Note!

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 137.

Third Edition (May 2001)

This edition applies to Version 5, Release 1, Modification Level 0, of IBM WebSphere Development Studio for iSeries (5722-WDS), ILE COBOL compiler, and to all subsequent releases and modifications until otherwise indicated in new editions.

Changes or additions to the text and illustrations are indicated by a vertical line to the left of the change or addition.

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About This Summary

This summary contains all the COBOL statements and related information you may need to refer to when programming in the Integrated Language Environment (ILE) COBOL language.

Before using this summary, you should have a basic understanding of the ILE COBOL language and of the Operating System/400® (OS/400) operating system Control Language (CL).

Who Should Use This Summary

This publication is for programmers familiar with the COBOL language. The purpose of this publication is to summarize the formats of the COBOL language as it is used on the ILE COBOL compiler.

In order to use this summary effectively, you should be familiar with the ILE COBOL Programmer’s Guide and the ILE COBOL Reference. If you need reference information for the Control Language, see the CL and APIs section of the Programming category in the iSeries 400 Information Center. You should also be familiar with data management concepts, which are described in the Database and File Systems category in the iSeries 400 Information Center. The Information Center is located at [http://www.ibm.com/eserver/iseries/isinfocenter](http://www.ibm.com/eserver/iseries/isinfocenter).

Prerequisite and Related Information

Use the iSeries Information Center as your starting point for looking up iSeries and AS/400e technical information. You can access the Information Center in two ways:

- From the following Web site:
- From CD-ROMs that ship with your Operating System/400 order:
  iSeries Information Center, SK3T-4091-00. This package also includes the PDF versions of iSeries manuals, iSeries Information Center: Supplemental Manuals, SK3T-4092-00, which replaces the Softcopy Library CD-ROM.

The iSeries Information Center contains advisors and important topics such as CL commands, system application programming interfaces (APIs), logical partitions, clustering, Java™, TCP/IP, Web serving, and secured networks. It also includes links to related IBM® Redbooks and Internet links to other IBM Web sites such as the Technical Studio and the IBM home page.
ILE COBOL Syntax Notation

ILE COBOL basic formats are presented in a uniform system of syntax notation. This notation, designed to assist you in writing COBOL source statements, is explained in the following paragraphs:

- COBOL keywords and optional words appear in uppercase letters; for example:

  MOVE

  They must be spelled exactly as shown. If any keyword is missing, the compiler considers it as an error.

- Variables representing user-supplied names or values appear in all lowercase italic letters; for example:

  parmx

  For easier text reference, some words are followed by a hyphen and a digit or a letter, as in:

  identifier–1

  This suffix does not change the syntactical definition of the word.

- If punctuation marks, parentheses, arithmetic operators, logical operators, or such symbols are shown, they must be entered as part of the syntax.

- Arithmetic and logical operators (+, −, *, /, **, >, <, =, ≥, and ≤) are special character reserved words. For a complete listing of reserved ILE COBOL words, see “Chapter 13. ILE COBOL Reserved Word List” on page 131.
How to Read the Syntax Diagrams

Throughout this book, syntax is described using the structure defined below.

- Read the syntax diagrams from left to right, from top to bottom, following the path of the line:
  - ➔ indicates the beginning of a statement.
  - ➔ indicates that the statement syntax is continued on the next line.
  - ➔ indicates that a statement is continued from the previous line.
  - ➔ indicates the end of a statement.

Diagrams of syntactical units other than statements, such as clauses, phrases, and paragraphs, also start with the ➔ symbol and end with the ➔ symbol.

**Note:** Statements within a diagram of an entire paragraph will not start with ➔ and end with ➔ unless their beginning or ending coincides with that of the paragraph.

- Required items appear on the horizontal line (the main path).

  ➔STATEMENT-required item

- Optional items appear below the main path.

  ➔STATEMENT  
  
  optional item

- When you can choose from two or more items, they appear vertically, in a stack. If you must choose one of the items, one item of the stack appears on the main path.

  ➔STATEMENT-required-choice-1
  
  required-choice-2

  If choosing one of the items is optional, the entire stack appears below the main path.

  ➔STATEMENT  
  
  optional-choice-1
  
  optional-choice-2

- An arrow returning to the left above an item indicates that the item can be repeated.
A repeat arrow above a stack of required or optional choices indicates that you can make more than one choice from the stacked items, or repeat a single choice.

- A syntax fragment is delimited in the main syntax diagram by a set of vertical lines. The corresponding definition of the fragment begins with the name of the fragment followed by the syntax, which starts and ends with a vertical line.

The following example shows how the syntax is used:

**Format**

(1) STATEMENT
(2) identifier-1
(3) literal-1
(4) item 1
(5) TO identifier-m
(6) ROUNDED
(7) SIZE ERROR
(8) imperative-statement-m
(9) ON
(10) END-STATEMENT
item 1:

```
identifier-2
| literal-2
| arithmetic-expression-1
```

Notes:

1. The STATEMENT key word must be specified and coded as shown.
2. This operand is required. Either identifier-1 or literal-1 must be coded.
3. The item 1 fragment is optional; it can be coded or not, as required by the application. If item 1 is coded, it can be repeated with each entry separated by one or more COBOL separators. Entry selections allowed for this fragment are described at the bottom of the diagram.
4. The operand identifier-m and associated TO key word are required and can be repeated with one or more COBOL separators separating each entry. Each entry can be assigned the key word ROUNDED.
5. The ON SIZE ERROR phrase with associated imperative-statement-m are optional. If the ON SIZE ERROR phrase is coded, the key word ON is optional.
6. The END-STATEMENT key word can be coded to end the statement. It is not a required delimiter.
IBM Extensions

An IBM extension generally modifies a rule or restriction that immediately precedes it. The standard is presented first, because some programmers use the ILE COBOL language without IBM extensions. The extensions are then presented for those who do use them.

Clauses and statements illustrated within syntax diagrams that are ILE COBOL language extensions to the American National Standards Institute (ANSI) standard X3.23b-1993, *American National Standard for Information Systems - Programming Language - COBOL* are identified by footnotes.

---

IBM Extension

ILE COBOL language extensions to ANSI X3.23b-1993 COBOL that are part of the text description are enclosed in IBM Extension bars, like this paragraph.

End of IBM Extension
Documentary Syntax

Some COBOL clauses and statements are syntax checked and treated as documentation by the ILE COBOL compiler. Such clauses and statements are identified with a footnote in syntax diagrams.
CL Entry Codes

The code that appears in the upper right corner of each CL syntax diagram contains the entry codes that specify the environment in which the command can be entered. The codes indicate whether or not the command can be:

- Used in a batch or interactive job (outside a compiled program; Job:B or I)
- Used in a batch or interactive compiled program (Pgm:B or I)
- Used in a batch or interactive REXX procedure (REXX:B or I)
- Used as a parameter for the CALL CL command, or passed as a character string to the system program QCMDEXC (Exec).
Industry Standard

Standard COBOL refers to the COBOL programming language as defined in the document entitled American National Standard for Information Systems - Programming Language - COBOL, ANSI X3.23-1985, ISO 1989:1985, updated with the content of the following documents, in the order they are listed:

- Programming Languages - COBOL, AMENDMENT 1: Intrinsic function module
- ANSI X3.23b-1993, American National Standard for Information Systems - Programming Language - Correction Amendment for COBOL
- ISO/IEC 1989 DAM2 Programming Languages - COBOL, AMENDMENT 2: Correction and clarification amendment for COBOL.

From this point on, the term Standard COBOL will be used to refer to the ANSI standard just described.
Chapter 1. Creating Module and Program Objects

Use the CRTCBLMOD (Create COBOL Module) command to create one or more module objects from ILE COBOL source members. Use the CRTPGM (Create Program) command to bind the module objects created by the CRTCBLMOD command into one or more program objects.

Use the CRTBNDCBL (Create Bound COBOL) command to create one or more program objects directly from ILE COBOL source members.

You can use the PROCESS statement in your source member to override the options specified for the CRTCBLMOD or CRTBNDCBL command. The options of the PROCESS statement are covered in "PROCESS Statement" on page 8.

CRTCBLMOD Command Syntax

The following diagram shows the syntax of the CRTCBLMOD command:

CRTCBLMOD Command—Format

- **CRTCBLMOD**
- **MODULE**
  - **library-name**
  - **module-name**
- **SRCFILE**
  - **LIBL**
  - **source-file-name**
- **SRCMBR**
  - **source-file-member-name**
- **PRINT**
  - **OUTPUT**
    - **NONE**
- **GENLVL**
  - **severity-level-value**
- **TEXT**
  - **SRCMBRTXT**
    - **BLANK**
    - "text-description"
Creating Module and Program Objects

- **OPTION**
  - **OPTION Details**
- **CVTOPT**
  - **CVTOPT Details**

- **MSGLMT**
  - *NOMAX*
  - `maximum-number`
  - `severity-level`

- **DBGVIEW**
  - *STMT*
  - *SOURCE*
  - *LIST*
  - *ALL*
  - *NONE*

- **OPTIMIZE**
  - *NONE*
  - *BASIC*
  - *FULL*

- **FLAGSTD**
  - *NOFIPS*
  - *NOOBsolete*
  - *MINIMUM*
  - *INTERMEDIATE*
  - *HIGH*

- **EXTDSPOPT**
  - *DFRWRT*
  - *UNDSPCHR*
  - *ACCUPDALL*
  - *NODFRWRT*
  - *NOUNDSPCHR*
  - *ACCUPDNE*

- **FLAG**
  - `severity-level`
  - **REPLACE**
  - *YES*
  - *NO*

- **AUT**
  - *LIBCRAUT*
  - *ALL*
  - *CHANGE*
  - *USE*
  - *EXCLUDE*
  - *authorization-list-name*

- **LINKLIT**
  - *PGM*
  - *PRC*

- **TGTRLS**
  - *CURRENT*
  - *PRV*
  - *target-release*
CRTBNDCBL Command Syntax

The following diagram shows the syntax of the CRTBNDCBL command:

**CRTBNDCBL Command - Format**

```
CRTBNDCBL
    PGM(library-name/program-name)
    *CURLIB/ *PGMID *PGMID
    SRCFILE(source-file-name)
    *LIBL/ QCBLLESRC
```

Creating Module and Program Objects

*PRTCORR* → *MONOPRC* → *RANGE* → *NOUNREF* → *NOSYNC*

*INZDLT* → *STDINZ* → *DOSFILLER* → *INZDLT* → *STDTRUNC* → *CHGPOSSGN* → *EVENTF* → *NOMONOPIC*

CVTOPT Details:

*VARCHAR* → *DATETIME* → *PICXGRAPHIC* → *PICNGRAPHIC* → *DATE* → *TIME* → *TIMESTAMP* → *CVTTODATE* → *CVTTODATE*
Creating Module and Program Objects

**SRCMBR** (source-file-member-name)

**PRINT**

**OUTPUT** (NONE)

**GENLVL** (severity-level-value)

**SRCMBRTXT**

**TEXT** (BLANK 'text-description')

**OPTION** (OPTION Details)

**CVTOPT** (CVTOPT Details)

**MSGLMT** (NOMAX maximum-number severity-level)

**DBGVIEW** (SOURCE LIST ALL NONE)

**OPTIMIZE** (NONE BASIC FULL)

**FLAGSTD** (NOFIPS MINIMUM INTERMEDIATE HIGH NOOBsolete)

**EXTDSPOPT** (DFRWRT NODFRWRT UNDSPCHR NOUNDSPCHR ACCUPDALL ACCUPDNE)

**FLAG** (severity-level)

**REPLACE** (YES NO)
Creating Module and Program Objects

USRPFW ( *OWNER )

