



SERENA[®] **COMPAREX[®] 8.7 for z/VM**

Getting Started Guide

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Welcome to Serena Comparex

About Comparex COMPAREX[®] is Serena Software's intelligent, anything-to-anything file comparison utility for the z/OS, z/VM, and z/VSE operating systems on IBM[®] Series z[®] mainframes. Comparex is backward-compatible with a wide variety of predecessor systems as well.

About this Document This document introduces basic concepts and commands for Serena[®] COMPAREX[®] 8.7 for z/VM and predecessor operating systems, such as VM/ESA, VM/SP, VM/XA, and VM/CMS. Topics include an explanation of DATA and TEXT comparison logic in a z/VM environment, as well as the components of difference reports. This book also guides you through some commonly used comparisons. In particular, it shows you how to:

- Run a DATA comparison with keys
- Run a DATA comparison without keys
- Run a TEXT comparison
- Understand the printed output for each comparison type

For an overview of Comparex operation and use in a z/OS or z/VSE environment, see the *Comparex Getting Started Guide* for the relevant operating system family.

If you need additional assistance using Comparex or customizing it for your requirements, please contact Serena Customer Support. Current contact information can be found in the README file or at www.serena.com.

Audience This document is intended for use by IBM mainframe application developers and systems programmers who are knowledgeable about IBM mainframes and the z/VM operating system or its direct predecessors. It assumes you have a working knowledge of your operating environment.

Before You Begin

Refer to the README for late-breaking information that became available after publication of this manual. The README information is updated frequently. The most recent README information is available to customers online at the Serena Customer Support site at www.serena.com/support.

Available Documentation

The Comparex documentation suite includes the following manuals.

Manual	Description
<i>Serena[®] COMPAREX[®] for z/OS Getting Started Guide</i>	Installation and configuration guide for z/OS and related environments.
<i>Serena[®] COMPAREX[®] for z/OS Getting Started Guide</i>	Basic Comparex concepts and usage in z/OS and related environments.

Manual	Description
<i>Serena[®] COMPAREX[®] for z/OS User's Guide</i>	User's guide to Comparex for z/OS and related environments, with command syntax and use cases.
<i>Serena[®] COMPAREX[®] for z/VM Getting Started Guide</i>	Installation and configuration instructions for z/VM and related environments.
<i>Serena[®] COMPAREX[®] for z/VM Getting Started Guide</i>	Basic Comparex concepts and usage in z/VM and related environments.
<i>Serena[®] COMPAREX[®] for z/VM User's Guide</i>	User's guide to Comparex for z/VM and related environments, with command syntax and use cases.
<i>Serena[®] COMPAREX[®] for z/VSE Getting Started Guide</i>	Installation and configuration instructions for z/VSE and related environments.
<i>Serena[®] COMPAREX[®] for z/VSE Getting Started Guide</i>	Basic Comparex concepts and usage in a z/VSE-related environment.
<i>Serena[®] COMPAREX[®] for z/VSE User's Guide</i>	User's guide to Comparex for z/VSE and related environments, with command syntax and use cases.
<i>Serena[®] Comparex[®] Quick Reference</i>	Comparex command and keyword reference for all OS environments.

Tips for Using the PDF Manuals

All Comparex documentation is provided electronically in Adobe Portable Document Format (PDF). To view PDF files, use Adobe[®] Reader[®], which can be downloaded at no charge from www.adobe.com/reader/.

This section highlights some of the main Reader features. For more detailed information, see the Adobe Reader online help system.

PDF Features The Comparex documentation uses the following PDF features:

- **Bookmarks.** All of the manuals contain a panel of nested bookmarks that make it easy to jump directly to specific topics. By default, the bookmarks appear to the left of the document content.
- **Links.** Cross-reference hyperlinks enable you to jump from topic to topic within a manual with a single mouse click. These links are highlighted in blue. Similar active hyperlinks to sites on the World Wide Web are highlighted in blue monospace.
- **Printing.** While viewing a manual, you can print the current page, a range of pages, or the entire manual. Printer output preserves the layout of the online document with higher resolution for graphics.
- **Advanced search.** Adobe Reader includes an advanced search feature that enables you to perform a full-text search across multiple PDF files concurrently in a specified directory.

Multi-Document Search To search for a text string in multiple PDF documents at once, perform the following steps (requires Adobe Reader 6 or higher):

- 1 In Adobe Reader, select **Edit > Search** (or press CTRL+F).
- 2 In the text box, enter the word or phrase for which you want to search.

- 3 Select the **All PDF Documents in** option, and browse to select the folder in which you want to search.
- 4 Optionally, select one or more of the additional search options, such as **Whole words only** or **Case-Sensitive**.
- 5 Click the **Search** button.



NOTE Optionally, you can click the **Use Advanced Search Options** link near the lower right corner of the application window to enable additional, more powerful search options. (If this link says **Use Basic Search Options** instead, the advanced options are already enabled.) For details, see Adobe Reader's online help.

Typographical Conventions

Substantive changes to content made since the previous publication of this manual are highlighted by a vertical bar in the left margin parallel to the changed text, as shown at left.

