

TurboIMAGE/XL Database Management System
DBChange Plus Technical Addendum
for MPE/iX Release 4.0



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Printing History

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Preface

With this release of DBChange Plus, you are introduced to a new document type called a technical addendum. This document exists to introduce the new functionality contained in this version of the product. It is meant to supplement the *DBChange Plus User's Guide*. The information contained in this document will be incorporated into the next edition of the manual.

Introducing MPE/iX

MPE/iX, Multiprogramming Executive with Integrated POSIX, is the latest in a series of forward-compatible operating systems for the HP 3000 line of computers.

In Hewlett-Packard documentation and in talking with HP 3000 users, you will encounter references to MPE XL, the direct predecessor of MPE/iX. MPE/iX is a superset of MPE XL. All programs written for MPE XL will run without change under MPE/iX, and you can continue to use MPE XL system documentation.

What This Document Contains

This technical addendum describes the new E data type supported by the TurboIMAGE/XL database management system. This data type is used for data stored in IEEE format on an MPE/iX system and is fully supported in the TurboIMAGE, DBChange Plus, and QUERY/3000 products. Read this document to learn how to include data items of type E in TurboIMAGE/XL databases and how to convert your data if it already is stored in IEEE data format.

Each chapter in this document assumes a knowledge of the DBChange Plus product. New users should read chapters 1, 2, and 4. Experienced users should read chapter 1 and refer to chapters 3 and 4 for IEEE data type usage.

The chapters are organized as follows:

Chapter 1 introduces you to the new data type. A diagram of the formats of IEEE and HP 3000 reals is included for comparison purposes.

Chapter 2 contains a tutorial of various tasks in which data items of type E are added to a database and data items of other types are converted to type E.

Chapter 3 provides the syntax and a brief description of the revised ADD ITEM, CHANGE ATTRIBUTES, and CHANGE ITEM commands. For additional information on these commands, refer to the DBChange Plus guide. Also in this chapter is the BASE command, which is not impacted by this release but is included to clarify the function of the NEW option.

Chapter 4 provides the new and revised messages related to the IEEE data type. This chapter supplements Appendix A of the DBChange Plus guide.

Conventions

UPPERCASE In a syntax statement, commands and keywords are shown in uppercase characters. The characters must be entered in the order shown; however, you can enter the characters in either uppercase or lowercase. For example:

COMMAND

can be entered as any of the following:

command Command COMMAND

It cannot, however, be entered as:

comm com_mand comamnd

italics In a syntax statement or an example, a word in italics represents a parameter or argument that you must replace with the actual value. In the following example, you must replace *filename* with the name of the file:

COMMAND *filename*

punctuation In a syntax statement, punctuation characters (other than brackets, braces, vertical bars, and ellipses) must be entered exactly as shown. In the following example, the parentheses and colon must be entered:

(*filename*):(*filename*)

underlining Within an example that contains interactive dialog, user input and user responses to prompts are indicated by underlining. In the following example, yes is the user's response to the prompt:

Do you want to continue? >> yes

{ } In a syntax statement, braces enclose required elements. When several elements are stacked within braces, you must select one. In the following example, you must select either **ON** or **OFF**:

**COMMAND { ON }
 { OFF }**

[] In a syntax statement, brackets enclose optional elements. In the following example, **OPTION** can be omitted:

COMMAND *filename* [OPTION]

When several elements are stacked within brackets, you can select one or none of the elements. In the following example, you can select **OPTION** or *parameter* or neither. The elements cannot be repeated.

**COMMAND *filename* [OPTION
 parameter]**

Conventions (continued)

[...] In a syntax statement, horizontal ellipses enclosed in brackets indicate that you can repeatedly select the element(s) that appear within the immediately preceding pair of brackets or braces. In the example below, you can select *parameter* zero or more times. Each instance of *parameter* must be preceded by a comma:

[, *parameter*] [...]

In the example below, you only use the comma as a delimiter if *parameter* is repeated; no comma is used before the first occurrence of *parameter*:

[*parameter*] [, ...]





| ... | In a syntax statement, horizontal ellipses enclosed in vertical bars indicate that you can select more than one element within the immediately preceding pair of brackets or braces. However, each particular element can only be selected once. In the following example, you must select **A**, **AB**, **BA**, or **B**. The elements cannot be repeated.




$\left\{ \begin{array}{l} \mathbf{A} \\ \mathbf{B} \end{array} \right\} | \dots |$

... In an example, horizontal or vertical ellipses indicate where portions of an example have been omitted.

␣ In a syntax statement, the space symbol ␣ shows a required blank. In the following example, *parameter* and *parameter* must be separated with a blank:

(*parameter*)␣(*parameter*)

 The symbol  indicates a key on the keyboard. For example,  represents the carriage return key or  represents the shift key.

 character  character indicates a control character. For example, Y means that you press the control key and the Y key simultaneously.

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Introduction

You can store real (floating-point) numbers in MPE/iX using one of two formats: IEEE or HP 3000. Until now, only an R data type was available for you to store just your TurboIMAGE HP 3000 reals. Some users may have stored their IEEE reals using either the K or R data type. An E data type is now available to distinguish the two formats available on MPE/iX and is especially important for users who take advantage of the math coprocessor. Refer to the *TurboIMAGE/XL Database Management System Reference Manual* for information on available data types.