AUT ( *LIBCRTAUT )

*CHANGE

*USE

*EXCLUDE

authorization-list-name

LINKLIT ( *PRC )

SIMPLEPGM ( *YES )

SIMPLEPGM ( *NO )

TGTRLS ( *PRV )

target-release

SRTSEQ ( *JOB )

*LANGIDUNQ

*LANGIDSHR

*LIBL/

sort-seq-table-name

library-name/

LANGID ( *JOB )

language-identifier-name

ENBPFRCOL ( *ENTRYEXIT )

*FULL

BNDDIR ( *LIBL/

binding-directory-name

*CURLIB/

library-name/

*USRLIBL/
Creating Module and Program Objects

**OPTION Details:**

- **SRC**
- **SOURCE**
- **NOXREF**
- **GEN**
- **NOSEQUENCE**
- **NOVBSUM**

- **NOSOURCE**
- **NOSRC**
- **XREF**
- **NOGEN**
- **SEQUENCE**
- **VBSUM**

- **NUMBER**
- **LINENUMBER**
- **NOMAP**
- **NOOPTIONS**
- **QUOTE**
- **NOSECLVL**

- **NONUMBER**
- **MAP**
- **OPTIONS**
- **APOST**
- **SECLVL**

- **PRTCORR**
- **NOSOURCE**
- **NOSRC**
- **NOSEQUENCE**
- **NOVBSUM**

- **NORANGE**
- **UNREF**
- **SYNC**

- **NOINZDLT**
- **INZDLT**

- **NODUPKEYCHK**
- **DUPKEYCHK**

- **NOIMBEDERR**
- **IMBEDERR**

- **DUMMY**
- **CHAIN**

- **SLAVE**
- **MASTER**

- **NOVBSUM**
- **VBSUM**

- **NOSEQUENCE**
- **SEQUENCE**

- **NOINZDLT**
- **INZDLT**

- **NODUPKEYCHK**
- **DUPKEYCHK**

- **NOIMBEDERR**
- **IMBEDERR**

Chapter 1. Creating Module and Program Objects 7
Creating Module and Program Objects

**CVTOPT Details:**

- `+NOVARCHAR` ➙ `+VARCHAR`
- `+NODATETIME` ➙ `+DATETIME`
- `+NOPICXGRAPHIC` ➙ `+PICXGRAPHIC`
- `+NOPICNGRAPHIC` ➙ `+PICNGRAPHIC`
- `+NOFLOAT` ➙ `+FLOAT`
- `+NODATE` ➙ `+DATE`
- `+NOTIME` ➙ `+TIME`
- `+NOTIMESTAMP` ➙ `+TIMESTAMP`
- `+NOCVTTODATE` ➙ `+CVTTODATE`

**PROCESS Statement**

The syntax of the PROCESS statement is:

```
PROCESS option-1
```

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<thead>
<tr>
<th>PROCESS Statement Options</th>
<th>CRTCBLMOD/CRTBNDCBL</th>
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## CRTCBLMOD/CRTBNDCBL Parameter Options

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### Creating Module and Program Objects

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Creating Module and Program Objects

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<td>JOB</td>
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<tr>
<td>HEX</td>
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<tr>
<td>coded-character-set-identifier</td>
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</tr>
<tr>
<td>b = Non-locale single-byte data CCSID</td>
<td></td>
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## PROCESS Statement Option NTLPADCHAR(a b c)

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<td>NX'0020'' = a national hexadecimal literal representing one national character</td>
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<tr>
<td>b = padding character for moving double-byte to national</td>
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<tr>
<td>NX'3000'' = a national hexadecimal literal representing one national character</td>
</tr>
<tr>
<td>c = padding character for moving national to national</td>
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<td>NX'3000'' = a national hexadecimal literal representing one national character</td>
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## PROCESS Statement Option LICOPT(a)

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Creating Module and Program Objects
Chapter 2. COBOL Source Program—General Structure

COBOL Source Program—Format

- IDENTIFICATION DIVISION.
  - PROGRAM-ID. program-name-1 (1)
  - ID literal-1
- INITIAL IS PROGRAM.
- IDENTIFICATION-DIVISION-content
- ENVIRONMENT DIVISION.
- DATA DIVISION.
- PROCEDURE DIVISION.
- END PROGRAM program-name-1.
- nested program:
  - IDENTIFICATION DIVISION.
    - PROGRAM-ID. program-name-2 (1)
    - ID literal-2
  - INITIAL IS PROGRAM.
  - IDENTIFICATION-DIVISION-content
  - ENVIRONMENT DIVISION.

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COBOL Source Program—General Structure

Notes:
1  IBM Extension
Chapter 3. Identification Division

Identification Division - Format

Notes:
1 IBM Extension
2 Allowed only for nested COBOL programs
Identification Division
Chapter 4. Environment Division

Environment Division - Format

**ENVIRONMENT DIVISION.**

**CONFIGURATION SECTION.** Configuration Section Paragraphs

**INPUT-OUTPUT SECTION.** Input-Output Section Paragraphs

Configuration Section Paragraphs:

**SOURCE-COMPUTER.** source-computer-entry

**OBJECT-COMPUTER.** object-computer-entry

**SPECIAL-NAMES.** special-names-entry

Input-Output Section Paragraphs:

**FILE-CONTROL.** file-control-entry

**I-O-CONTROL.** i-o-control-entry
Environment Division

Configuration Section

**SOURCE-COMPUTER Paragraph**

**SOURCE-COMPUTER Paragraph - Format**

```
 SOURCE-COMPUTER. computer-name .
    WITH DEBUGGING MODE .
```

**OBJECT-COMPUTER Paragraph**

**OBJECT-COMPUTER Paragraph - Format**

```
 OBJECT-COMPUTER. computer-name Entry .
```

**Entry:**

```
(1) MEMORY integer WORDS CHARACTERS MODULES
```

```
PROGRAM COLLATING IS alphabet-name
```

```
(1) SEGMENT-LIMIT segment-number IS
```

**Notes:**

1. Syntax-checked only.

**SPECIAL-NAMES Paragraph**

**SPECIAL-NAMES Paragraph - Format**

```
 SPECIAL-NAMES.
```
Environment Division

cond:

ON

STATUS IS condition-1

off phrase

ON

STATUS IS condition-1

off phrase

off phrase:

OFF

STATUS IS condition-2
Environment Division

Notes:
1 The separator period must be used if any of the optional clauses are selected. Clauses can be entered in any order.
2 IBM Extension
3 Subsequent repetitions are IBM Extensions.

ALPHABET Clause

ALPHABET Clause - Format

```
ALPHABET alphabet-name-1 IS
   STANDARD-1
      STANDARD-2
      NATIVE
      EBCDIC
         (1)
      NLSSORT
      literal-1
         THROUGH literal-2
         THRU
      ALSO literal-3
```

Notes:
1 IBM Extension

CLASS Clause

CLASS Clause - Format

```
CLASS class-name-1 IS
   literal-4
      THROUGH literal-5
      THRU
```

CONSOLE Clause

CONSOLE Clause - Format

```
CONSOLE (1) CRT IS DISPLAY
```

Notes:
1 IBM Extension
CRT STATUS Clause

CRT STATUS Clause - Format

\[\text{CRT STATUS} \quad \text{data-name-2} \quad \text{IS} \quad \text{67,P0----67,GL----} \]

Notes:
1  IBM Extension

CURRENCY Clause

CURRENCY SIGN Clause - Format

\[\text{CURRENCY} \quad \text{SIGN} \quad \text{IS} \quad \text{67,P0----67,GL----} \]

Notes:
1  IBM Extension

CURSOR Clause

CURSOR Clause - Format

\[\text{CURSOR} \quad \text{data-name-1} \quad \text{IS} \quad \text{67,P0----67,GL----} \]

Notes:
1  IBM Extension

DECIMAL-POINT Clause

DECIMAL-POINT IS COMMA Clause - Format

\[\text{DECIMAL-POINT} \quad \text{IS} \quad \text{COMMA} \]
Environment Division

FORMAT Clause

IBM Extension

FORMAT Clause - Format

FORMAT OF DATE IS

literal-8

SIZE Phrase 1:

SIZE IS integer-4

LOCALE Phrase 1:

LOCALE IS mnemonic-name-4

End of IBM Extension

LINKAGE-TYPE Clause

LINKAGE TYPE Clause - Format

(1)

LINKAGE TYPE IS environment-name-3 FOR

PROCEDURE

literal-7 USING linkage-arguments

ILE COBOL Reference Summary
Environment Division

linkage-arguments:

\[ \text{ALL} \quad \text{integer-1} \quad \text{THRU} \quad \text{integer-2} \quad \text{IS} \quad \text{DESCRIBED} \quad \text{ARE} \]

Notes:

1. IBM Extension

LOCALE Clause

\[
\text{IBM Extension} \quad \text{LOCALE Clause - Format} \quad \text{IBM Extension} \quad \text{LOCALE Clause - Format}
\]

\[
\text{locale-name-1} \quad \text{literal-4} \quad \text{LIBRARY} \quad \text{literal-5} \quad \text{IN} \quad \text{IS} \quad \text{mnemonic-name-5}
\]

End of IBM Extension

Input-Output Section

Note: The keyword FILE-CONTROL appears only once at the beginning of the paragraph before the first file-control entry. The keyword I-O-CONTROL appears only once at the being of the paragraph before the first input-output-control entry.

FILE-CONTROL Paragraph

FILE-CONTROL Paragraph - Format 1 - Sequential

\[
\text{FILE-CONTROL. SELECT} \quad \text{file-name} \quad \text{OPTIONAL} \quad \text{ASSIGN} \quad \text{assignment-name-1} \quad \text{TO} \quad \text{literal-1} \quad (2)
\]
Environment Division

(1) 
RESERVE integer AREA AREAS

ORGANIZATION IS SEQUENTIAL

(1) 
PADDING CHARACTER IS data-name-6 literal-2

(1) 
RECORD DELIMITER STANDARD-1 IS assignment-name-2

ACCESS MODE IS SEQUENTIAL

FILE STATUS IS data-name-1 
  data-name-5 (3)

Notes:
1   Syntax-checked only.
2   Subsequent repetitions syntax-checked only.
3   IBM Extension

FILE-CONTROL Paragraph - Format 2 - Relative

FILE-CONTROL SELECT file-name
  OPTIONAL

ASSIGN TO assignment-name-1 (1) literal-1
Environment Division

(2) RESERVE integer AREA AREAS

ORGANIZATION IS RELATIVE

ACCESS MODE IS SEQUENTIAL

RANDOM rel-key rel-key

DYNAMIC

FILE STATUS data-name-1

data-name-5

rel-key:

RELATIVE

KEY IS data-name-4

Notes:
1 Subsequent repetitions syntax-checked only.
2 Syntax-checked only.
3 IBM Extension

FILE-CONTROL Paragraph - Format 3 - Indexed

FILE-CONTROL. SELECT file-name

ASSIGN assignment-name-1 TO literal-1

(2)

RESERVE integer AREA AREAS

INDEXED

ORGANIZATION IS

ACCESS MODE IS SEQUENTIAL

RANDOM rel-key rel-key

DYNAMIC

RECORD KEY IS
Environment Division

1. IBM Extension
2. Subsequent repetitions syntax-checked only.
3. Syntax-checked only.

FILE-CONTROL Paragraph - Format 4 - Sort or Merge

Notes:
1. Syntax checked only.