In addition, the following typographical conventions are used in the main body text to highlight special information. (These conventions do not apply to titles or headings.)

Convention	Explanation
bold	Marks field names or literals shown on a screen.
<i>italics</i>	Introduces new terms that you may not be familiar with. Also indicates emphasis.
UPPERCASE	Identifies keys or key combinations that invoke a function. For example, "Press the ENTER key."
greater-than symbol >	Separates menu names from their subordinate options or commands. For example, "select File > Copy " means you should select the Copy option from the File menu.
monospace	Highlights sample code, syntax definitions, inline commands in body text, prompt text displayed on a screen, or values you enter at the keyboard.
monospace bold	In a monospaced syntax definition, highlights the default value in a list of mutually exclusive parameter options.
<i>monospaced italics</i>	Indicates placeholders for values you must specify in a command or file name; for example, <i>filename</i> .
MONOSPACED UPPERCASE	Indicates a literal value that must appear as shown in a command or file name.
vertical line 	In a monospaced syntax definition, separates mutually exclusive choices for a parameter value. For example, "Y N" indicates a choice between allowed parameter values Y (Yes) or N (No), with no other values accepted.
square brackets []	In a monospaced syntax definition, delimits an optional parameter or a choice of possible values for an optional parameter.

Convention	Explanation
curly braces { }	In a monospaced syntax definition, delimits a list of possible values that may be taken by a mandatory parameter.
blue	Active hyperlink to a topic in this manual.
blue monospace	Active hyperlink to an external Web site.

Code Syntax Conventions

This legend describes the symbols and abbreviations used in the descriptions of the Comparex keywords. The symbols and abbreviations are used the same way in the *Comparex Quick Reference* and in the *Comparex Getting Started Guide*.

Symbol	Meaning
[]	Square brackets enclose an optional entry.
()	Parentheses must be coded as shown in the examples.
{ }	Curly braces indicate a required entry when more than one selection is available.
UPPERCASE	Uppercase letters indicate a keyword, name, or field to be coded as shown.
lowercase	Lowercase letters indicate that variable information is to be supplied.
<u>underscore</u>	Underscores indicate the default value.
ddd	Relative displacement from the first position of the input record. When MODE=SYSTEM, displacements are relative to 0, and values range from 0 to 32767. When MODE=APPLICATION, displacements are relative to 1, and values range from 1 to 32767.
len	Length, in bytes. Values range from 1 to 32767. (For KEY and KEY1, values range from 1 to 256.)
t	Type. Values are X for hexadecimal and C for character.
vvvv	Literal value between apostrophes. For example, t 'vv' could be X'5B'.
N=	Descriptive phrase for display on Comparex report. Maximum length is 32 bytes.
	Applies to a DATA comparison.
	Applies to a TEXT comparison.
	Applies to a DIRECTORY comparison.

Chapter 1

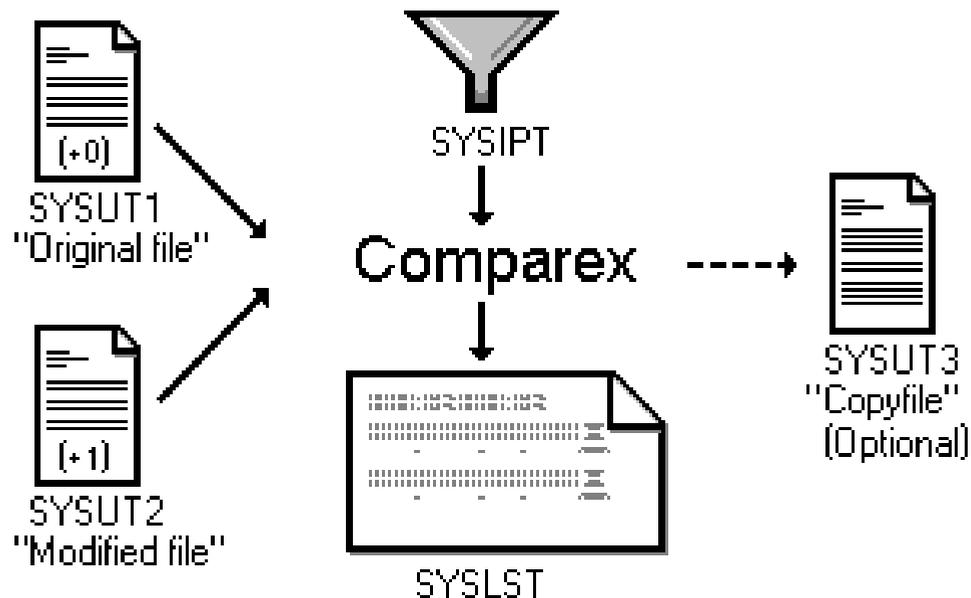
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What Comparex Does

Comparex is an anything-to-anything file and data comparison utility that compares two files or data objects and prints a report showing the records that are different. The basic data flow for Comparex is shown in the diagram below.