You can use DBChange Plus to change your TurboIMAGE/XL databases to include data items of type E. You can add new data items, and you can change existing items. If you change existing items to type E, any stored data is converted to IEEE data format unless you indicate that it already is in IEEE format. You do this by specifying type E with a special no-conversion option, which is provided specifically for this purpose.

Caution Before installing this version of DBChange Plus, be sure to apply any changes to your database already stored in an existing change file. Change files created by an earlier version of DBChange Plus cannot be used with this version, and you will have to reenter the changes if they are not applied. Of course, you can always purge the old version change file when you use the BASE command.

Managing Items and their Data Types

You can use DBChange Plus to add items of type E to your TurboIMAGE/XL databases. The item length for each item must be 2 or 4 halfwords and is declared by using either E2 or E4.

You can also change existing items to type E. A no-conversion option is available if your data is already stored in IEEE format, and you only wish to change the data type to correctly reflect the format of your data. You just specify the E data type with an optional exclamation point (!E); only the type is changed and the length is translated into halfwords. Refer to chapter 2 for more information on this option.

You can add items of type E or change existing items to type E with the following existing commands which are fully described in chapters 2 and 3:

- ADD ITEM
- CHANGE ATTRIBUTES
- CHANGE ITEM

Data Conversion Rules

- For data to be converted to IEEE data format, the original type of the data item must be I, J, K, or R. Other types (P, U, X, and Z) cannot be converted and attempts to do so result in an error for each command.
- The no-conversion option is only available with type E. It means simply that the data is already stored in IEEE format, and only the type needs to be changed. Any attempts to use this option with other types result in an error.
- When using !E to convert the type to E without converting the data, the original item length must be *exactly* equivalent to 2 or 4 halfwords (4 or 8 bytes). The original type is ignored, but the length is changed to its equivalent in halfwords. If the original length cannot be expressed exactly as 2 or 4 halfwords, an error is returned.
- When !E is specified and the item length is increased or decreased, the data is assumed to be in IEEE format for the original length and is simply converted to IEEE format for the new length.

Comparing IEEE and HP 3000 Real Formats

The diagrams below show the formats for IEEE and HP 3000 reals. You can use these for comparison purposes.

Bits:	← 1 →	← 8 →	← 23 →
E2	sign	exponent	mantissa

Bits:	← 1 →	← 9 →	← 22 →
R2	sign	exponent	mantissa

The approximate range for E2 and R2 is $\pm 3.402823 \times 10^{38}$.

Bits:	← 1 →	← 11 →	← 52 →
E4	sign	exponent	mantissa

Bits:	← 1 →	← 9 →	← 54 →
R4	sign	exponent	mantissa

The approximate range for E4 and R4 is $\pm 1.797693134862318 \times 10^{308}$.

Purging a Change File

If you want to purge any existing change files, you can specify the `NEW` or `PURGECECF` options with the `BASE` command; if you do not specify an option, `NEW` is assumed by default. The `NEW` and `PURGECECF` options purge any existing change files. In interactive mode, however, before any file is purged you are prompted to verify that this is indeed the action you wish to take. In batch mode, a `NEW` or no option automatically purges the change file. If you specify the `OLD` option and the old change file cannot be used for any reason, DBChange Plus returns an error.

The complete syntax and description of the `BASE` command are provided in chapter 3.

Adding and Changing Data Items

This chapter explains how to add data items of type E to a TurboIMAGE/XL database, and how to change data items to type E. It provides instructions for and examples of the various commands used to change data items.

Helpful TurboIMAGE/XL Information

Remember the following TurboIMAGE/XL characteristics when making changes to data items:

- A data item name must be unique within the database. It must be from 1 to 16 characters long, and the first character must be alphabetic.
- No more than 1023 data items can exist in a TurboIMAGE/XL database.
- Valid data item types for TurboIMAGE/XL are E, I, J, K, P, R, U, X, and Z. For data item type conversion information, refer to Table 2-1.

Note

Data type E can be specified with an optional exclamation point (!E). This is a special version of the E data type and is also known as the no-conversion option. It indicates that the data is already in IEEE data format and should *not* be converted; only the type specifications should be changed. If the item length is changed, the data is converted to the new length but is still assumed to be in IEEE format.

- The unit of measure for data item length depends upon the type designator and can be a **halfword**, a **byte**, or a **nibble**. A halfword is 16 bits, a byte is 8 bits, and a nibble is 4 bits or a half byte.
- A data item cannot exceed 2047 halfwords in length and must be an even number of bytes.
- The subitem count must be an integer from 1 to 255. For item type P, the subitem count multiplied by the item length must be evenly divisible by 4. For item types U, X, and Z, the subitem count multiplied by the item length must be an even number.

- The subitem length must be from 1 to 255, depending on the type designator as follows:

Type	Length
E, R	Must be 2 or 4 halfwords.
I, J	Must be 1, 2, or 4 halfwords.
K	Must be 1 or 2 halfwords.
P	Maximum is 255 nibbles.
U, X, Z	Maximum is 255 bytes.

- A compound data item is a data item with a subitem count of more than one. Search and sort items cannot be compound items.

When changing data item length, reevaluate the blocking factor of the sets containing the items.