IBM Extension

FILE-CONTROL Paragraph - Format 5 - Transaction

Notes:
1. Syntax checked only.
ACCESS SEQUENTIAL

DYNAMIC rel-key

STATUS data-name-1

FILE IS data-name-5

CONTROL-AREA IS data-name-7.

rel-key:

RELATIVE KEY IS data-name-4

Notes:

1  Subsequent repetitions syntax checked only.

End of IBM Extension

I-O-CONTROL Paragraph

I-O-CONTROL Paragraph - Format 1 - Sequential
Environment Division

**records:**

```
EVERY integer-1 RECORDS OF file-name-2 OF file-name-2
integer-2 CLOCK-UNITS condition-name-1
```

**files:**

```
file-name-3 file-name-4
```

**multiple file tape:**

```
(1)
MULTIPLE FILE TAPE CONTAINS
file-name-5
POSITION integer-2
```

**Notes:**

1. Syntax-checked only.
2. IBM Extension

**I-O-CONTROL Paragraph - Format 2 - Relative/Indexed**

```
RERUN records.
ON assignment-name-1 file-name-1
SAME RECORD AREA FOR files
COMMITMENT CONTROL FOR file-name-6
```
records:

```
EVERY integer-1 RECORDS OF file-name-2
integer-2 CLOCK-UNITS
condition-name-1
```

files:

```
file-name-3 file-name-4
```

Notes:

1. Syntax-checked only.
2. IBM Extension

I-O-CONTROL Paragraph - Format 3 - Sort/Merge

```
I-O-CONTROL.

SAME RECORD (1) AREA FOR files
SORT (1) FOR
SORT-MERGE
```

files:

```
file-name-3 file-name-4
```

Notes:

1. Syntax-checked only.
Environment Division
Chapter 5. Data Division

Data Division - Format

DATA DIVISION.

FILE SECTION.

WORKING-STORAGE SECTION.

LINKAGE SECTION.

file-section-entries:

File Section

File Description Entry - Format 1a - Format, Database

FD—file-name—EXTERNAL

IS GLOBAL

BLOCK CONTAINS integer1—TO integer2 CHARACTERS RECORDS
Data Division

**Notes:**
1. Syntax-checked only.

**File Description Entry - Format 1b - Disk**
Data Division

Notes:
1 Syntax-checked only.

File Description Entry - Format 2 - Diskette
Data Division

Notes:
1 Syntax-checked only.

File Description Entry - Format 3 - Tapefile
Data Division

LABEL RECORD STANDARD IS OMITTED

RECORDS ARE

VALUE OF (1) system-name-1 data-name-1 IS literal-1

DATA RECORD (1) data-name-2 IS RECORDS ARE

CODE-SET alphabet-name-1 IS.

varying:

VARYING IN SIZE FROM integer-4 TO integer-5 CHARACTERS

Notes:

1 Syntax-checked only.

File Description Entry - Format 4 - Printer

FD file-name EXTERNAL IS GLOBAL

BLOCK CONTAINS integer1 TO integer2 CHARACTERS RECORDS
Data Division

- RECORD CONTAINS integer3 to integer6 TO integer7 CHARACTERS

(1)
- LABEL RECORD IS OMITTED
- RECORDS ARE

(1)
- VALUE OF system-name-1 data-name-1 IS literal-1

(1)
- DATA RECORD IS data-name-2
- RECORDS ARE

linage clause:
- CODE-SET alphabet-name-1 IS

Notes:
1. Syntax-checked only.
File Description Entry - Format 5 - Sort/Merge

SD file-name

RECORD
  CONTAINS integer3 CHARACTERS
  CONTAINS integer6 TO integer7 CHARACTERS
  CONTAINS varying DEPENDING ON data-name-1

DATA RECORD data-name-2
  RECORDS ARE

varying:
  IS VARYING IN SIZE
  FROM integer-4
  TO integer-5 CHARACTERS

Notes:
1 Syntax-checked only.

IBM Extension

File Description Entry - Format 6 - Transaction

FD file-name
  EXTERNAL IS
  IS GLOBAL

RECORD
  CONTAINS integer3 CHARACTERS
  CONTAINS integer6 TO integer7 CHARACTERS
Data Division

(1)
LABEL
RECORD
IS STANDARD
RECORDS ARE OMITTED

(1)
DATA
RECORD
IS data-name-2
RECORDS ARE

Notes:
1 Syntax-checked only.
End of IBM Extension

Working-Storage Section

Data Description Entry - General Format 1

level-number

data-name-1
FILLER

(1)
REDEFINES data-name-2
LIKE data-name-3 (integer)

(2)
TYPEDEF

EXTERNAL
IS BLANK WHEN ZERO

FORMAT Clause
IS GLOBAL

JUSTIFIED
JUSTIFIED
RIGHT
(3)
OCCURS clause - Format 1
OCCURS clause - Format 2

PICTURE
character-string
PIC IS SIZE and LOCALE Phrases
Notes:
1. Cannot be used with the TYPEDEF clause.
2. IBM Extension
3. Syntax-checked only
Data Division

Data Description Entry - General Format 1 (continued)

OCCURS clause - Format 1:

```
OCCURS integer-2 TIMES key-indexed-by phrase
```

OCCURS clause - Format 2:

```
OCCURS integer-1 TO integer-2 TIMES DEPENDING ON data-name-1
```

key-indexed-by phrase:

```
(1) ASCENDING data-name-2
(1) DESCENDING KEY IS data-name-2
INDEXED index-name-1
```

Size and Locale Phrases:

```
(2) SIZE integer-3 LOCALE IS mnemonic-name-1
```

FORMAT Clause:

```
(2) FORMAT DATE OF TIME IS TIMESTAMP
```
phrase 1:

```
<table>
<thead>
<tr>
<th>SIZE</th>
<th>integer-4</th>
<th>LOCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS</td>
<td></td>
<td>IS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mnemonic-name-2</td>
</tr>
</tbody>
</table>
```

phrase 2:

```
<table>
<thead>
<tr>
<th>SIZE</th>
<th>integer-5</th>
<th>LOCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS</td>
<td></td>
<td>IS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mnemonic-name-3</td>
</tr>
</tbody>
</table>
```

Notes:
1. Cannot be used with boolean data type
2. IBM Extension

Data Description Entry - General Format 2

```

Data Description Entry - General Format 3

```

Data Description Entry - Format 4 - Boolean Data
Data Division

- level-number
  - data-name-1
    - (1)
      - FILLER
    - REDEFINES data-name-2
      - LIKE data-name-3
    - TYPEDEF

- EXTERNAL
  - IS
    - GLOBAL

- OCCURS clause - Format 1
  - OCCURS clause - Format 2

- INDICATOR
  - integer-3
    - PIC IS

- VALUE
  - boolean-literal
    - IS

- TYPE
type-name-1
  - DISPLAY
    - IS

OCCURS clause - Format 1:

- OCCURS integer-2
  - TIMES
    - INDEXED
      - BY
        - index-name-1

OCCURS clause - Format 2:

- OCCURS integer-1 TO integer-2
  - TIMES
    - DEPENDING
      - ON data-name-4
Notes:
1. Cannot be used with the TYPEDEF clause.
2. Syntax-checked only

End of IBM Extension

Linkage Section

See “Working-Storage Section” on page 40 for data description entry clause formats.

The EXTERNAL clause cannot be specified in the Linkage Section.
Chapter 6. Procedure Division

Procedure Division - Format 1

PROCEDURE DIVISION

USING Using-phrase

RETURNING data-name-2

ADDRESS OF (1)

GIVING (1)

DECLARATIVES. Sections-2 END DECLARATIVES.

Sections-1

Using-phrase:

REFERENCE BY (1)

VALUE BY (1)

Sections-1:

section-name SECTION segment-number
Procedure Division

Sections-2:

Notes:
1 IBM Extension

Procedure Division - Format 2

Notes:
1 IBM Extension
Procedure Division Statements

These statements are presented in alphabetical order.

**ACCEPT Statement**

**ACCEPT Statement - Format 1 - Data Transfer**

```
ACCEPT identifier-1 FROM mnemonic-name (1)

environment-name
```

**Notes:**

1. IBM Extension

**ACCEPT Statement - Format 2 - System Info Transfer**

```
ACCEPT identifier-1 FROM DATE

YYYYMMDD

DAY

YYYYDDD

DAY-OF-WEEK

TIME
```

**Notes:**

1. IBM Extension

**IBM Extension**

**ACCEPT Statement - Format 3 - Feedback**

```
ACCEPT identifier-1 FROM mnemonic-name

FOR file-name-1
```

**Notes:**

1. IBM Extension
Procedure Division Statements

Notes:
1  IBM Extension

ACCEPT Statement - Format 4 - Local Data Area

```
ACCEPT identifier-1 FROM mnemonic-name (1)
FOR identifier-2 literal-1
```

Notes:
1  Syntax-checked only.

ACCEPT Statement - Format 5 - PIP Data Area

```
ACCEPT identifier-1 FROM mnemonic-name

EXCEPTION imperative-statement-1 ON

NOT EXCEPTION imperative-statement-2 ON END-ACCEPT
```

ACCEPT Statement - Format 6 - Attribute Data

```
ACCEPT identifier-1 FROM mnemonic-name

FOR identifier-2 literal-1
FOR file-name-1
END-ACCEPT
```

ACCEPT Statement - Format 7 - Workstation I/O

```
ACCEPT identifier-1 line-column-language
FROM CRT MODE BLOCK IS
with-phrase
```
Procedure Division Statements

- EXCEPTION imperative-statement-1
  - ON

- NOT
  - ON
  - EXCEPTION imperative-statement-2
  - END-ACCEPT

line-column-phrase:

- AT LINE
  - COLUMN
  - NUMBER

- AT
  - identifier-3
  - integer-2

- AT
  - identifier-2
  - integer-1
Procedure Division Statements

with-phrase:

WITH

- AUTO
- AUTO-SKIP
- BELL
- BEEP
- BLINK
- FULL
- LENGTH-CHECK
- HIGHLIGHT
- REQUIRED
- EMPTY-CHECK
- REVERSE-VIDEO
- SECURE
- NO-ECHO
- UNDERLINE
- RIGHT-JUSTIFY
- SPACE-FILL
- TRAILING-SIGN
- UPDATE
- ZERO-FILL
- SIZE IS identifier-4 (1)
- PROMPT CHARACTER IS literal-1 (1)
- FOREGROUND-COLOR IS integer-4
- BACKGROUND-COLOR IS integer-5 (1)
- LEFT-JUSTIFY

Notes:
1 Syntax-checked only.