Comparex Data Flow



For example, when a software change is introduced, Comparex can be used to compare files produced before the change with files produced after the change. A difference report allows you to see precisely which bytes differ between the two files, record by record. The results will either confirm your expected changes or, more importantly, expose any unexpected changes. In this way, Comparex helps you check the accuracy of software changes and it facilitates effective unit, system, and regression testing for new development.

Comparex is flexible and intelligent. For example, when comparing fixed-format data files, Comparex can compare records in sequential order or by key value. It can compare whole records or perform comparisons on selected data fields, generating a report that

highlights differences in just those specific fields, and it can compare those fields regardless of their location in the input records. Nor is Comparex limited to comparisons of fixed-format data. Comparex can compare text files intelligently by looking for similar content, synchronizing around the similar blocks of text, and then looking for differences.

Types of Files You Can Compare

Comparex can compare any two files of almost any structure or organization. The utility supports three basic types of comparisons: DATA, TEXT, and DIRECTORY compares.

Comparison Type	Types of Data Compared
DATA 	Virtually all databases, sequential or indexed master and transaction data files, CSECTs, or load modules.
TEXT 	Source code, JCL, reports, documentation
DIRECTORY 	Directories in library management systems

DATA Comparisons

DATA File Definition To Comparex, a DATA file is any file that contains formatted records. These records are organized into fields located at fixed positions within each record.

DATA records are generally sequenced in a particular order. The sequence may be physical in the case of transaction data files, which often use a sequential file organization. But the sequence may also be logical, as it often is with master data files. In this case the processing sequence for a file is defined by an external index file, which sorts key field values in numerical or alphabetical order; each index record points to the physical location of an associated data record with a matching key field value.

Comparex compares DATA files by pairing physical records and then comparing these records field by field. Record pairing can be done by using key-to-key, segment-to-segment, or record-number to record-number synchronization.

Example DATA Files Examples of Comparex DATA files are:

- Master data files
- Intermediate or working data files
- Transaction data files
- Database files
- Assembly language source code
- Executable load modules



NOTE The DATA comparison option is the default in Comparex.

TEXT Comparisons

TEXT File Definition To Comparex, a TEXT file is any file where no specific data format exists. Within individual records, TEXT files do not have fields in fixed positions. TEXT records can contain blanks and might be entirely free-form. In addition, the records themselves may be variable in length. Records may not be defined physically, but instead may be marked by a special character such as a carriage return and/or line feed.

When Comparex compares TEXT files, it does not attempt to pair physical records by record number or by key, nor does it try to compare specific fields within a record structure. Instead, TEXT synchronization matches records by content, seeking blocks of matching text. Comparex then isolates differences within these text blocks.

TEXT File Examples Examples of Comparex TEXT files are:

- Free-format text files
- COBOL program source code
- Job control language files
- Control card images
- Help files
- Spooled reports

Keywords and Defaults

The type of comparison you want to perform is selected in Comparex by means of command keywords. The most commonly used keywords are selected by default.

Default Mode

A Comparex job can be run in all-defaults mode, with no keywords. In this mode, Comparex reads two DATA files. It then synchronizes and compares the records in these files by relative record number — that is, it compares the n th record from the first file with the n th record from the second file. If the records differ in one or more bytes, both records are printed in the difference report.

In all-defaults mode, Comparex reads to the end of each file, printing all the pairs of differing records and all the extra records from the longer of the two input files.

Of the many other processing options available in Comparex, the most frequently used options are also implemented as Comparex defaults.

Keyword Mode

You can modify Comparex processing by using keywords in Comparex commands. For examples, keyword options let you tell Comparex to read a file of any organization, synchronize by logical key, choose specific records or fields to compare, customize the output format of the difference report, or create an output file of selected records.

Running Comparex Jobs

- Batch and Interactive Jobs** Comparex may be run as a batch job or interactively under CMS. Execution is invoked by JCL commands or by submitting a JCL procedure. In either mode of execution, Comparex can run with all-defaults and no keywords — the "default" mode — or with keyword specifications of almost any desired complexity.
- Tutorial Option** When executed interactively under CMS, Comparex provides a tutorial option at startup. When run in tutorial mode, Comparex prompts you to select some basic keyword values, such as DATA versus TEXT comparisons, or the maximum number of lines to print in the difference report. The tutorial provides a rapid introduction to the basic features of Comparex and is used in many of the examples shown in this guide.

Getting Started: Create Two Known Input Files

The next chapters in this manual will guide you through some example DATA and TEXT comparisons using Comparex with and without keywords. The examples are simple, but we recommend that you become familiar with them before attempting to work with complex keyword combinations.

To work with the example scenarios in the following chapters, allocate and create the two data files shown.