For more information about TurboIMAGE/XL data items, refer to the *TurboIMAGE/XL Database Management System Reference Manual*.

Item Type Conversions

DBChange Plus supports type conversion for all data item types defined in the *TurboIMAGE/XL Reference Manual* with the exception of I4 and J4. Table 2-1 shows the data item type conversions supported by DBChange Plus. An x in the appropriate box indicates that you can convert the current item type to the new item type.

Table 2-1. DBChange Plus Supported Item Type Conversions

Current Item Type	New Item Type								
	E2,E4 [†]	I1,I2	J1,J2	K1	P	R2,R4	U	X	Z
E2,E4	x	x	x	x		x			
I1,I2	x	x	x	x	x	x	x	x	x
J1,J2	x	x	x	x	x	x	x	x	x
K1	x	x	x	x	x	x	x	x	x
P		x	x	x	x		x	x	x
R2,R4	x	x	x	x		x			
U							x	x	
X							x	x	
Z		x	x	x	x		x	x	x
[†] !E2 or !E4 assumes a current data type of E. The length must be equivalent to 2 or 4 halfwords.									

Caution

When converting data item types, overflow, underflow, and truncation may occur if you are reducing data item size. Be sure to verify that data item conversions do not result in loss of data. When converting to new data types and prior to restructuring your database, always check any values that could exceed the minimum and maximum limits for the new data types. You can use QUERY/3000 to verify the data item conversions and to check for values less than the minimum and greater than the maximum limits before converting to the new data type.

Adding Data Items

In this section, several data items of various data types are added to the ORDERS database. TAX-RATE is used to illustrate adding a data item of type E. CREDIT-LIMIT is added as a type I and is converted to a type E in a later section. SCRAP-FACTOR and YIELD are both added as items of type R; when these are later converted to type E, one is assumed to contain data already in IEEE format while the other contains data in HP 3000 real format.

Use the ADD ITEM command to add the new data items TAX-RATE, CREDIT-LIMIT, SCRAP FACTOR, and YIELD to the ORDERS database. Before adding the data items, use the REVIEW ITEMS command to see a listing of the current items, as follows:

Itm No.	Item Name	Attrib	Security

1	ACCOUNT	I4	(11,12,13,14,18/)
2	BINNUM	Z2	(/13)
3	CITY	X12	(12,13,14/11)
4	CREDIT-RATING	R2	(/14)
5	DATE	X6	(11,12,13,14,18/)
6	DELIV-DATE	X6	(/14)
7	DESCRIPTION	X20	(11,12,13,14,18/)
8	FIRST-NAME	X10	(14/11)
9	INITIAL	U2	(14/11)
10	LAST-NAME	X16	(14/11)
11	LASTSHIPDATE	X6	(12/)
12	ONHANDQTY	J2	(14/12)
13	PRICE	J2	(14/)
14	PURCH-DATE	X6	(11/14)
15	QUANTITY	I1	(/14)
16	STATE	X2	(12,13,14/11)
17	STOCK#	U8	(11,12,14,18/)
18	STREET-ADD	X26	(12,13,14/11)
19	SUPPLIER	X16	(12,13/)
20	TAX	J2	(14/)
21	TOTAL	J2	(11,14/)
22	UNIT-COST	P8	(/12)
23	ZIP	X6	(12,13,14/11)

In the example below, the data items TAX-RATE, CREDIT-LIMIT, SCRAP-FACTOR, and YIELD are added using the ADD ITEM command. They should appear in the data item list before the data items identified inside parentheses on each command line below. The sub-count for all of these data items is assumed to be 1 by default. For TAX-RATE, the type is E, the length 2; and user class 14 has read access to it. For CREDIT-LIMIT, the type is I, the length 2; and user class 14 has write access to it. For SCRAP-FACTOR, the type is R, the length is 4; and user class 12 has write access to it. For YIELD, the type is R, the length is 2; item security is not added at this time for illustrative purposes here and in a later section. The DBCPLUS program displays a message confirming that each new data item is accepted.

```
>add item tax-rate (total) e 2 (14/)
  Addition of data item accepted.

>add item credit-limit (credit-rating) i 2 (/14)
  Addition of data item accepted.

>add item scrap-factor (state) r 4 (/12)
  Addition of data item accepted.

>add item yield (zip) r 2
  Addition of data item accepted.

>
```

Refer to “ADD ITEM” in chapter 3, “Revised DBChange Plus Commands,” for a detailed description of the command syntax and parameters.

If you want to verify that the new data items TAX-RATE, CREDIT-LIMIT, SCRAP-FACTOR, and YIELD have been added to the change file, use the REVIEW ITEMS command. You can see that the data items have been added.