ACCEPT Statement - Format 8 - Session I/O

---- ACCEPT identifier-1 FROM DISPLAY END-ACCEPT ----

ACCEPT Statement - Format 9 - Data Area

---- ACCEPT identifier-1 FROM mnemonic-name FOR identifier-2 literal-1 ----
ACQUIRE Statement

ADD Statement

ADD Statement - Format 1 - ADD

ADD Statement - Format 2 - ADD GIVING

Chapter 6. Procedure Division  53
Procedure Division Statements

ADD Statement - Format 3 - ADD CORRESPONDING

ALTER Statement

CALL Statement
Procedure Division Statements

**BY Phrase:**

- **REFERENCE**
- **BY ADDRESS OF**
- **CONTENT**
- **BY ADDRESS OF LENGTH OF**

**ON EXCEPTION Phrase:**

- **EXCEPTION**
Procedure Division Statements

NOT ON EXCEPTION Phrase:

```
| NOT | EXCEPTION | imperative statement-2 |
```

Notes:
1. IBM Extension

CALL Statement - Format 2

```
CALL identifier-1 literal-1

 LINKAGE environment-name-1
 TYPE IS PROCEDURE

 USING BY Phrase

 RETURNING identifier-4 INTO ADDRESS OF GIVING

 ON EXCEPTION Phrase
 NOT ON EXCEPTION Phrase
 OVERFLOW-imperative statement-3

 END-CALL

BY Phrase:
```
Procedure Division Statements

BY VALUE Phrase:

SIZE IS Phrase:

ON EXCEPTION Phrase:

NOT ON EXCEPTION Phrase:
Procedure Division Statements

Notes:
1 IBM Extension

CALL GDDM Statement - Format

(1) CALL "GDDM" USING routine-name data-name-1

Notes:
1 IBM Extension

End of IBM Extension

CANCEL Statement

CANCEL Statement - Format

(1) CANCEL

identifier-1 literal-1 In Library Phrase

Linkage Phrase:

(1) LINKAGE

TYPE IS PROGRAM

PROGRAM

PROCEDURE

In Library Phrase:

(1) LIBRARY

identifier-2 literal-2
CLOSE Statement

CLOSE Statement - Format 1

CLOSE Statement - Format 2 - Tape Files

COMMIT Statement

COMPUTE Statement

COMPUTE Statement - Format
**CONTINUE Statement**

**CONTINUE Statement - Format**

```
CONTINUE
```

**DELETE Statement**

**DELETE Statement - Format**

```
DELETE file-name

RECORD (1) FORMAT (identifier-1 IS literal-1)

NULL-KEY-MAP (1) identifier-2

INVALID KEY imperative-statement-1

NOT INVALID KEY imperative-statement-2 END-DELETE
```

**Notes:**
1. IBM Extension

**DISPLAY Statement**

**DISPLAY Statement - Format 1 - Data Transfer**

```
DISPLAY identifier-1 literal-1

UPON (1) mnemonic-name environment-name
```
IBM Extension

DISPLAY Statement - Format 2 - Local Data Area

DISPLAY identifier-1 literal-1 UPON mnemonic-name END-DISPLAY

Notes:
1 Syntax-checked only.

DISPLAY Statement - Format 3 - Workstation I/O

DISPLAY identifier-1 literal-1 line-column-phrase UPON CRT CRT-UNDER MODE BLOCK IS with-phrase END-DISPLAY

line-column-phrase:

AT LINE COLUMN NUMBER identifier-2 integer-1
AT identifier-3 integer-2

Notes:
1 Syntax-checked only.
Procedure Division Statements
with-phrase:

\[
\begin{align*}
\text{WITH} & \quad \text{BELL} \\
\text{WITH} & \quad \text{BEEP} \\
\text{WITH} & \quad \text{BLINK} \\
\text{WITH} & \quad \text{HIGHLIGHT} \\
\text{WITH} & \quad \text{REVERSE-VIDEO} \\
\text{WITH} & \quad \text{UNDERLINE} \\
\text{WITH} & \quad \text{BLANK SCREEN} \\
\text{WITH} & \quad \text{LINE SIZE} \\
\text{WITH} & \quad \text{IS integer-3 (1)} \\
\text{WITH} & \quad \text{FOREGROUND-COLOR (1) IS integer-4} \\
\text{WITH} & \quad \text{FOREGROUND-COLOUR (1) IS integer-4} \\
\text{WITH} & \quad \text{BACKGROUND-COLOR (1) IS integer-5} \\
\text{WITH} & \quad \text{BACKGROUND-COLOUR (1) IS integer-5} \\
\end{align*}
\]

Notes:
1 Syntax-checked only.

DISPLAY Statement - Format 4 - Session I/O

\[
\begin{align*}
\text{DISPLAY} & \quad \text{identifier-1} \\
\text{DISPLAY} & \quad \text{literal-1} \\
\text{DISPLAY} & \quad \text{UPON DISPLAY} \\
\text{DISPLAY} & \quad \text{NO ADVANCING} \\
\text{DISPLAY} & \quad \text{END DISPLAY} \\
\end{align*}
\]

DISPLAY Statement - Format 5 - Data Area

\[
\begin{align*}
\text{DISPLAY} & \quad \text{identifier-1} \\
\text{DISPLAY} & \quad \text{literal-1} \\
\text{DISPLAY} & \quad \text{UPON mnemonic-name FOR identifier-2} \\
\text{DISPLAY} & \quad \text{LIBRARY identifier-3 IN literal-3} \\
\text{DISPLAY} & \quad \text{AT identifier-4 integer-1} \\
\end{align*}
\]
DIVIDE Statement

DIVIDE Statement - Format 1 - INTO

```
DIVIDE identifier-1 INTO identifier-2 ROUNDED
```

DIVIDE Statement - Format 2 - INTO GIVING

```
DIVIDE identifier-1 INTO identifier-2 literal-2
GIVING identifier-3 ROUNDED
```

End of IBM Extension

Procedure Division Statements
Procedure Division Statements

**DIVIDE Statement - Format 3 - BY GIVING**

```
DIVIDE identifier-1 BY identifier-2
GIVING identifier-3 ROUNDED
```

```
ON SIZE ERROR-imperative-statement-1
```

```
NOT ON SIZE ERROR-imperative-statement-2 END-DIVIDE
```

**DIVIDE Statement - Format 4 - INTO GIVING REMAINDER**

```
DIVIDE identifier-1 INTO identifier-2
GIVING identifier-3 ROUNDED REMAINDER identifier-4
```

```
ON SIZE ERROR-imperative-statement-1
```

```
NOT ON SIZE ERROR-imperative-statement-2 END-DIVIDE
```

**DIVIDE Statement - Format 5 - BY GIVING REMAINDER**

```
DIVIDE identifier-1 BY identifier-2
GIVING identifier-3 ROUNDED REMAINDER identifier-4
```

```
ON SIZE ERROR-imperative-statement-1
```
**DROP Statement**

IBM Extension

DROP Statement - Format

\[\text{DROP identifier literal FROM file-name}\]

End of IBM Extension

**ENTER Statement**

ENTER Statement - Format

\[
\text{ENTER language-name routine-name.}
\]

Notes:

1 Syntax-checked only.

**EVALUATE Statement**

EVALUATE Statement - Format

\[
\text{EVALUATE identifier-1 literal-1 expression-1 TRUE FALSE}
\]

\[
\text{ALSO identifier-2 literal-2 expression-2 TRUE FALSE}
\]

\[
\text{WHEN phrase imperative-stmt-1}
\]

\[
\text{ALSO phrase}
\]
Procedure Division Statements

WHEN phrase:

WHEN ANY
- condition-1
  TRUE
  FALSE
  NOT
  literal-3
  THROUGH
  identifier-4
  arith-expr-1
  THRU
  literal-4
  arith-expr-2

ALSO phrase:

ALSO ANY
- condition-2
  TRUE
  FALSE
  NOT
  literal-5
  THROUGH
  identifier-6
  arith-expr-3
  THRU
  literal-6
  arith-expr-4

EXIT Statement

EXIT Statement - Format

EXIT

EXIT PROGRAM Statement

EXIT PROGRAM Statement

EXIT PROGRAM

AND CONTINUE RUN UNIT (1)

Notes:

1 IBM Extension
GOBACK Statement

IBM Extension

GOBACK Statement - Format

End of IBM Extension

GO TO Statement

GO TO Statement - Format 1 - Unconditional

GO TO Statement - Format 2 - Conditional

GO TO Statement - Format 3 - Altered

IF Statement

IF Statement — Format
Procedure Division Statements

INITIALIZE Statement

INITIALIZE Statement - Format

```
INITIALIZE identifier-1
```

REPLACING ALPHABETIC BY Phrase

```
REPLACING ALPHANUMERIC
  ALPHANUMERIC-EDITED
  NUMERIC
  NUMERIC-EDITED
  DBCS
  DBCS-EDITED
  NATIONAL
```

BY Phrase:

```
DATA BY identifier-2 literal-1
```

Notes:
1 IBM Extension

INSPECT Statement

INSPECT Statement - Format 1

```
INSPECT identifier-1 TALLYING
```
Procedure Division Statements

phrase 1:

BEFORE
AFTER
INITIAL

phrase 2:

identifier-3
literal-1

INSPECT Statement - Format 2

identifier-3
literal-1

BY
identifier-5
literal-3

phrase 1:

BEFORE
AFTER
INITIAL

phrase 2:

identifier-3
literal-1

BY
identifier-5
literal-3
Procedure Division Statements

INSPECT Statement - Format 3

phrase 1:

phrase 2:
Procedure Division Statements

**INSPECT Statement - Format 4**

```
INSPECT identifier-1 CONVERTING literal-4 TO literal-5
```

**MERGE Statement**

**MERGE Statement — Format**

```
MERGE file-name-1 ON data-name-1 COLLATING SEQUENCE IS alphabet-name USING file-name-2 file-name-3 OUTPUT PROCEDURE Phrase GIVING file-name-4
```

**OUTPUT PROCEDURE Phrase:**

```
OUTPUT PROCEDURE IS procedure-name-1
```
Procedure Division Statements

MOVE Statement

MOVE Statement - Format 1

MOVE identifier-1 TO identifier-2

MOVE Statement — Format 2

MOVE CORRESPONDING identifier-1 TO identifier-2

MULTIPLY Statement

MULTIPLY Statement - Format 1

MULTIPLY identifier-1 BY identifier-2

MULTIPLY Statement - Format 2 - GIVING

MULTIPLY identifier-1 BY identifier-2

GIVING identifier-3

ROUNDED

ON SIZE ERROR imperative-statement-1

ON SIZE ERROR imperative-statement-2 END-MULTIPLY

ILE COBOL Reference Summary
OPEN Statement

OPEN Statement — Format 1 — Sequential

OPEN Statement - Format 2 - Indexed and Relative
Procedure Division Statements

IBM Extension

OPEN Statement - Format 3 - TRANSACTION

OPEN I-O file-name-3

End of IBM Extension

PERFORM Statement

PERFORM Statement - Format 1

PERFORM procedure-name-1 THROUGH procedure-name-2 THRU imperative-statement END-PERFORM

PERFORM Statement - Format 2

PERFORM procedure-name-1 THROUGH procedure-name-2 THRU phrase 1

phrase-1:

identifier-1 TIMES integer-1

imperative-statement END-PERFORM

PERFORM Statement - Format 3

PERFORM procedure-name-1 THROUGH procedure-name-2 THRU phrase 2

phrase-2

imperative-statement END-PERFORM
**Procedure Division Statements**

**PERFORM Statement - Format 4**

```
PERFORM

procedure-name-1
THROUGH
THRU
procedure-name-2
```

**imperative-statement-1**

```
END-PERFORM
```

**READ Statement**

```
READ - Format 1 - Sequential Retrieval/Access

READ

file-name

NEXT RECORD

INTO

identifier-1
```

**Chapter 6. Procedure Division** 75
Procedure Division Statements

Notes:
1 IBM Extension.

READ - Format 2 - Sequential Ret./Dynamic Access
Procedure Division Statements

Notes:
1 IBM Extension

READ Statement - Format 3 - Random Retrieval

READ file-name
  RECORD
  INTO identifier-1

  NO LOCK
  WITH
  KEY data-name-1

  FORMAT
  INTO identifier-2
  IS literal-1

  NULL-KEY-MAP
  INTO identifier-5

  NULL-MAP
  INTO identifier-6

INVALID
  KEY
  INTO imperative-statement-1
Notes:
1  IBM Extension
2  Syntax-checked only.