Example Input File Data

FILE1

```
RECORD01AAAAAAAAAAAAA  
RECORD02BBBBBBBBBBBBB  
RECORD03CCCCCCCCCCCCC  
RECORD04DDDDDDDDDDDDD  
RECORD05EEEEEEEEEEEEEE  
RECORD06FFFFFFFFFFFFFFF  
RECORD07GGGGGGGGGGGGG  
RECORD08HHHHHHHHHHHHH  
RECORD09IIIIIIIIIIIIII  
RECORD10JJJJJJJJJJJJJ  
RECORD26 INSERTION
```

FILE2

```
RECORD01AAAAAAAAAAAAA  
RECORD02BBBBBBBBBBBBB  
RECORD03FIRST CHANGE  
RECORD04DDDDDDDDDDDDD  
RECORD05EEEEEEEEEEEEEE  
RECORD06SECONDCHANGE  
RECORD07GGGGGGGGGGGGG  
RECORD08HHHHHHHHHHHHH  
RECORD09IIIIIIIIIIIIII  
RECORDXX INSERTION  
RECORD10JJJJJJJJJJJJJ  
RECORD11 INSERTION
```

Chapter 2

Comparing DATA Files

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DATA Comparison in Default Mode

In this scenario, we compare the two input files you created in [Chapter 1, "Getting Started: Create Two Known Input Files"](#) on page 12 by running Comparex in default mode. In this mode, Comparex reads two files by record number, without attempting to synchronize the input files on keys. Each record from the first file is compared with the same-numbered record in the second file. When Comparex finds at least one byte that differs, it prints both records in the difference report.

Invoking Comparex in Default Mode

For this exercise, you will run Comparex in default mode and use the tutorial feature to prompt for comparison options.

Default DATA
Comparison
Exercise

- 1 At the CMS command line, type
`comparex`
and press ENTER.
- 2 Comparex presents the following prompt:
DO YOU WANT TO BE LEAD THROUGH THIS TUTORIAL FOR EACH STEP: (Y/N)
Type yes and press ENTER.
- 3 When Comparex prompts you for the name of the first input data set (SYSUT1), enter
`comparex file1`
- 4 When Comparex prompts you for the second input data set (SYSUT2), enter
`comparex file2`
- 5 At the "maximum differences" (MAXDIFF) prompt, you can specify the maximum number of differences to include in the difference report. This avoids large printouts. For the present example, type
5

and press ENTER.

- 6** For the type of comparison (DATA or TEXT), enter
data

The example screen below shows what your input should look like. Your entries are shown in **bold**, while the Comparex responses are shown in plain type.

**DATA
Comparison
Request in
Default Mode**

```
comparex
DO YOU WANT TO BE LEAD THROUGH THIS TUTORIAL FOR EACH STEP: (Y/N)
yes
SYSUT1 DATA SET NAME: fn ft fm
comparex file1
SYSUT2 DATA SET NAME: fn ft fm
comparex file2
MAXIMUM DIFFERENCES TO ISOLATE: (N/####)
5
DATA OR TEXT FILE COMPARE: (DATA/TEXT)
data
PRINT LINE FORMAT: (xy)
WHERE x IS 0 OR 1 OR 2
      AND y IS 1 OR 2 OR 3 OR 4 OR 5 OR 6
02
DIFFERENCE REPORT DISPOSITION: (1/2/3)
1 = DISPLAY AT YOUR TERMINAL
2 = WRITE TO DATA SET "COMPAREX LISTING A1"
3 = WRITE TO VIRTUAL PRINTER
2
```

Invoke Comparex as suggested above. Data set 'COMPAREX LISTING A1' may be browsed and printed on the virtual printer.

```
=====
C O M P A R E X (CMS-8.6.0 - 2006/105)                SATURDAY APRIL 15, 2006 (2006/105)  15:59:59  PAGE 1
SYSUT1=COMPAREX.FILE1.A1,SYSUT2=COMPAREX.FILE2.A1

CPX00I - *****
CPX00I - ***  I N S T A L L A T I O N  D E F A U L T S  ***
CPX00I - *****
CPX00I -      HALT=COND /* STOP EXECUTION IF SYNTAX ERRORS FOUND */
CPX00I - *****
CPX00I - ***  E N D  O F  I N S T A L L A T I O N  D E F A U L T S  ***
CPX00I - *****
CPX00I - SYSUT1='COMPAREX.FILE1'
CPX00I - SYSUT2='COMPAREX.FILE2.A1'
CPX00I - MAXDIFF=5
CPX00I - DATA
CPX00I - FORMAT=02

CPX03I - EXECUTION OF CMS - VALUES EXTRACTED/DEFAULTED:
```

```

CPX04I - MAXDIFF=5,STOFAFT=999999999999
CPX05I - PRINT=(MATCH,MISMATCH),MBRHDR=YES,HALT=COND,KILLRC=NO
CPX06I - WILDCARD=C'.' ,MODE=APPLICATIONS,(ALL DISPLACEMENTS RELATIVE TO ONE)
CPX08I - DECIMAL,EBCDIC,CASE=MIXED,LINE=(32,HORIZONTAL),PAGE=58
CPX11I - DASH=C'-' ,PLUS=C'+'
CPX21I - SYSUT1=COMPAREX.FILE1.A1          DCB=(DISK,RECFM=F,BSIZE=80)
CPX22I - SYSUT2=COMPAREX.FILE2.A1          DCB=(DISK,RECFM=F,BSIZE=80)
CPX25I - DATA,FORMAT=02
        (FORMAT EXPLANATION: FULL SYSUT1 FOLLOWED BY DIFFERING LINES OF SYSUT2)+