>review items

REVIEW ITEMS:

Itm No.	Item Name	Attrib	Security
1	ACCOUNT	I4	(11,12,13,14,18/)
2	BINNUM	Z2	(/13)
3	CITY	X12	(12,13,14/11)
4	CREDIT-LIMIT	I2	(/14) ← data item added
5	CREDIT-RATING	R2	(/14)
6	DATE	X6	(11,12,13,14,18/)
7	DELIV-DATE	X6	(/14)
8	DESCRIPTION	X20	(11,12,13,14,18/)
9	FIRST-NAME	X10	(14/11)
10	INITIAL	U2	(14/11)
11	LAST-NAME	X16	(14/11)
12	LASTSHIPDATE	X6	(12/)
13	ONHANDQTY	J2	(14/12)
14	PRICE	J2	(14/)
15	PURCH-DATE	X6	(11/14)
16	QUANTITY	I1	(/14)
17	SCRAP-FACTOR	R4	(/12) ← data item added
18	STATE	X2	(12,13,14/11)
19	STOCK#	U8	(11,12,14,18/)
20	STREET-ADD	X26	(12,13,14/11)
21	SUPPLIER	X16	(12,13/)
22	STORE#	8J2	(11,12/14)
23	TAX	J2	(14/)
24	TAX-RATE	E2	(14/) ← data item added
25	TOTAL	J2	(11,14/)
26	UNIT-COST	P8	(/12)
27	YIELD	R2	← data item added
28	ZIP	X6	(12,13,14/11)

Changing a Data Item

In this section, the YIELD data item in the ORDERS database is changed to type E. YIELD is changed from a type R to a type E, although the data already is stored in IEEE data format. The length and security are also changed.

Use the CHANGE ITEM command to change the data item YIELD in the ORDERS database. Before changing the data item, the REVIEW ITEMS output looks like this:

Itm No.	Item Name	Attrib	Security
27	YIELD	R2	

Note Refer to Table 2-1 for information about data item type conversions supported by DBChange Plus.

In the example below, the CHANGE ITEM command is used to change the data item YIELD to type E. The length is changed to 4. Notice that the special no-conversion option (!E) is used with YIELD to change just the type and length, because the data is already stored in IEEE data format. When restructuring takes place, the data is converted from E2 format to E4 format. The security is also changed to allow write access for user class 12. The DBCPLUS program displays messages confirming that the changes are accepted.

```
>change item yield !e 4 (/12)
Change of item attributes accepted.

Change of item security accepted.
```

Caution If the data item length is changed to a smaller number than the original data item length, the data may truncate or overflow the new field.

Refer to “CHANGE ITEM” in chapter 3, “Revised Command Descriptions,” for a detailed description of the command syntax and parameters.

If you want to verify that the modifications to the data item YIELD are in the change file, use the REVIEW ITEMS command. In the following example, YIELD is the name of the data item to be reviewed. You can see that the data item YIELD is now defined as a type E with a length of 4 and that security has been added.

```
>review items yield

REVIEW ITEMS:

Itm No. Item Name      Attrib Security
-----
27      YIELD              E4      (/12)
```

Changing Data Item Attributes

In this section, two data items of different data types in the ORDERS database are changed to type E. CREDIT-LIMIT is changed from a type I to a type E, which converts the data to IEEE data format. SCRAP-FACTOR is changed from a type R to a type E without the no-conversion option, because the data in SCRAP-FACTOR is stored in HP 3000 real format.

To change the subitem count, the type, and the length of a data item, use the CHANGE ATTRIBUTES command. CHANGE ATTRIBUTES and CHANGE ITEM are similar in that they both change data item attributes. However, CHANGE ITEM also changes the order of a data item in the data item list and the data item security. If you only want to change data item attributes, use the CHANGE ATTRIBUTES command. If you want to change the data item attributes in conjunction with data item sequence and/or security changes, use the CHANGE ITEM command. Before changing the data items, the REVIEW ITEMS output looks like this:

Itm No.	Item Name	Attrib	Security
1	ACCOUNT	I4	(11,12,13,14,18/)
2	BINNUM	Z2	(/13)
3	CITY	X12	(12,13,14/11)
4	CREDIT-LIMIT	I2	(/14) ← data item to be changed
5	CREDIT-RATING	R2	(/14)
6	DATE	X6	(11,12,13,14,18/)
7	DELIV-DATE	X6	(/14)
8	DESCRIPTION	X20	(11,12,13,14,18/)
9	FIRST-NAME	X10	(14/11)
10	INITIAL	U2	(14/11)
11	LAST-NAME	X16	(14/11)
12	LASTSHIPDATE	X6	(12/)
13	ONHANDQTY	J2	(14/12)
14	PRICE	J2	(14/)
15	PURCH-DATE	X6	(11/14)
16	QUANTITY	I1	(/14)
17	SCRAP-FACTOR	R4	(/12) ← data item to be changed
18	STATE	X2	(12,13,14/11)
19	STOCK#	U8	(11,12,14,18/)
20	STREET-ADD	X26	(12,13,14/11)
21	SUPPLIER	X16	(12,13/)
22	STORE#	8J2	(11,12/14)
23	TAX	J2	(14/)
24	TAX-RATE	E2	(14/)
25	TOTAL	J2	(11,14/)
26	UNIT-COST	P8	(/12)
27	YIELD	E4	(/12)
28	ZIP	X6	(12,13,14/11)

Note Refer to Table 2-1 for information about data item type conversions supported by DBChange Plus.

In the example below, the CHANGE ATTRIBUTES command is used to change the data items CREDIT-LIMIT and SCRAP-FACTOR to type E. The DBCPLUS program displays messages confirming that the changes are accepted.

```
>change attributes credit-limit e  
Change of item attributes accepted.
```

```
>change attributes scrap-factor e  
Change of item attributes accepted.
```

Caution If the data item length is changed to a smaller number than the original data item length, the data may truncate or overflow the new field.

