
CSICXENA05	CSICXTCP IS ALREADY ACTIVE
CSICXENA06	UNSUPPORTED VERSION OF CICS
CSICXENA07	CSICXTCP IS NOT ACTIVE
CSICXENA09	COMPRESSION HAS BEEN TURNED ON FOR xxxx ID=yyyy
CSICXENA10	COMPRESSION HAS BEEN TURNED OFF FOR xxxx ID=yyyy
CSICXENA11	COMPRESSION STATISTICS TABLE HAS BEEN RESET
CSICXENA12	INVALID REQUEST
CSICXENA13	xxxx ID EXCLUDE TABLE IS FULL
CSICXENA14	xxxx ID=yyyy NOT FOUND IN EXCLUDE TABLE
CSICXENA15	xxxx ID=yyyy ALREADY IN EXCLUDE TABLE
CSICXENA16	STATISTICS ENTRY FOR xxxx ID=yyyy HAS BEEN RESET
CSICXENA18	EXITS=YES MISSING FROM SIT
CSICXENA19	ENABLE ERROR EXIT=xxxxxxxx EIBRCODE=xxxxxxxx
CSICXENA20	CSICXRES PROGRAM NOT FOUND
CSICXENA21	TRACE STARTED
CSICXENA22	TRACE STOPPED
CSICXENA23	TRACE DUMPED
CSICXENA24	TRACE NOT STARTED RC=xx

CSICXENA25	COMP=INBOUND ACTIVATED
CSICXENA26	COMP=OUTBOUND ACTIVATED
CSICXENA27	COMP=INBOUND DEACTIVATED
CSICXENA28	COMP=OUTBOUND DEACTIVATED
CSICXENA29	COMP=INBOUND ALREADY ACTIVE
CSICXENA30	COMP=OUTBOUND ALREADY ACTIVE
CSICXENA31	COMMAND PROCESSING COMPLETE
CSICXENA32	COMP=INBOUND ALREADY INACTIVE
CSICXENA33	COMP=OUTBOUND ALREADY INACTIVE
CSICXSTA01	PROGRAM NOT FOUND(CSICXTCP)
CSICXSTA02	NO STATISTICS COLLECTED, COMPRESSION NEVER STARTED