```

```

=====
C O M P A R E X (CMS-8.6.0 - 2006/105)          SATURDAY APRIL 15, 2006 (2006/105)  15:59:59  PAGE 2
SYSUT1=COMPAREX.FILE1.A1,SYSUT2=COMPAREX.FILE2.A1

CPX51I - RECORD NUMBER 3 ON FILE SYSUT1

 1   D9C5C3D6 D9C4F0F3 C3C3C3C3 C3C3C3C3 C3C3C3C3 40404040 ... *RECORD03CCCCCCCCCCCC * O N E
33   40404040 40404040 40404040 40404040 40404040 40404040 ... * * O N E
65   40404040 40404040 40404040 40404040 40404040 ... * * O N E

CPX52I - RECORD NUMBER 3 ON FILE SYSUT2

 1   D9C5C3D6 D9C4F0F3 C6C9D9E2 E340C3C8 C1D5C7C5 40404040 ... *RECORD03FIRST CHANGE * T W O
        ----- --          ----- -DIFFERENCE+

CPX71I - END OF DATA ON FILE SYSUT1

CPX57I - EXTRA RECORD NUMBER 12 ON FILE SYSUT2
 1   D9C5C3D6 D9C4F1F1 40C9D5E2 C5D9E3C9 D6D54040 40404040 ... *RECORD11 INSERTION * T W O
33   40404040 40404040 40404040 40404040 40404040 40404040 ... * * T W O
65   40404040 40404040 40404040 40404040 40404040 ... * * T W O

CPX67I - MAXDIFF INVOKED, CONTINUING WITHOUT PRINTING BY REQUEST

CPX72I - END OF DATA ON FILE SYSUT2

CPX74I - BYTES UNDERSCORED(51)
CPX75I - RECORDS PROCESSED: SYSUT1(11)/SYSUT2(12),DIFFERENCES(4,0,1)
        EXPLANATION - 4 RECORDS DIFFER THAT SYNCHRONIZED TOGETHER
        0 RECORDS WERE CONSIDERED INSERTED ON SYSUT1
        1 RECORD WAS CONSIDERED INSERTED ON SYSUT2

CPX80I - TIME OF DAY AT END OF JOB: 15:59:59 - CONDITION CODE ON EXIT: 4

```

Difference Report for DATA Comparisons

This section discusses some of the key items on the difference report. The following discussion will apply to both keyword and all-defaults mode of operation.

Immediately below the product and license information, Comparex lists the keywords the user has specified. It also lists the Comparex installation-specific defaults that override the normal defaults (as listed in Chapter 2 of the *Comparex User's Guide*). For example, the manual lists HALT=NO, but the report lists HALT=COND.



NOTE All valid keywords are associated with message number CPX00I.

Next, Comparex prints messages showing the execution parameters:

- DASH=C'-' means that this character will be used to underscore differing bytes.
- PLUS=C'+' will be used to underscore excess bytes when the SYSUT2 record is longer than the paired SYSUT1 record.
- DECIMAL indicates that the displacement on each line is shown in decimal.

At the top of page 2 of the difference report and on all subsequent pages, Comparex lists the time, date, page number, and input file data set names.

Immediately below these two lines, Comparex displays the differing records and the literals ONE, TWO, or DIFFERENCE in the right-hand column:

- Comparex displays ONE when the line contains data from a SYSUT1 record.
- Comparex displays TWO when the line contains data from a SYSUT2 record.
- Comparex displays DIFFERENCE when a SYSUT2 record has been selected for printing, because it differs from corresponding record on SYSUT1.

The amount of detail on the report depends on the FORMAT keyword. In this example, FORMAT=02 is used, implying the IBM dump format. This means that the SYSUT1 record will display fully followed by the differing lines of SYSUT2 with the differences underscored.

At the end of the report, Comparex prints its "end-of-processing" totals. The format is:

```
SYSUT1(n1)/SYSUT2(n2)SYSUT3(n3),DIFFERENCES(d0,d1,d2)
```

where:

- n1 = number of records read from SYSUT1
- n2 = number of records read from SYSUT2
- n3 = number of records written to SYSUT3
- d0 = number of record pairs which differed
- d1 = number of records on SYSUT1, not on SYSUT2
- d2 = number of records on SYSUT2, not on SYSUT1

In the sample difference report above, n2 exceeds n1 by one, because file SYSUT2 contains an extra record. The value 'd2' also reflects this fact.

The value of d0 is '4', because the inserted record on SYSUT2 (after RECORD09) makes all subsequent records unmatched.

DATA Comparison with Key Synchronization

The three types of synchronization available for DATA comparison logic are:

- KEY
- SEGMENT
- same-physical-record-number (actually, no synchronization)

In this next scenario, we will compare the two files you created in [Chapter 1](#) by matching records based on KEY synchronization. To do this, we will specify the logical key to Comparex as the first eight bytes of each record. (It is in character format and ascending.)