Refer to “CHANGE ATTRIBUTES” in chapter 3, “Revised Command Descriptions,” for a detailed description of the command syntax and parameters.

If you want to verify that the modifications to the data items CREDIT-LIMIT and SCRAP-FACTOR are in the change file, use the REVIEW ITEMS command. You can see that the attributes for data items CREDIT-LIMIT and SCRAP-FACTOR are changed.

>review items

REVIEW ITEMS:

Itm No.	Item Name	Attrib	Security
1	ACCOUNT	I4	(11,12,13,14,18/)
2	BINNUM	Z2	(/13)
3	CITY	X12	(12,13,14/11)
4	CREDIT-LIMIT	E2	(/14) ← data item changed
5	CREDIT-RATING	R2	(/14)
6	DATE	X6	(11,12,13,14,18/)
7	DELIV-DATE	X6	(/14)
8	DESCRIPTION	X20	(11,12,13,14,18/)
9	FIRST-NAME	X10	(14/11)
10	INITIAL	U2	(14/11)
11	LAST-NAME	X16	(14/11)
12	LASTSHIPDATE	X6	(12/)
13	ONHANDQTY	J2	(14/12)
14	PRICE	J2	(14/)
15	PURCH-DATE	X6	(11/14)
16	QUANTITY	I1	(/14)
17	SCRAP-FACTOR	E4	(/12) ← data item changed
18	STATE	X2	(12,13,14/11)
19	STOCK#	U8	(11,12,14,18/)
20	STREET-ADD	X26	(12,13,14/11)
21	SUPPLIER	X16	(12,13/)
22	STORE#	8J2	(11,12/14)
23	TAX	J2	(14/)
24	TAX-RATE	E2	(14/)
25	TOTAL	J2	(11,14/)
26	UNIT-COST	P8	(/12)
27	YIELD	E4	(/12)
28	ZIP	X6	(12,13,14/11)

Revised Command Descriptions

ADD ITEM

Adds a data item to the database.

Syntax

```
A[DD] ITEM ItemName [(NextItem)] [SubitemCount] SubitemType SubitemLength
([ReadClassList] / [WriteClassList])
```

Parameters

<i>ItemName</i>	is the name of the data item to be added. Each data item within the database must have a unique name. This name must be from 1 to 16 characters, the first of which must be alphabetic. Characters after the first must be chosen from this set: letters A - Z, digits 0 - 9, and + * / ? ' # % & @ only.
(<i>NextItem</i>)	is the existing data item that follows the newly added data item in the schema. If this parameter is omitted, the new data item is placed last in the ITEM part of the schema.
<i>SubitemCount</i>	must be an integer from 1 to 255. For data item type P, the product of the subitem count and the subitem length must be evenly divisible by 4. For data item types U, X, and Z, the product of the subitem count and the subitem length must equal an even number. If this parameter is omitted, the subitem count is assumed to be 1.
<i>SubitemType</i>	must be a valid data item type: E, I, J, K, P, R, U, X, or Z.
<i>SubitemLength</i>	must be an integer from 1 to 255 for data item types P, U, X, and Z. The length for types I and J must be 1, 2, or 4. For type K, it must be 1 or 2; and for types E and R, it must be 2 or 4. For data item type P, the product of the subitem count and the subitem length must be evenly divisible by 4. For data item types U, X, and Z, the product of the subitem count and the subitem length must equal an even number.
(<i>ReadClassList</i> / <i>WriteClassList</i>)	defines user class access to the data item. If this entire parameter is omitted (an absent list), all user classes can read the data item unless access is further restricted by data set security. Note that access to a data item is only possible when the data item is a field in a data entry. The two class lists are defined as follows:

ADD ITEM

(ReadClassList)

is a list of the user classes that have read-only access to the added item. It can consist of user class numbers from 0 to 63, separated by commas. If this parameter is empty [for example, (/12,14)], no user classes have read access to the data item unless access is allowed by data set security. However, the database creator can read the data item.

(WriteClassList)

is a list of the user classes that have write (and implied read) access to the data item. It can consist of user class numbers from 0 to 63, separated by commas. If this parameter is empty [for example, (12,14/)], no user class has write access to the data item unless access is allowed by data set security. However, the database creator can write to the data item.

Description

Use this command to add a new data item to the database.

When defining data item security, note that the absence of a *ReadClassList/WriteClassList* (an absent list), allows all user classes to read the data item unless prevented by data set security, while the null (or empty) list (/), prevents all user classes from accessing the data item unless allowed by data set security. Note also that data set security can further restrict or enhance user class access to data items.

Example

```
>add item store# j 2 (11,12/14)
```

In this example, a new data item STORE# is added to the database. The data item is of type J and has a subitem length of 2. User classes 11 and 12 have read access and user class 14 has write access to the new data item. Because *NextItem* and *SubitemCount* parameters are not specified, the new data item appears at the end of the ITEMS part of the schema and has a subitem count of 1.