IBM Extension

READ Statement - Format 4 - Transaction (Nonsubfile)

READ file-name
  RECORD INTO identifier-1
  FORMAT identifier-2 IS literal-1 TERMINAL identifier-3 IS literal-2
  INDICATOR identifier-4
  INDICATORS IS INDIC ARE
  NO DATA imperative-statement-1
  AT END imperative-statement-2

NOT AT END imperative-statement-3 END READ

READ - Format 5a - Transaction (Subfile Sequential)

READ SUBFILE-file-name NEXT MODIFIED RECORD
  INTO identifier-1 FORMAT identifier-2 IS literal-1
  TERMINAL IS identifier-3 IS literal-2
Procedure Division Statements

**READ - Format 5b - Transaction (Subfile Random)**

```
READ SUBFILE-file-name INTO identifier-1

FORMAT IS identifier-2 TERMINAL IS identifier-3

INDICATOR identifier-4 IS ARE

INVALID KEY imperative-statement-1

NOT INVALID KEY imperative-statement-2 END-READ
```

End of IBM Extension

**RELEASE Statement**

**RELEASE Statement - Format**

```
RELEASE-record-name-1 FROM identifier-1
```
Procedure Division Statements

RETURN Statement

RETURN Statement - Format

- \texttt{RETURN file-name-1} INTO identifier-1
- AT END imperative-statement-1
- NOT AT END imperative-statement-2 END RETURN

REWRITE Statement

REWRITE Statement - Format 1

- \texttt{REWRITE record-name-1} FROM identifier-1
- \texttt{FORMAT} identifier-2 IS literal-1
- (1) \texttt{NULL-KEY-MAP} identifier-5 IS
- (1) \texttt{NULL-MAP} identifier-6 IS
- INVALID KEY imperative-statement-1
- NOT INVALID KEY imperative-statement-2 END-REWRITE

Notes:
1 IBM Extension
Procedure Division Statements

SEARCH Statement - Format 2 - Binary Search
- SEARCH ALL-identifier-1
  - AT
  - WHEN equal phrase 1 AND equal phrase 2
    - condition-name-1 = condition-name-2
  - imperative-statement-2
  - NEXT SENTENCE
  - END-SEARCH

equal phrase 1:
- data-name-1 IS EQUAL TO identifier-3
  - literal-1
  - arithmetic-expression-1

equal phrase 2:
- data-name-2 IS EQUAL TO identifier-4
  - literal-2
  - arithmetic-expression-2

SET Statement

SET Statement - Format 1
- SET index-name-1 TO index-name-2
  - identifier-1
  - integer-1

Procedure Division Statements

SEARCH Statement - Format 2 - Binary Search

search all identifier-1
at
when equal phrase 1 and equal phrase 2
condition-name-1 = condition-name-2
imperative-statement-2
next sentence
end-search

equal phrase 1:
data-name-1 is equal to identifier-3
literal-1
arithmetic-expression-1

equal phrase 2:
data-name-2 is equal to identifier-4
literal-2
arithmetic-expression-2

set statement

set statement - format 1
set index-name-1 to index-name-2
identifier-1
integer-1
SET Statement - Format 2

```
SET index-name-3 UP BY identifier-3 DOWN BY integer-2
```

SET Statement - Format 3

```
SET mnemonic-name-1 TO ON
```

SET Statement - Format 4

```
SET condition-name-1 TO TRUE
```

IBM Extension

SET Statement - Format 5

```
SET identifier-4 ADDRESS OF identifier-5 TO identifier-6 ADDRESS OF identifier-7 NULL NULLS
```

SET Statement - Format 6

```
SET procedure-pointer-data-item-1 TO procedure-pointer-data-item-2 ENTRY identifier-1 Library Phrase literal-1 Linkage Phrase NULL NULLS
```

Linkage Phrase:
Procedure Division Statements

Library Phrase:

SET Statement - Format 7

Set Statement - Format 8

End of IBM Extension
SORT Statement

SORT Statement - Format

\[
\text{SORT} \quad \text{file-name-1} \quad \text{ON} \quad \text{ASCENDING} \quad \text{data-name-1} \\
\quad \text{ON} \quad \text{DESCENDING} \quad \text{KEY} \quad \text{data-name-1} \\
\quad \text{DUPLICATES} \quad \text{WITH} \quad \text{IN ORDER} \\
\quad \text{SEQUENCE} \quad \text{COLLATING} \quad \text{IS} \quad \text{alphabet-name} \\
\quad \text{USING} \quad \text{file-name-2} \quad \text{GIVING} \quad \text{file-name-3} \\
\text{input procedure phrase} \quad \text{output procedure phrase}
\]

input procedure phrase:

\[
\text{INPUT PROCEDURE} \quad \text{procedure-name-1} \\
\quad \text{THROUGH} \quad \text{procedure-name-2} \quad \text{THRU} \quad \text{procedure-name-2}
\]

output procedure phrase:

\[
\text{OUTPUT PROCEDURE} \quad \text{procedure-name-3} \\
\quad \text{THROUGH} \quad \text{procedure-name-4} \quad \text{THRU} \quad \text{procedure-name-4}
\]
Procedure Division Statements

START Statement

START Statement - Format

```
START file-name-1

WITH NO LOCK

KEY IS EQUAL TO data

= GREATER THAN

> NOT LESS THAN

< NOT <

>= GREATER THAN OR EQUAL TO

(1) (2)

FORMAT identifier-1

IS literal-1

(1)

NULL-KEY-MAP identifier-2

INVALID

imperative-statement-1

NOT INVALID

imperative-statement-2

END-START
```

data:

```
EXTERNALLY-DESCRIBED-KEY

data-name-1
```

Notes:

1 IBM Extension
Applies only to indexed files on DATABASE devices

STOP Statement
STOP Statement - Format

STRING Statement
STRING Statement - Format

SUBTRACT Statement
SUBTRACT Statement - Format 1
Procedure Division Statements

SUBTRACT Statement - Format 2 - GIVING

- `SUBTRACT` followed by `identifier-1` and `FROM` followed by `identifier-2`
- `GIVING` followed by `identifier-3` and `ROUNDED`
- `SIZE ERROR-imperative-statement-1`
- `NOT SIZE ERROR-imperative-statement-2`
- `END-SUBTRACT`

SUBTRACT Statement - Format 3 - CORRESPONDING

- `SUBTRACT` followed by `CORRESPONDING` followed by `identifier-1` and `FROM` followed by `identifier-2` and `ROUNDED`
- `SIZE ERROR-imperative-statement-1`
- `NOT SIZE ERROR-imperative-statement-2`
- `END-SUBTRACT`

UNSTRING Statement

UNSTRING Statement - Format

- `UNSTRING` followed by `identifier-1`
WRITE Statement

WRITE Statement - Format 1 - Sequential Files

WRITE record-name-1 FROM identifier-1
**Procedure Division Statements**

```
BEFORE identifier-2
AFTER ADVANCING integer-1
LINE integer-1
LINES
PAGE

(1)
NULL-MAP IS identifier-9

AT END-OF-PAGE imperative-statement-1
AT EOP

NOT AT END-OF-PAGE imperative-statement-2
AT EOP
END-WRITE

Notes:
1 IBM Extension.

WRITE - Format 2 - Indexed and Relative Files
```

```
WRITE record-name-1 FROM identifier-1

(1)
FORMAT IS literal-1

(1)
NULL-KEY-MAP IS identifier-8

(1)
NULL-MAP IS identifier-9

INVALID KEY imperative-statement-1
```
Notes:
1 IBM Extension

IBM Extension

WRITE Statement - Format 3 - FORMATFILE

WRITE record-name-1
FROM identifier-1

FORMAT IS identifier-2
IS literal-1

INDICATOR INDICATORS IS indicator-3
ARE

AT END-OF-PAGE imperative-statement-1

NOT AT END-OF-PAGE imperative-statement-2
END-WRITE

WRITE - Format 4 - TRANSACTION (Nonsubfile)

WRITE record-name-1
FROM identifier-1

FORMAT IS identifier-2
TERMINAL IS literal-1

STARTING AT LINE literal-3
Rolling Phrase

END-WRITE
**Procedure Division Statements**

```
INDICATOR indicator-8 END-WRITE
INDICATORS INDIC ARE

Rolling Phrase:
BEFORE ROLLING LINES LINE
AFTER ROLLING LINES LINE
THRU
THRU
DOWN
UP

WRITE Statement - Format 5 - TRANSACTION (Subfile)
WRITE SUBFILE record-name-1 FROM identifier-1
FORMAT IS literal-1 TERMINAL IS literal-2
INDICATOR identifier-4
INDICATORS INDIC ARE
INVALID KEY imperative-statement-1
NOT INVALID KEY imperative-statement-2 END-WRITE
```

**Intrinsic Functions**

This is the general syntax for intrinsic functions.
These following intrinsic functions are presented in alphabetical order.

**ACOS Function**

Format

```plaintext
FUNCTION ACOS(argument-1)
```

**ADD-DURATION Function**

IBM Extension

Format

```plaintext
FUNCTION ADD-DURATION(argument-1 argument-2 argument-3)
```

End of IBM Extension

**ASIN Function**

Format

```plaintext
FUNCTION ASIN(argument-1)
```

**ATAN Function**

Format

```plaintext
FUNCTION ATAN(argument-1)
```
Intrinsic Functions

CHAR Function

Format

```
FUNCTION CHAR(argument-1)
```
DATE-TO-YYYYMMDD Function

IBM Extension

Format

FUNCTION DATE-TO-YYYYMMDD(argument-1,argument-2)

End of IBM Extension

DAY-TO-YYYYYDDD Function

IBM Extension

Format

FUNCTION DAY-TO-YYYYYDDD(argument-1,argument-2)

End of IBM Extension

EXTRACT-DATE-TIME Function

IBM Extension

Format

FUNCTION EXTRACT-DATE-TIME(argument-1,argument-2)

End of IBM Extension

FIND-DURATION Function

IBM Extension

Format

FUNCTION FIND-DURATION(argument-1,argument-2,argument-3)

End of IBM Extension
Intrinsic Functions

INTEGER-OF-DATE Function
Format

FUNCTION INTEGER-OF-DATE-(argument-1)

INTEGER-OF-DAY Function
Format

FUNCTION INTEGER-OF-DAY-(argument-1)

LENGTH Function
Format

FUNCTION LENGTH-(argument-1)

LOCALE-DATE Function
IBM Extension

FUNCTION—LOCALE-DATE—(argument-1)

End of IBM Extension

LOCALE-TIME Function
IBM Extension

FUNCTION—LOCALE-TIME—(argument-1)

End of IBM Extension

LOG Function
Format

FUNCTION LOG-(argument-1)
LOG10 Function

Format

FUNCTION LOG10{argument-1}

LOWER-CASE Function

Format

FUNCTION LOWER-CASE{argument-1}

MEAN Function

Format

FUNCTION MEAN{argument-1}

NUMVAL Function

Format

FUNCTION NUMVAL{argument-1}

Argument-1 can have one of the following formats:

- digit
- .digit
- space
- +
- space
- CR
- DB
- space
Intrinsic Functions

NUMVAL-C Function

Format

\[ \text{FUNCTION NUMVAL-C} \left( \text{argument-1} \right) \]

\[ \text{argument-2} \]

The format for argument-1 is one of the following two formats, where cs is the currency sign specified in argument-2:

\[ \text{space} \text{cs} \text{space} \]

\[ \text{digit} \text{digit} \text{digit} \text{digit} \text{space} \]

\[ \text{space} \text{cs} \text{space} \]

\[ \text{digit} \text{digit} \text{digit} \text{space} \text{CR} \text{DB} \]

ORD Function

Format

\[ \text{FUNCTION ORD} \left( \text{argument-1} \right) \]