Executing Comparex with Keywords

Comparex most commonly is run in keyword mode. Keyword options may be supplied on the job cards that invoke Comparex, but for more complex comparisons, keyword specifications are usually supplied by a SYSIN file.

The syntax for the KEY keyword is as follows:

```
KEY=(1,8)
```

where (1) is the displacement and (8) is the length.

Because the previous difference report was in the IBM Dump format, many hexadecimal characters were displayed. In this example, we will restrict the display to alphanumeric characters. To do this, we will specify the following:

```
LINE=80
```

When you created the FILE1 and FILE2 data sets in [Chapter 1](#), was there a sequence number in columns 73 through 80? If so, Comparex probably underscored that number in the difference report. To avoid this, we will specify the following to "mask" out the sequence numbers:

```
MASK=(73,END)
```

Now, create a data set called 'COMPAREX SYSIN A1', which will be referenced later in this document. Sample contents of this data set are shown here.

```
xedit COMPAREX<=== Key and Enter
* This is data set "COMPAREX.SYSIN.A1"
  * CMSPRINT /* Send difference report to "COMPAREX.LISTING.A1" */
  SYSUT1='COMPAREX.FILE1.A1'
  SYSUT2='COMPAREX.FILE2.A1'
  KEY=(1,8) /*KEY will be the field in first 8 characters */
  LINE=80 /*Format in alphanumeric only-no HEX characters*/
  MASK=(73,END) /* Ignore any sequence number in columns 73-80 */
  CMSEND /* Recommended practice to end SYSIN */
file <=== Save the file
```

Figure 2-1. Data Set COMPAREX SYSIN A1

Invoking Keyword Mode

To run Comparex interactively in keyword mode, perform the following steps.

- 1 Using a file editor such as `xedit`, create a SYSIN file containing Comparex keywords. This file also maps actual file names for your input data files to the SYSUT1 and SYSUT2 input file names expected by Comparex.
- 2 At the CMS command line, type


```
comparex (sysin cmsprint
```

 Press ENTER.

- 3 Comparex runs the job in the background using the keywords in the SYSIN file. It sends the resulting difference report to the disk file defined by CMSPRINT, which may be viewed online or printed at the virtual printer. (CMSPRINT is the default output option.)

The result of the above specifications is to generate a difference report that describes a DATA comparison, pairing records that match on the specified key and isolating inserted and deleted records. Through the use of KEYS, this run of Comparex will also detect and write out-of-sync records to the difference report. The output will differ from the previous run because Comparex will now resynchronize after insertions and deletions.

comparex (sysin cmsprint <=== Key and Enter

Figure 2-2. DATA File Comparison - KEY and MASK

Invoke Comparex as suggested above. Data set '**COMPAREX SYSIN A1**' may be browsed and should resemble [Figure 2-3, "Difference Report - DATA, KEY, FORMAT, MASK," on page 19.](#)

```

=====
SERENA COMPAREX (CMS-8.6.0 - 2006/105) SATURDAY APRIL 15, 2006 (2006/105) 15:59:59 PAGE 2
SYSUT1=COMPAREX.FILE1.A1,SYSUT2=COMPAREX.FILE2.A1

DSPL |...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...8
CPX51I - RECORD NUMBER 3 ON FILE SYSUT1
1 RECORD03CCCCCCCCCCC ONE
CPX52I - RECORD NUMBER 3 ON FILE SYSUT2 FIELD=1
1 RECORD03FIRST CHANGE TWO
----- -DIFFERENCE+

CPX51I - RECORD NUMBER 6 ON FILE SYSUT1
1 RECORD06FFFFFFFFFFFF ONE
CPX52I - RECORD NUMBER 6 ON FILE SYSUT2 FIELD=1
1 RECORD06SECONDCHANGE TWO
----- -DIFFERENCE+

CPX36A - KEY OUT OF SPECIFIED SEQUENCE - RECORD 10 ON FILE SYSUT2
1 RECORDXX INSERTION TWO

CPX62I - KEY SYNCHRONIZATION MISMATCH - RECORD 10 ON FILE SYSUT2
1 RECORDXX INSERTION TWO

CPX62I - KEY SYNCHRONIZATION MISMATCH - RECORD 12 ON FILE SYSUT2
1 RECORD11 INSERTION TWO
CPX72I - END OF DATA ON FILE SYSUT2

CPX61I - KEY SYNCHRONIZATION MISMATCH - RECORD 11 ON FILE SYSUT1
1 RECORD26 INSERTION ONE
CPX67I - MAXDIFF INVOKED, CONTINUING WITHOUT PRINTING BY REQUEST
CPX71I - END OF DATA ON FILE SYSUT1
    
```

```

CPX74I - BYTES UNDERSCORED(23)
CPX75I - RECORDS PROCESSED: SYSUT1(11)/SYSUT2(12),DIFFERENCES(2,1,2)
          EXPLANATION - 2 RECORDS DIFFER THAT SYNCHRONIZED TOGETHER
                        1 RECORD WAS CONSIDERED INSERTED ON SYSUT1
                        2 RECORDS WERE CONSIDERED INSERTED ON SYSUT2
CPX80I - TIME OF DAY AT END OF JOB: 15:59:59 - CONDITION CODE ON EXIT: 4

```

Figure 2-3. Difference Report - DATA, KEY, FORMAT, MASK

Difference Report with DATA, KEY, FORMAT, and MASK

The difference report above lists the same insertions and deletions shown in our first, "default mode" example.