Before the addition, the ITEMS part of the schema looks like this:

```
ITEMS:
  ACCOUNT      , J2(0,11,12,13,14,18/);
  BINNUM       , Z2(/13);
  :
  TOTAL        , J2(11,14);
  UNIT-COST    , P8(/12);
  ZIP          , X6(12,13,14/11);    ⇐ item to be added after ZIP
```

After the addition, the ITEMS part of the schema looks like this:

```
ITEMS:
  ACCOUNT      , J2(0,11,12,13,14,18/);
  BINNUM       , Z2(/13);
  :
  TOTAL        , J2(11,14);
  UNIT-COST    , P8(/12);
  ZIP          , X6(12,13,14/11);
  STORE#       , J2(11,12/14);    ⇐ new item added
```

BASE

Specifies the database to be modified.

Syntax

$$B[ASE] DatabaseName \left[\begin{array}{l} NEW \\ OLD \\ PURGECF \end{array} \right]$$

Parameters

<i>DatabaseName</i>	is the name of the database to be modified. It cannot be qualified with the group and account names.
NEW	creates a new change file (<i>DatabaseNameCF</i>). If an old change file exists, it is purged. This parameter is the default.
OLD	uses the existing change file and adds to it.
PURGECF	purges the existing change file without creating a new change file.

Description

Use this command to specify the name of the database you want to modify. The BASE command must be entered before any other DBChange commands, except COPY, HELP, OUTPUT, REDO, and XEQ. The BASE command has the three following change file options:

- NEW—used to create a new change file. If an old change file exists it is purged. In interactive mode, if NEW is specified and a change file already exists, a confirmation message is displayed asking if you want to purge the old change file and create a new one. In batch mode, the old change file is purged automatically and a new one is created.

Note Because NEW is assumed by default when no NEW, OLD, or PURGECF parameter is specified, the old change file is automatically purged (in batch mode) when the default is used.

- OLD—used to enter additional changes to an existing change file. In interactive mode, if no change file exists, the DBCPLUS program asks if you want to create a new change file. In batch mode, if no change file exists, an error occurs and all commands after that are invalid.
- PURGECF—used to purge the existing change file without creating a new change file. In interactive mode, you are prompted for confirmation and asked if a new change file should be created after the existing change file is purged.

Example

```
>base orders purgecf
To purge change file, confirm purge [y/N] ? y
Change file ORDERSCF has been purged.

No old change file. Create new file [y/N] ? y
Creating new change file:

Creating new change file: item information records

Creating new change file: set information records

Creating new change file: security table

Creating new change file: control record

>
```

In this example, the existing change file for the ORDERS database is purged. The DBCPLUS program asks you to confirm the purge and returns a message confirming that the change file ORDERSCF has been purged. The DBCPLUS program then asks if you want a new change file created. Messages are returned confirming the creation of the new change file.

CHANGE ATTRIBUTES

Changes the subitem count, type, and/or length of a data item. (For information about supported item type conversions, refer to Table 3-1 later in this section.)

Syntax

```
CHA[NGE] A[TTIBUTES] DataItemName [SubitemCount] SubitemType SubitemLength
```

Parameters

DataItemName is the name of the data item whose attributes are changed. Each data item within the database must have a unique name. This name must be from 1 to 16 characters, the first of which must be alphabetic. Characters after the first must be chosen from this set: letters A - Z, digits 0 - 9, and + * / ? ' # % & @ only.

SubitemCount must be an integer from 1 to 255. For data item type P, the product of the subitem count and the subitem length must be evenly divisible by 4. For data item types U, X, and Z, the product of the subitem count and the subitem length must equal an even number. If this parameter is omitted, the subitem count is assumed to be 1.

SubitemType must be a valid data item type: [!]E, I, J, P, R, U, X, or Z. Data type E is specified in two ways as follows:

E Specifies IEEE format for real numbers.

!E Specifies IEEE format when the stored data is already in IEEE data format. The optional exclamation point (!) indicates that the data type is changed to type E; however, the data is not converted because it is already in the correct format. To use !E, the current subitem length *must* be equivalent to 2 or 4 halfwords.

SubitemLength must be an integer from 1 to 255 for data item types P, U, X, and Z. The length for types I and J must be 1, 2, or 4. For type K, it must be 1 or 2; and for types E and R, it must be 2 or 4. For data item type P, the product of the subitem count and the subitem length must be evenly divisible by 4. For data item types U, X, and Z, the subitem count and the subitem length must be an even number.

Note When specifying type E with the no-conversion option (!E), if the subitem length is changed from 2 to 4, or 4 to 2, the data has to be converted to fit into the new field size with the assumption it is already in IEEE format.

Description

Use this command to change the subitem count, type, and/or length of a data item. This command is similar to CHANGE ITEM; however, use the CHANGE ATTRIBUTE command when you only want to change data item attributes but do not want to change the security or order in which the data item appears in the ITEMS part of the schema.

Example

```
>change attributes store# X 4
```

In this example, the attributes of the data item STORE# are changed. The subitem type is changed to X and the subitem length to 4. Because the *SubitemCount* parameter is not specified, the subitem count does not change.