REVERSE Function

Format

\[ \text{FUNCTION REVERSE} \left( \text{argument-1} \right) \]
SIN Function

Format

```
FUNCTION SIN(argument-1)
```

SQRT Function

Format

```
FUNCTION SQRT(argument-1)
```

SUBTRACT-DURATION Function

IBM Extension

Format

```
FUNCTION SUBTRACT-DURATION(argument-1 argument-2 argument-3)
```

End of IBM Extension

TAN Function

Format

```
FUNCTION TAN(argument-1)
```

TEST-DATE-TIME Function

IBM Extension

Format

```
FUNCTION TEST-DATE-TIME
```
Intrinsic Functions

UPPER-CASE Function

Format

\[
\text{FUNCTION UPPER-CASE}(\text{argument-1})
\]

WHEN-COMPILED Function

Format

\[
\text{FUNCTION WHEN-COMPILED}
\]

YEAR-TO-YYYY Function

IBM Extension

Format

\[
\text{FUNCTION YEAR-TO-YYYY}(\text{argument-1}\text{argument-2})
\]

End of IBM Extension

End of IBM Extension
Chapter 7. Conditional Expressions

Class Condition - Format

```
identifier IS NOT NUMERIC ALPHABETIC ALPHABETIC-Lower ALPHABETIC-Upper (1) DBCS (1) KANJI class-name
```

Notes:
1 IBM Extension

Condition-Name Condition - Format

```
condition-name
```

Relation Condition - Format

```
operand-1 IS NOT (1) GREATER THAN LESS THAN EQUAL TO GREATER OR EQUAL TO LESS THAN OR EQUAL TO
```

Notes:
1 NOT GREATER THAN OR EQUAL TO, NOT >=, NOT LESS THAN OR EQUAL TO, and NOT <=, are IBM Extensions.
IBM Extension

The following two syntax diagrams apply to pointer data items and procedure-pointer data items, respectively.

ADDRESS Comparison - Format

ProcPointer Comparison - Format

End of IBM Extension

Sign Condition - Format

Switch-Status Condition - Format

Negated Simple Condition - Format

Combined Conditions - Format
Abbreviated Combined Relation Conditions - Format

relation-condition

AND

OR

IS

NOT

(1)

GREATER THAN

LESS THAN

EQUAL TO

greater or equal:

LESS THAN OR EQUAL TO

less or equal:

Notes:

1 NOT GREATER THAN OR EQUAL TO, NOT >=, NOT LESS THAN OR EQUAL TO, and NOT <=, are IBM Extensions.
Chapter 8. Qualifying Data Reference Formats

Format 1 - Identifier

Format 2 - LINAGE-COUNTER

Format 3 - condition-name

Qualification

References to Data Division Names - Format 1
References to Data Division Names - Format 2

References to Procedure Division Names - Format 1

References to Procedure Division Names - Format 2

References to COPY Libraries - Format 3

Notes:
1 Required hyphen between library-name-file-name to qualify

Reference Modification

Format
Subscripting - Format

- \( \text{condition-name-1} \)
- \( \text{data-name-1} \) \( \text{IN} \) \( \text{data-name-2} \) \( \text{OF} \)
- \( \text{IN} \) \( \text{file-name-1} \) \( \text{OF} \)
- \( (\text{integer-1}) \text{ALL} \)
- \( \text{data-name-3} \) \( + \) \( \text{integer-2} \)
- \( \text{index-name-1} \) \( - \) \( \text{integer-3} \)
Chapter 9. Compiler-Directing Statements

CONTROL Statement

```
*CONTROL (*CBL) Statement - Format

*CONTROL
*CBL

SOURCE
NOSOURCE
(1)
LIST
NOLIST
(1)
MAP
NOMAP
(1)
```

Notes:

1 Syntax-checked only.

End of IBM Extension

COPY Statement

```
COPY Statement - Format 1

COPY-text-name

OF

file-name

IN

library-name-

(1)

SUPPRESS

REPLACING Phrase
```

Notes:

1 Required hyphen between library-name-file-name to qualify.

2 IBM Extension

REPLACING Phrase - Format
IBM Extension

COPY Statement - Format 2 - DDS Translate

COPY (I) file-name
   library-name- (1) WITH

   I-FIELDS
   O-FIELDS
   I-O-FIELDS
   INDICATOR
   INDICATORS
   INDIC
   NULL-MAP
   NULL-MAP-ALPHANUM
   NULL-KEY-MAP
   PREFIX--BY--literal
   ALIAS
   SUBSTITUTE Phrase
   VLR
   SUPPRESS
   REPLACING Phrase

SUBSTITUTE Phrase:

   SUBSTITUTE
   ALL
   EXCEPT--literal-2

Notes:
1 Required hyphen between library-name-file-name to qualify.

End of IBM Extension
EJECT Statement

IBM Extension

EJECT Statement - Format

\[ \text{EJECT} \]

End of IBM Extension

REPLACE Statement

REPLACE Statement - Format 1

\[ \text{REPLACE} \ldots \text{BY} \ldots \]

REPLACE Statement - Format 2

\[ \text{REPLACE OFF} \]

SKIP Statement

IBM Extension

SKIP1/2/3 Statements - Format

\[ \text{SKIP1} \text{SKIP2} \text{SKIP3} \]

End of IBM Extension

TITLE Statement

IBM Extension

TITLE Statement - Format

\[ \text{TITLE} \ldots \text{literal} \]

End of IBM Extension
### USE Statement

#### USE Statement - Format

```
USE GLOBAL AFTER STANDARD EXCEPTION PROCEDURE ON
```

- `file-name-1`
  - INPUT
  - OUTPUT
  - I-O
  - EXTEND

#### USE FOR DEBUGGING Declarative - Format

```
USE FOR DEBUGGING ON
```

- `identifier-1`
  - ALL REFERENCES OF file-name-1 procedure-name-1 ALL PROCEDURES

### Notes:

1. Syntax-checked only.
# Chapter 10. Symbols, Names, and Figurative Constants

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Alphabetic character or space</td>
</tr>
<tr>
<td>B</td>
<td>Space insertion character</td>
</tr>
<tr>
<td>P</td>
<td>Decimal scaling position (not counted in size of data item)</td>
</tr>
<tr>
<td>S</td>
<td>Operational sign (not counted in size of data item unless a SIGN clause with optional SEPARATE CHARACTER phrase is specified)</td>
</tr>
<tr>
<td>V</td>
<td>Assumed decimal point (not counted in size of data item)</td>
</tr>
<tr>
<td>X</td>
<td>Alphanumeric character (any from the EBCDIC set)</td>
</tr>
<tr>
<td>Z</td>
<td>Zero suppression character</td>
</tr>
<tr>
<td>9</td>
<td>Numeric character</td>
</tr>
</tbody>
</table>

**IBM Extension**

- 1  Boolean character

**End of IBM Extension**

**IBM Extension**

- E  Floating-point data

**End of IBM Extension**

**IBM Extension**

- G  DBCS character

**End of IBM Extension**

**IBM Extension**

- N  DBCS character

**End of IBM Extension**

- 0  Zero insertion character
- /  Slash insertion character
- ,  Comma insertion character
- .  Decimal point or period editing control character
- +  Plus sign insertion editing control character
- −  Minus sign editing control character
- CR Credit editing control character
- DB Debit editing control character
- $  Currency symbol insertion character ($ is default).
Assignment-Names in the ASSIGN Clause

Format

\[\text{device} \rightarrow \text{file-name} \rightarrow \text{attribute}\]

- **device:**
  - PRINTER
  - FORMATFILE
  - TAPEFILE
  - DISKETTE
  - DISK
  - DATABASE
  - WORKSTATION

- **file-name:** 1-10 character name

- **attribute:**
  - SI (separate indicator area) (allow null fields)

Environment-Names in the SPECIAL-NAMES Paragraph

*Table 1. Choices of Environment-Name-1 and Action Taken*

<table>
<thead>
<tr>
<th>Environment-name-1</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSOLE, SYSTEM-CONSOLE</td>
<td>Communicate with the system operator’s message queue (QSYSOPR).</td>
</tr>
<tr>
<td>REQUESTOR</td>
<td>Communicate with the user work station (interactive jobs) or the batch input stream or job log (batch jobs).</td>
</tr>
<tr>
<td>CSP</td>
<td>Suppress spacing when printing a line. Use only when PRINTER is the device.</td>
</tr>
<tr>
<td>C01</td>
<td>Skip to the next page. Use only when PRINTER is the device.</td>
</tr>
<tr>
<td>OPEN-FEEDBACK</td>
<td>Give information about a file, but only when the file is open.</td>
</tr>
<tr>
<td>I-O-FEEDBACK</td>
<td>Give information about the last I-O operation on a file, but only when the file is open.</td>
</tr>
<tr>
<td>DATA-AREA</td>
<td>Retrieves or updates an AS/400 data area.</td>
</tr>
<tr>
<td>ATTRIBUTE-DATA</td>
<td>Retrieve attribute data about a program device acquired by a transaction file, but only when the file is open.</td>
</tr>
<tr>
<td>LOCAL-DATA</td>
<td>Retrieve data from, or move data to the local data area created by the system for every job.</td>
</tr>
<tr>
<td>PIP-DATA</td>
<td>Retrieve data from the Program Initialization Parameters (PIP) data area for programs running as part of a prestart job.</td>
</tr>
<tr>
<td>SYSIN</td>
<td>The equivalent of REQUESTOR (for the ACCEPT statement only)</td>
</tr>
</tbody>
</table>
Table 1. Choices of Environment-Name-1 and Action Taken (continued)

<table>
<thead>
<tr>
<th>Environment-name-1</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSOUT</td>
<td>The equivalent of REQUESTOR (for the</td>
</tr>
<tr>
<td></td>
<td>DISPLAY statement only)</td>
</tr>
</tbody>
</table>

Table 2. Choices of Environment-Name-2 and Action Taken

<table>
<thead>
<tr>
<th>Environment-name-2</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPSI-0 through UPSI-7</td>
<td>Program switches associated with condition-names</td>
</tr>
<tr>
<td>SYSTEM-SHUTDOWN</td>
<td>Internal switches associated with condition-names</td>
</tr>
</tbody>
</table>

Figurative Constants

The following figurative constants can be used:

- ALL "literal"
- HIGH-VALUE
- HIGH-VALUES
- LOW-VALUE
- LOW-VALUES

- IBM Extension
  - NULL
  - NULLS

- End of IBM Extension
  - QUOTE
  - QUOTES
  - SPACE
  - SPACES
  - ZERO
  - ZEROES
  - ZEROS
Chapter 11. File Structure Support Summary and Status Key Values

File Structure Support Tables

Table 3 lists the required and optional entries for various types of file structures supported. Any file with a device type of disk can be assigned to a database or non-database auxiliary storage file. The codes used are as follows:

- Not applicable
- Optional for a work station that supports subfiles
- Optional entry, treated as comments only
- Optional for file assigned to DATABASE-, not allowed if not assigned to a database file
- Optional for a file opened for input or input-output
- Optional for a file opened for input-output
- Optional
- Required
- Required for a work station that supports subfiles
- Required; syntax checked, but treated as documentation

Table 4 on page 121 and Table 5 on page 122 contain status key values and their meanings.