Additionally, the difference report generated through KEY synchronization flags out-of-sync situations.

In this scenario, these situations correspond to the following messages:

CPX36A - The inserted record, RECORDXX, on SYSUT2 is not in the KEY sequence (ascending) specified by default.

CPX62I - The records, RECORDXX and RECORD11, on SYSUT2 are not synchronized to the corresponding records on SYSUT1.

CPX61I - The record, RECORD26, on SYSUT1 is not synchronized with the corresponding record on SYSUT2.



NOTE For purposes of clear presentation, some of the lines in both example difference reports have been deleted.

What If the Comparison Job Fails?

If the comparison operation runs unsuccessfully, consider the following questions:

- Are your data sets spelled correctly?
- Do the data sets exist?
- Were there any syntax (message CPX30A) errors?

Once you have addressed these questions, rerun the comparison.

Chapter 3

TEXT Files

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Introduction

To Comparex, TEXT is any file where no known inter-record relationship exists. TEXT files might have bytes or fields in any fixed relationship between records. They can, however, contain blanks and might be entirely free-form.

In this chapter we will use TEXT logic to compare the same two files. You will recognize the keywords MAXDIFF and CONTINUE from the previous chapter. The setting

```
TEXT=JCL
```

lets us ignore the sequence number and use the first 72 columns for the comparison.

The PRINT keyword specifies printing a certain number of records from file SYSUT1 in context with the differing records from file SYSUT2. The setting

```
PRINT=MLC
```

specifies that Comparex will print a few (MLC) records before and after the highlighted differences on the difference report. PRINT=MLC is referred to as *fade-in, fade-out*. In this scenario, we have accepted the default value for MLC, 2.

```
f list COMPAREX * A1                                     <=== Key and Enter

COMPAREX FILE1    A1 _____ {Data set Information}
COMPAREX FILE2    A1 _____ {Data set Information}

    Position your cursor behind "COMPAREX FILE1 A1" and press PF11

COMPAREX FILE1    A1 x_____
COMPAREX FILE2    A1 _____ {Data set Information}

    At the cursor position, key and enter

COMPAREX FILE1    A1 comparex / = file2 = (jcl mlc)_____
COMPAREX FILE2    A1 _____ {Data set Information}
```

Figure 3-4. TEXT Comparison Under FLIST

Invoke Comparex as suggested above. The difference report has been sent directly to the virtual printer and should resemble "Difference Report TEXT=JCL, PRINT=MLC."

```

RECORD01AAAAAAAAAAAAA                                O N E 1
RECORD02BBBBBBBBBBBBB                                O N E 2

+++++<+++ .+++1+++ .+++2+++ .+++3+++ .+++4+++ .+++5+++ .+++6+++ .+++7+>+ .+++8+++++
D   RECORD03CCCCCCCCCCC                                DIF O N E 3
-----3--- .----1--- .----2--- .----3--- .----4--- .----5--- .----6--- .----7--- .----8-----
I   RECORD03FIRST CHANGE                                DIF T W O 3
+++++<+++ .+++1+++ .+++2+++ .+++3+++ .+++4+++ .+++5+++ .+++6+++ .+++7+>+ .+++8+++++

RECORD04DDDDDDDDDDD                                O N E 4
RECORD05EEEEEEEEEEEEE                                O N E 5

+++++<+++ .+++1+++ .+++2+++ .+++3+++ .+++4+++ .+++5+++ .+++6+++ .+++7+>+ .+++8+++++
D   RECORD06FFFFFFFFFFF                                DIF O N E 6
-----3--- .----1--- .----2--- .----3--- .----4--- .----5--- .----6--- .----7--- .----8-----
I   RECORD06SECONDCHANGE                                DIF T W O 6
+++++<+++ .+++1+++ .+++2+++ .+++3+++ .+++4+++ .+++5+++ .+++6+++ .+++7+>+ .+++8+++++

RECORD07GGGGGGGGGGG                                O N E 7
RECORD08HHHHHHHHHHH                                O N E 8
RECORD09IIIIIIIIIII                                O N E 9

+++++<+++ .+++1+++ .+++2+++ .+++3+++ .+++4+++ .+++5+++ .+++6+++ .+++7+>+ .+++8+++++
I   RECORDXX INSERTION                                DIF T W O 10
+++++<+++ .+++1+++ .+++2+++ .+++3+++ .+++4+++ .+++5+++ .+++6+++ .+++7+>+ .+++8+++++

RECORD10JJJJJJJJJJJ                                O N E 10

+++++<+++ .+++1+++ .+++2+++ .+++3+++ .+++4+++ .+++5+++ .+++6+++ .+++7+>+ .+++8+++++
D   RECORD26 INSERTION                                DIF O N E 11
-----3--- .----1--- .----2--- .----3--- .----4--- .----5--- .----6--- .----7--- .----8-----
I   RECORD11 INSERTION                                DIF T W O 12
+++++<+++ .+++1+++ .+++2+++ .+++3+++ .+++4+++ .+++5+++ .+++6+++ .+++7+>+ .+++8+++++

CPX71I - END OF TEXT ON FILE SYSUT1

CPX72I - END OF TEXT ON FILE SYSUT2

CPX75I - RECORDS PROCESSED: SYSUT1(11)/SYSUT2(12), DIFFERENCES (3,0,1)
          EXPLANATION - 3 RECORDS DIFFER THAT SYNCHRONIZED TOGETHER
                        0 RECORDS WERE CONSIDERED INSERTED ON SYSUT1
                        1 RECORD WAS CONSIDERED INSERTED ON SYSUT2

CPX80I - TIME OF DAY AT END OF JOB: 08:52:39 - CONDITION CODE ON EXIT: 4