Before the change, the ITEMS part of the schema looks like this:

```
ITEMS:
ACCOUNT          , J2(0,11,12,13,14,18/);
BINNUM           , Z2(/13);
CITY             , X12(12,13,14,/11);
CREDIT-RATING   , R2(/14);
DATE            , X6(0,11,12,13,14,18/);
DELIV-DATE      , X6(/14);
DESCRIPTION      , X20(0,11,12,13,14,18/);
FIRST-NAME      , X10(14/11);
INITIAL         , U2(14/11);
LAST-NAME       , X16(14/11);
LASTSHIPDATE    , X6(12/);
ONHANDQTY       , J2(14/12);
PRICE           , J2(14/);
PURCH-DATE      , X6(11/14);
QUANTITY        , I1(/14);
STATE           , X2(12,13,14,/11);
STOCK#          , U8(0,11,12,13,14,18/);
STREET-ADD      , S26(12,13,14/11);
SUPPLIER        , X16(12,13/);
TAX             , J2(14/);
TOTAL           , J2(11,14);
UNIT-COST       , P8(/12);
ZIP             , X6(12,13,14/11);
STORE#         , J2(11,12/14);           ← attributes to be changed
```

CHANGE ATTRIBUTES

After attributes change, the ITEMS part of the schema looks like this:

```
ITEMS:
ACCOUNT          , J2(0,11,12,13,14,18/);
BINNUM           , Z2(/13);
CITY             , X12(12,13,14,/11);
CREDIT-RATING   , R2(/14);
DATE            , X6(0,11,12,13,14,18/);
DELIV-DATE      , X6(/14);
DESCRIPTION     , X20(0,11,12,13,14,18/);
FIRST-NAME      , X10(14/11);
INITIAL         , U2(14/11);
LAST-NAME       , X16(14/11);
LASTSHIPDATE    , X6(12/);
ONHANDQTY       , J2(14/12);
PRICE           , J2(14/);
PURCH-DATE      , X6(11/14);
QUANTITY        , I1(/14);
STATE           , X2(12,13,14,/11);
STOCK#          , U8(0,11,12,13,14,18/);
STREET-ADD      , S26(12,13,14/11);
SUPPLIER        , X16(12,13/);
TAX             , J2(14/);
TOTAL           , J2(11,14);
UNIT-COST       , P8(/12);
ZIP             , X6(12,13,14/11);
STORE#          , X4(11,12/14);           ← attributes changed
```

CHANGE ITEM

Changes the subitem count, type, length, security, and/or order of a data item. (For information about supported item type conversions, refer to Table 3-1 later in this section.)

Syntax

```
CHA[NGE] ITEM DataItemName [(NextItem)] [SubitemCount] SubitemType SubitemLength
[( [ReadClassList] / [WriteClassList] )]
```

Parameters

<i>DataItemName</i>	is the name of the data item to be changed. It must be an existing data item in the database. Each data item within the database must have a unique name. This name must be from 1 to 16 characters, the first of which must be alphabetic. Characters after the first must be chosen from this set: letters A - Z, digits 0 - 9, and + * / ? ' # % & @ only.
(<i>NextItem</i>)	is the name of the data item that will follow the changed data item in the schema. If this parameter is omitted, the data item order is not changed.
<i>SubitemCount</i>	must be an integer from 1 through 255. For data item type P, the product of the subitem count and the subitem length must be evenly divisible by 4. For data item types U, X, and Z, the product of the subitem count and the subitem length must be an even number. The default is 1 subitem. If this parameter is selected, the <i>SubitemType</i> and the <i>SubitemLength</i> parameters are also required. If this parameter is omitted, the subitem count remains unchanged.
<i>SubitemType</i>	<p>must be a valid data item type: [!]E, I, J, K, P, R, U, X, or Z. Data type E is specified in two ways as follows:</p> <ul style="list-style-type: none"> E Specifies IEEE format for real numbers. !E Specifies IEEE format when the stored data is already in IEEE data format. The optional exclamation point (!) indicates that the data type is changed to type E; however, the data is not converted because it is already in the correct format. To use !E, the current subitem length <i>must</i> be equivalent to 2 or 4 halfwords. <p>If this parameter is selected, the <i>SubitemLength</i> parameter is also required. If this parameter is omitted, the subitem type remains unchanged.</p>
<i>SubitemLength</i>	must be an integer from 1 to 255 for data item types P, U, X, and Z. The length for types I and J must be 1, 2, or 4. For type K, it must be 1 or 2; and for types E and R, it must be 2 or 4. For data item type P, the product of the subitem count and the subitem length must be evenly divisible by 4. For data item types U, X, and Z, the subitem count and the subitem

CHANGE ITEM

length must be an even number. If this parameter is selected, the *SubitemType* parameter is also required. If this parameter is omitted, the subitem length remains unchanged.

Note When specifying type E with the no-conversion option (!E), if the subitem length is changed from 2 to 4, or 4 to 2, the data has to be converted to fit into the new field size with the assumption it is already in IEEE format.

*(ReadClassList/
WriteClassList)*

defines user class access to the data set. If this entire parameter is omitted, the data item security remains unchanged. The class lists are defined as follows:

(ReadClassList) is a list of user classes having read access to the data set. It can consist of user class numbers from 0 to 63, separated by commas. If this parameter is empty [for example, (/12,14)], read access to the data set remains unchanged.

(WriteClassList) is a list of user classes that have write (and implied read) access to the data set. It can consist of user class numbers from 0 to 63, separated by commas. If this parameter is empty [for example (12,14/)], write access to the data set remains unchanged.

Description

Use this command when making several data item changes at the same time.