Table 3. File Structure Support

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Printer</th>
<th>Tape</th>
<th>Disk Seq</th>
<th>Disk Rel Seq</th>
<th>Disk Rel Random</th>
<th>Disk Rel Dynamic</th>
<th>Disk IDX Seq</th>
<th>Disk IDX Random</th>
<th>Disk IDX Dynamic</th>
<th>Workstation Diskette Format File</th>
</tr>
</thead>
<tbody>
<tr>
<td>RERUN..RECORDS</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>SAME</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>AREA</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>RECORD AREA</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>SORT AREA</td>
<td>.</td>
<td>C</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>SORT MERGE AREA</td>
<td>.</td>
<td>C</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>MULTIPLE FILE TAPE</td>
<td>.</td>
<td>C</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>SELECT</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>ASSIGN</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>OPTIONAL</td>
<td>.</td>
<td>.</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

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### File Structure Support Summary

Table 3. File Structure Support (continued)

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Printer</th>
<th>Tape</th>
<th>Disk Seq</th>
<th>Disk Rel Seq</th>
<th>Disk Rel Random</th>
<th>Disk IDX Seq</th>
<th>Disk IDX Random</th>
<th>Workstation Diskette Format</th>
<th>File Status</th>
<th>Control-AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORGANIZATION</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>SEQUENTIAL</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>O</td>
<td></td>
</tr>
<tr>
<td>RELATIVE</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>R</td>
<td>R</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td></td>
</tr>
<tr>
<td>INDEXED</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>R</td>
<td>R</td>
<td>R</td>
<td>.</td>
<td>.</td>
<td></td>
</tr>
<tr>
<td>TRANSACTION</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td></td>
</tr>
<tr>
<td>ACCESS</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>R</td>
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</tbody>
</table>

Return codes are set by the system after transaction I-O, which involves ICF files or DISPLAY files.
### Table 4. File Status Keys and Corresponding Return Codes

<table>
<thead>
<tr>
<th>File Status Key</th>
<th>Major Return Code</th>
<th>Minor Return Code</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>00</td>
<td>xx</td>
<td>Normal completion (operation was successful).</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>xx except 09</td>
<td>No data received.</td>
</tr>
<tr>
<td></td>
<td>08</td>
<td>00</td>
<td>Acquire operation attempted to acquire an already active session or device.</td>
</tr>
<tr>
<td></td>
<td>09</td>
<td>00</td>
<td>File has been dynamically created for OPEN OUTPUT. (See the OPTION(*CRTF) parameter description on the CRTCBLMOD command in the ILE COBOL Programmer’s Guide for further information about dynamic file creation.)</td>
</tr>
<tr>
<td>0A</td>
<td>02</td>
<td>xx</td>
<td>Job being cancelled (controlled).</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>09</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>00</td>
<td>Read-from-invited-program-device rejected; no invites outstanding.</td>
</tr>
<tr>
<td>30</td>
<td>80</td>
<td>xx</td>
<td>Permanent system error. The session has been ended.</td>
</tr>
<tr>
<td>92</td>
<td>81</td>
<td>xx</td>
<td>Permanent device or session error.</td>
</tr>
<tr>
<td>9C</td>
<td>82</td>
<td>xx</td>
<td>Open or acquire failed; session was not started.</td>
</tr>
<tr>
<td>9G</td>
<td>34</td>
<td>xx</td>
<td>Output exception to device or session.</td>
</tr>
<tr>
<td>9I</td>
<td>04</td>
<td>xx</td>
<td>Output exception to device or session.</td>
</tr>
<tr>
<td>9K</td>
<td>83</td>
<td>E0</td>
<td>Format not found.</td>
</tr>
<tr>
<td>9N</td>
<td>83</td>
<td>xx (except E0)</td>
<td>Session error. Session is still active.</td>
</tr>
</tbody>
</table>
### File Status Key Values and Meanings

For information about **error handling**, refer to the “Error and Exception Handling” section in the *ILE COBOL Programmer’s Guide*.

<table>
<thead>
<tr>
<th>High Order Digit</th>
<th>Meaning</th>
<th>Low Order Digit</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Successful Completion</td>
<td>0</td>
<td>Nofurther information</td>
</tr>
<tr>
<td>2</td>
<td>The READ statement was successfully executed, but a duplicate key was detected. That is, the key value for the current key of reference was equal to the value of the key in the next record. For information about enabling file status 02 see the accompanying notes under the READ statement.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>An attempt was made to read a record that is larger than the largest, or smaller than the smallest record allowed by the RECORD IS VARYING clause of the associated file-name.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>An OPEN statement is successfully executed, but the referenced optional file is not present at the time the OPEN statement is executed. If the open mode is I-O or EXTEND, the file has been created. CPF4101, CPF4102, CPF4103, CPF4207, CPF9812.</td>
<td></td>
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</tr>
<tr>
<td>7</td>
<td>For a CLOSE statement with the NO REWIND, REEL/UNIT, or FOR REMOVAL phrase or for an OPEN statement with the NO REWIND phrase, the referenced file was on a non-reel/unit medium.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Job ended in a controlled manner by CL command ENDJOB, PWRODNBSYS, ENDSYS, or ENDSBS CPF4741. Escape message sent during an accept input operation, READ from invited program device (multiple device listings only).</td>
<td></td>
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</tr>
<tr>
<td>M</td>
<td>Last record written to a subfile. CPF5003</td>
<td></td>
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<tr>
<td>P</td>
<td>The file has been opened successfully, but it contains null-capable fields and the ASSIGN clause does not specify ALWNULL and device-type DATABASE.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>A CLOSE statement for a sequentially-processed relative file was successfully executed. The file was created with the *INZDLT and *NOMAX options, so its boundary has been set to the number of records written.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Order Digit</td>
<td>Meaning</td>
<td>Low Order Digit</td>
<td>Meaning</td>
</tr>
<tr>
<td>------------------</td>
<td>---------</td>
<td>----------------</td>
<td>---------</td>
</tr>
<tr>
<td>1</td>
<td>At end conditions</td>
<td>0</td>
<td>A sequential READ statement was attempted and no next logical record existed in the file because the end of the file had been reached (no invites outstanding) CPF4740, CPF5001, CPF5025.</td>
</tr>
<tr>
<td>2</td>
<td>IBM Extension</td>
<td>No modified subfile record found. CPF5037</td>
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</tr>
<tr>
<td></td>
<td>End of IBM Extension</td>
<td></td>
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</tr>
<tr>
<td>4</td>
<td>A sequential READ statement was attempted for a relative file and the number of significant digits in the relative record number was larger than the size of the relative key data item described for the file.</td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Invalid key</td>
<td>1</td>
<td>A sequence error exists for a sequentially accessed indexed file. The prime record key value has been changed by the program between the successful execution of a READ statement and the execution of the next REWRITE statement for that file, or the ascending requirements for successive record key values were violated. Alternatively, the program has changed the record key value between a successful READ and subsequent REWRITE or DELETE operation on a randomly or dynamically-accessed file with duplicate keys.</td>
</tr>
<tr>
<td></td>
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<td>2</td>
<td>An attempt was made to write a record that would create a duplicate key in a relative file; or an attempt was made to write or rewrite a record that would create a duplicate prime record key in an indexed file. CPF4759, CPF5008, CPF5026, CPF5034, CPF5084, CPF5085.</td>
</tr>
<tr>
<td>3</td>
<td>An attempt was made to randomly access a record that does not exist in the file. CPF5001, CPF5006, CPF5013, CPF5020, CPF5025.</td>
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<tr>
<td>4</td>
<td>An attempt was made to write beyond the externally defined boundaries of a relative or indexed file. Or, a sequential WRITE statement was attempted for a relative file and the number of significant digits in the relative record number was larger than the size of the relative record key data item described for the file. CPF5006, CPF5018, CPF5021, CPF5043, CPF5272.</td>
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</tbody>
</table>
## File Status Key Values

### Table 5. File Status Key Values (continued)

<table>
<thead>
<tr>
<th>High Order Digit</th>
<th>Meaning</th>
<th>Low Order Digit</th>
<th>Meaning</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>Permanent error condition</td>
<td>0</td>
<td>No further information CPF4192, CPF5101, CPF5102, CPF5129, CPF5030, CPF5143.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>A permanent error exists because of a boundary violation; an attempt was made to write beyond the externally-defined boundaries of a sequential file. CPF5116, CPF5018, CPF5272 if organization is sequential.</td>
</tr>
<tr>
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<td></td>
<td>5</td>
<td>An OPEN statement with the INPUT, I-O, or EXTEND phrase was attempted on a non-optional file that was not present. CPF4101, CPF4102, CPF4103, CPF4207, CPF9812.</td>
</tr>
</tbody>
</table>
|                   |                          | 7               | An OPEN statement was attempted on a file that would not support the open mode specified in the OPEN statement. Possible violations are:  
  • The EXTEND or OUTPUT phrase was specified but the file would not support write operations.  
  • The I-O phrase was specified but the file would not support the input and output operations permitted.  
  • The INPUT phrase was specified but the file would not support read operations. CPF4194. |
<p>|                   |                          | 8               | An OPEN statement was attempted on a file previously closed with lock. |
|                   |                          | 9               | The OPEN statement was unsuccessful because a conflict was detected between the fixed file attributes and the attributes specified for that file in the program. The minimum record length specified by the program is less than the minimum record length required for the file. Level check error. CPF4131. |</p>
<table>
<thead>
<tr>
<th>High Order Digit</th>
<th>Meaning</th>
<th>Low Order Digit</th>
<th>Meaning</th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td>Logic error condition</td>
<td>1</td>
<td>An OPEN statement was attempted for a file in the open mode.</td>
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<tr>
<td></td>
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<td>2</td>
<td>A CLOSE statement was attempted for a file that was already closed.</td>
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<tr>
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<td></td>
<td>3</td>
<td>For a sequential file in the sequential access mode, the last input-output statement executed for the associated file prior to the execution of a REWRITE statement was not a successfully executed READ statement. For relative and indexed files in the sequential access mode, the last input-output statement executed for the file prior to the execution of a DELETE or REWRITE statement was not a successfully executed READ statement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>A boundary violation exists because an attempt was made to rewrite a record to a file and the record was not the same size as the record being replaced. An attempt was made to write or rewrite a record that is larger than the largest, or smaller than the smallest record allowed by the RECORD IS VARYING clause of the associated file-name.</td>
</tr>
<tr>
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<td></td>
<td>6</td>
<td>A sequential READ, READ NEXT or READ PRIOR statement was attempted on a file open in the input or I-O mode and no valid next record had been established because the preceding START statement was unsuccessful, or the preceding READ statement was unsuccessful or caused an at end condition. CPF5001, CPF5025, CPF5183.</td>
</tr>
<tr>
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<td>7</td>
<td>The execution of a READ or START statement was attempted on a file not open in the input or I-O mode.</td>
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<td>8</td>
<td>The execution of a WRITE statement was attempted on a sequential file not open in the output, or extend mode. The execution of a WRITE statement was attempted on an indexed or relative file not open in the I-O, output, or extend mode.</td>
</tr>
<tr>
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<td>9</td>
<td>The execution of a DELETE or REWRITE statement was attempted on a file not open in the I-O mode.</td>
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</table>
Table 5. File Status Key Values (continued)