```

Figure 3-5. Difference Report - TEXT=JCL,PRINT=MLC

It is possible to send the difference report to data set 'COMPAREX SYSIN A1' by adding keyword CMSPRINT, for example,

```
COMPAREX FILE1 A1 comparex / = file2 = (jcl mlc cmsprint)_____
```

The file can be subsequently browsed and/or sent to the virtual printer.



NOTE It is possible to use FILELIST instead of FLIST

Difference Report with TEXT

Because Comparex uses TEXT comparison logic to compare blocks (or records) of significant data rather than fields, Comparex displays an entire record (isolated) without underscoring the differing, or excess, bytes.

Records from SYSUT1 that are not matched to any records from file SYSUT2 are identified, on the right-hand side of the report, by **DIF ONE**. Similarly, records from SYSUT2 that are not matched to any record from file SYSUT1 are identified by **DIF TWO**. Furthermore, the logical record number is shown on the far right.

In this scenario, we used the setting PRINT=MLC. If, however, we specified PRINT=FULL, all the records from the file SYSUT1 would have appeared in context.

In this scenario, we chose not to “frame” the differing records. However, had we used the FRAME keyword, the differing records would have been surrounded by the PLUS character and separated by the DASH character.

Chapter 4

Interfaces

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Introduction

Comparex interfaces (via CPXIFACE) to many different data collection structures such as DL/1, IDMS, RAMIS, etc. The success of these interfaces depends on the following:

- Your environment
- How CPXIFACE was generated
- How your environment is configured

Additionally, Comparex provides the "Delta Deck Option," enabling you to apply transaction files (commonly called delta decks) against one or more sequential files with the intent of updating them.

FILEDEF and RAMIS II

Comparex can interface to RAMIS databases directly and compare one version against another. Through the FILEDEF interface, you can compare tapes or anything that FILEDEF can handle sequentially.

FILEDEF

Any file that can legitimately be allocated to the session through a FILEDEF command, can be read by Comparex via the Comparex interface, for example:

```
FILEDEF SYSUT1 DISK cpxiface assemble a1
FILEDEF SYSUT2 TAP1 SL 2 (recfm fb lrecl 80 blksize 6000
FILEDEF PDS1 DISK osmacro maclib a1 (dsorg po member abc
```

To compare our two newly created files through the FILEDEF interface, issue the following commands:

```
FILEDEF SYSUT1 DISK COMPAREX FILE1 A1
FILEDEF SYSUT2 DISK COMPAREX FILE2 A1
```

The only way to tell Comparex to read these data sets through the Comparex interface is to instruct him through the 'COMPAREX SYSIN A1' data set. Add the following lines:

```
SYSUT1=(OTH, MEMBER=FILE1)
SYSUT1=(OTH, MEMBER=FILE2)
CPXIFACE=CPXFLDEF /* Generated interface for FILEDEF
KEY=(1,8) /* KEY will be the field in first 8 characters */
LINE=80 /* Format in alphanumeric only-no HEX characters */
MASK=(73,END) /* Ignore any sequence number in columns 73-80 */
```

Now compare the files through the interface:

```
COMPAREX (SYSIN
```

RAMIS II

Users that have RAMIS available in a VM/CMS environment will be able to read and compare files within that proprietary structure through this interface. It does require a special set of FILEDEFs to take care of connection to minidisks and allocations beforehand.

Modify the 'COMPAREX SYSIN A1' data set as follows:

```
CPXIFACE=CPXRAMIS /* Special generation */
SYSUT1=(OTH, MEMBER=filenam1)
SYSUT2=(OTH, MEMBER=filenam2)
MAXDIFF=50, CONTINUE
KEY=(1,nn,,R), BUFF=256 /* Random KEY, large BUFFER */
* * **=====> Fine tune the KEY specification.
CMSEND
```

Now compare the files through the interface:

```
COMPAREX (SYSIN
```

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