Note Several parameters are interrelated. For example, if you enter the subitem count, you must enter the subitem type and the subitem length, even if the last two parameters have not changed. The *SubitemType* and *SubitemLength* parameters are also interrelated. If you enter one, you must enter the other, even if only one has changed.

When making changes to data item security, remember that access to data items within data sets may be further allowed or restricted by data set security.

Item Type Conversions

DBChange Plus supports type conversion for all data item types defined in the *TurboIMAGE/XL Reference Manual* with the exception of I4 and J4. Table 3-1 shows the data item type conversions supported by DBChange Plus. An x in the appropriate box indicates that you can convert the current item type to the new item type.

Table 3-1. DBChange Plus Supported Item Type Conversions

Current Item Type	New Item Type								
	E2,E4 [†]	I1,I2	J1,J2	K1	P	R2,R4	U	X	Z
E2,E4	x	x	x	x		x			
I1,I2	x	x	x	x	x	x	x	x	x
J1,J2	x	x	x	x	x	x	x	x	x
K1	x	x	x	x	x	x	x	x	x
P		x	x	x	x		x	x	x
R2,R4	x	x	x	x		x			
U							x	x	
X							x	x	
Z		x	x	x	x		x	x	x

[†] !E2 or !E4 assumes a current data type of E. The length must be equivalent to 2 or 4 halfwords.

Caution

When converting data item types, overflow, underflow, and truncation may occur if you are reducing data item size. Be sure to verify that data item conversions do not result in loss of data. When converting to new data types and prior to restructuring your database, always check any values that could exceed the minimum and maximum limits for the new data types. You can use QUERY/3000 to verify the data item conversions and to check for values less than the minimum and greater than the maximum limits before converting to the new data type.

Example

```
>change item deliv-date 2 u 6 (/11,14)
```

In this example, the subitem count of the data item DELIV-DATE is changed to 2, the subitem type to U, and the subitem length to 6. User class 11 has also been given write access to the data item. Note that the subitem length must be entered even though it has not been changed. Because *NextItem* was not entered, the data item order remains the same.

Before the change, the ITEMS part of the schema looks like this:

```
ITEMS:
ACCOUNT          , J2(0,11,12,13,14,18/);
BINNUM           , Z2(/13);
CITY             , X12(12,13,14,/11);
CREDIT-RATING    , R2(/14);
DATE            , X6(0,11,12,13,14,18/);
DELIV-DATE       , X6(/14);           ← item to be changed
DESCRIPTION      , X20(0,11,12,13,14,18/);
```


CHANGE ITEM

```
FIRST-NAME      , X10(14/11);
INITIAL         , U2(14/11);
LAST-NAME      , X16(14/11);
LASTSHIPDATE   , X6(12/);
ONHANDQTY      , J2(14/12);
PRICE          , J2(14/);
PURCH-DATE     , X6(11/14);
QUANTITY       , I1(/14);
STATE          , X2(12,13,14,/11);
STOCK#         , U8(0,11,12,13,14,18/);
STREET-ADD     , S26(12,13,14/11);
SUPPLIER       , X16(12,13/);
TAX            , J2(14/);
TOTAL          , J2(11,14);
UNIT-COST      , P8(/12);
ZIP            , X6(12,13,14/11);
```

After the change, the ITEMS part of the schema looks like this:

ITEMS:

```
ACCOUNT         , J2(0,11,12,13,14,18/);
BINNUM         , Z2(/13);
CITY           , X12(12,13,14,/11);
CREDIT-RATING  , R2(/14);
DATE           , X6(0,11,12,13,14,18/);
DELIV-DATE     , 2U6(/11,14);           ⇐ item changed
DESCRIPTION    , X20(0,11,12,13,14,18/);
FIRST-NAME     , X10(14/11);
INITIAL        , U2(14/11);
LAST-NAME      , X16(14/11);
LASTSHIPDATE   , X6(12/);
ONHANDQTY      , J2(14/12);
PRICE          , J2(14/);
PURCH-DATE     , X6(11/14);
QUANTITY       , I1(/14);
STATE          , X2(12,13,14,/11);
STOCK#         , U8(0,11,12,13,14,18/);
STREET-ADD     , S26(12,13,14/11);
SUPPLIER       , X16(12,13/);
TAX            , J2(14/);
TOTAL          , J2(11,14);
UNIT-COST      , P8(/12);
ZIP            , X6(12,13,14/11);
STORE#         , J2(11,12/14);
```

Revised DBChange Plus Messages

70	MESSAGE	New item type cannot be converted from current item type/len (DBC 70).
	MEANING	When changing data item attributes, the new data item type must be able to convert from the existing data item type, or the length must be equivalent to 2 or 4 halfwords when using !E.
	ACTION	Refer to Table 2-1 or Table 3-1 for information on available type conversions between different item types.
108	MESSAGE	Sub-item length for item type E or R must be 2 or 4 (DBC 108).
	MEANING	The specified length is invalid for item type E or R.
	ACTION	Specify a subitem length of either 2 or 4.
204	MESSAGE	Type must be [!]E, I, J, K, P, R, U, X, or Z (DBC 204).
	MEANING	A data item type was entered that was not [!]E, I, J, K, P, R, U, X, or Z.
	ACTION	Enter a valid data item type. Refer to the <i>TurboIMAGE/XL DBMS Reference Manual</i> for a list of types accepted by TurboIMAGE/XL.