<table>
<thead>
<tr>
<th>High Order Digit</th>
<th>Meaning</th>
<th>Low Order Digit</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>9</td>
<td>Other errors</td>
<td>0</td>
<td>Other errors:</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• File not found</td>
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<td></td>
<td>• Member not found</td>
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<td></td>
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<td></td>
<td>• Unexpected I-O exceptions</td>
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<td></td>
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<td></td>
<td>CPF4101, CPF4102, CPF4103 if a USE is applicable for the file (on OPEN OUTPUT, non-optional file). The following exceptions are monitored generically:</td>
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<td></td>
<td>CPF4101 through CPF4399</td>
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<td></td>
<td>CPF4501 through CPF4699</td>
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<td></td>
<td>CPF4701 through CPF4899</td>
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<td></td>
<td>CPF5001 through CPF5099</td>
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<td></td>
<td>CPF5101 through CPF5399</td>
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<td></td>
<td>CPF5501 through CPF5699</td>
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<td></td>
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<td></td>
<td>These exceptions are caught, and FILE STATUS is set to 90.</td>
</tr>
<tr>
<td>1</td>
<td>Undefined or unauthorized access type CPF2207, CPF4104, CPF4236, CPF4238, CPF5057, CPF5109, CPF5134, CPF5279.</td>
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<tr>
<td>2</td>
<td>Logic error:</td>
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<td>• File locked</td>
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<td>• File already open</td>
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<td>• I-O to closed file</td>
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<td></td>
<td>• READ after end of file</td>
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<td></td>
<td>• CLOSE on unopened file</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CPF4106, CPF4132, CPF4740, CPF5067, CPF5070, CPF5119, CPF5145, CPF5146, CPF5149, CPF5176, CPF5209.</td>
</tr>
<tr>
<td>4</td>
<td>No file position indicator REWRITE/DELETE when not sequential access, and last operation was not a successful READ.</td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>Other errors</td>
<td>5</td>
<td>Invalid or incomplete file information (1) Duplicate keys specified in COBOL program. The file has been successfully opened, but indexed database file created with unique key; or (2) Duplicate keys not specified in COBOL program, and indexed database file created allowing duplicate keys.</td>
</tr>
<tr>
<td>9</td>
<td>Undefined (display or ICF).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Acquire failed; session was not started.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Record is locked CPF5027, CPF5032.</td>
<td></td>
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</tr>
<tr>
<td>G</td>
<td>Output exception to device or session.</td>
<td></td>
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</tr>
<tr>
<td>H</td>
<td>ACQUIRE operation failed. Resource owned by another program, or unavailable. (9H is the result when an ACQUIRE operation causes any of the OS/400 exceptions monitored for 90, or 9N to occur.)</td>
<td></td>
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<tr>
<td>I</td>
<td>WRITE operation failed CPF4702, CPF4737, CPF5052, CPF5076.</td>
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<tr>
<td>K</td>
<td>Invalid format-name; format not found. CPF5022, CPF5023, CPF5053, CPF5054, CPF5121, CPF5152, CPF5153, CPF5186, CPF5187.</td>
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### Table 5. File Status Key Values (continued)

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<th>High Order Digit</th>
<th>Meaning</th>
<th>Low Order Digit</th>
<th>Meaning</th>
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<tr>
<td>9</td>
<td>Other errors</td>
<td>N</td>
<td>Temporary (potentially recoverable) hardware I-O error. (Error during communication session.) CPF4145, CPF4146, CPF4193, CPF4229, CPF4291, CPF4299, CPF4354, CPF4526, CPF4542, CPF4577, CPF4592, CPF4602, CPF4603, CPF4611, CPF4612, CPF4616, CPF4617, CPF4622, CPF4623, CPF4624, CPF4625, CPF4628, CPF4629, CPF4630, CPF4631, CPF4632, CPF4705, CPF5013, CPF5017, CPF5128, CPF5166, CPF5198, CPF5280, CPF5282, CPF5287, CPF5293, CPF5352, CPF5353, CPF5354, CPF5517, CPF5524, CPF5529, CPF5530, CPF5532, CPF5533.</td>
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<tr>
<td>P</td>
<td>OPEN failed because file cannot be placed under commitment control CPF4293, CPF4326, CPF4327, CPF4328, CPF4329.</td>
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<tr>
<td>Q</td>
<td>An OPEN statement for a randomly- or dynamically-accessed relative file failed because its size was *NOMAX. Change the file size (for example, using CHGPF) to the size you expect, and submit the program again.</td>
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<td>R</td>
<td>Referential integrity error. CPF502D, CPF502E, CPF503A.</td>
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<tr>
<td>S</td>
<td>REWRITE or DELETE failed because last READ operation specified NO LOCK.</td>
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<td>T</td>
<td>Trigger program exception. CPF502B</td>
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<tr>
<td>U</td>
<td>Cannot complete READ PRIOR because records are left in block from READ NEXT, or vice versa. CPF5184. Close the file, then open it again.</td>
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<td>W</td>
<td>Check constraint exception. CPF502F.</td>
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<tr>
<td>X</td>
<td>OPEN failed because the file type is not supported in a multithreaded job. Change the file type to DATABASE, PRINTER (spool file only), or a DDM file of type *IP and submit the program again. CPF4380.</td>
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File Status Key Values
Chapter 12. ILE COBOL Function-Name and Context-Sensitive Word List

The following sections list all of the context-sensitive words and function-names in ILE COBOL.

Visual Key

The following key identifies the function-names and context-sensitive words in the ILE COBOL language:

**Blank**  An ILE COBOL function-name or context-sensitive word from Standard COBOL.

(1)  An ILE COBOL function-name or context-sensitive word that is an IBM extension to Standard COBOL.

(2)  A COBOL function-name from the 1985 (revised 1989) ANSI Standard that is not used by the ILE COBOL compiler.

Function-Names

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<td>ANNUITY (2)</td>
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<td>ASIN</td>
<td>ATAN</td>
<td>CHAR</td>
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<td>CONVERT-DATE-TIME (1)</td>
<td>COS</td>
<td>CURRENT-DATE</td>
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<tr>
<td>DATE-OF-INTEGER</td>
<td>DATE-TO-YYYYMMDD (1)</td>
<td>DAY-OF-INTEGER</td>
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<td>DAY-TO-YYYYDDD (1)</td>
<td>EXTRACT-DATE-TIME (1)</td>
<td>FACTORIAL (2)</td>
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<td>FIND-DURATION (1)</td>
<td>INTEGER (2)</td>
<td>INTEGER-OF-DATE</td>
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<td>INTEGER-OF-DAY</td>
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<td>LOCALE-TIME (1)</td>
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<td>LOG10</td>
<td>LOWER-CASE</td>
<td>MAX (2)</td>
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<td>MEAN</td>
<td>MEDIAN (2)</td>
<td>MIDRANGE (2)</td>
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<tr>
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<td>MOD (2)</td>
<td>NUMVAL</td>
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<td>ORD</td>
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<td>PRESENT-VALUE (2)</td>
<td>RANGE (2)</td>
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<td>REM (2)</td>
<td>REVERSE</td>
<td>SIN</td>
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<td>SUBTRACT-DURATION (1)</td>
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<tr>
<td>SUM (2)</td>
<td>TAN</td>
<td>TEST-DATE-TIME (1)</td>
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<td>UPPER-CASE</td>
<td>VARIANCE (2)</td>
<td>WHEN-Compiled</td>
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<td>YEAR-TO-YYYY (1)</td>
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Context-Sensitive Words

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<tr>
<td>DAYS</td>
<td>MOVE FUNCTION ADD-DURATION(date-1 DAYS 90)</td>
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(Also can be used in SUBTRACT-DURATION, FIND-DURATION, and EXTRACT-DATE-TIME.)
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<td>SET LOCALE LC_ALL FROM DEFAULT</td>
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<tr>
<td>HOURS</td>
<td>MOVE FUNCTION ADD-DURATION(time-1 HOURS 90)</td>
</tr>
<tr>
<td></td>
<td>(Also can be used in SUBTRACT-DURATION, FIND-DURATION, and EXTRACT-DATE-TIME.)</td>
</tr>
<tr>
<td>LC_ALL</td>
<td>SET LOCALE LC_ALL FROM DEFAULT</td>
</tr>
<tr>
<td>LC_COLLATE</td>
<td>SET LOCALE LC_COLLATE FROM DEFAULT</td>
</tr>
<tr>
<td>LC_CURRENCY</td>
<td>SET LOCALE LC_CURRENCY FROM DEFAULT</td>
</tr>
<tr>
<td>LC_MESSAGES</td>
<td>SET LOCALE LC_MESSAGES FROM DEFAULT</td>
</tr>
<tr>
<td>LC_MONETARY</td>
<td>SET LOCALE LC_MONETARY FROM DEFAULT</td>
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<tr>
<td>LC_NUMERIC</td>
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<tr>
<td>LC_TIME</td>
<td>SET LOCALE LC_TIME FROM DEFAULT</td>
</tr>
<tr>
<td>LC_TYPE</td>
<td>SET LOCALE LC_TYPE FROM DEFAULT</td>
</tr>
<tr>
<td>MICROSECONDS</td>
<td>MOVE FUNCTION ADD-DURATION(time-1 MICROSECONDS 30)</td>
</tr>
<tr>
<td></td>
<td>(Also can be used in SUBTRACT-DURATION, FIND-DURATION, and EXTRACT-DATE-TIME.)</td>
</tr>
<tr>
<td>MINUTES</td>
<td>MOVE FUNCTION ADD-DURATION(time-1 MINUTES 35)</td>
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<tr>
<td></td>
<td>(Also can be used in SUBTRACT-DURATION, FIND-DURATION, and EXTRACT-DATE-TIME.)</td>
</tr>
<tr>
<td>MONTHS</td>
<td>MOVE FUNCTION ADD-DURATION(date-1 MONTHS 12)</td>
</tr>
<tr>
<td></td>
<td>(Also can be used in SUBTRACT-DURATION, FIND-DURATION, and EXTRACT-DATE-TIME.)</td>
</tr>
<tr>
<td>SECONDS</td>
<td>MOVE FUNCTION ADD-DURATION(time-1 SECONDS 30)</td>
</tr>
<tr>
<td></td>
<td>(Also can be used in SUBTRACT-DURATION, FIND-DURATION, and EXTRACT-DATE-TIME.)</td>
</tr>
<tr>
<td>SYMBOL</td>
<td>CURRENCY IS &quot;EUR&quot; PICTURE SYMBOL &quot;$&quot;</td>
</tr>
<tr>
<td>TIMESTAMP</td>
<td>05 date-1 FORMAT TIMESTAMP</td>
</tr>
<tr>
<td></td>
<td>(Also found in SPECIAL-NAMES paragraph, intrinsic functions TEST-DATE-TIME and CONVERT-DATE-TIME.)</td>
</tr>
<tr>
<td>YEARS</td>
<td>MOVE FUNCTION ADD-DURATION(date-1 YEARS 2)</td>
</tr>
<tr>
<td></td>
<td>(Also can be used in SUBTRACT-DURATION, FIND-DURATION, and EXTRACT-DATE-TIME.)</td>
</tr>
<tr>
<td>YYYYDDD</td>
<td>ACCEPT id-1 FROM DATE YYYYDDD</td>
</tr>
<tr>
<td>YYYYMMDDD</td>
<td>ACCEPT id-1 FROM DATE YYYYMMDDD</td>
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</tbody>
</table>

End of IBM Extension
### Chapter 13. ILE COBOL Reserved Word List

The following sections list all of the reserved words in ILE COBOL.

#### Visual Key

The following key identifies the reserved words in the ILE COBOL language:

- **Blank**: An ILE COBOL reserved word from Standard COBOL.
- **(1)**: An ILE COBOL reserved word that is an IBM extension to the Standard COBOL.
- **(2)**: A COBOL reserved word from Standard COBOL that is not used by the ILE COBOL compiler. These words should not be used if compatibility is important to an installation. If used, a diagnostic message will be issued.
- **(3)**: A COBOL reserved word that is not in Standard COBOL and is not supported by the ILE COBOL compiler. If used, a diagnostic message will be issued.

#### Reserved Words

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<td>AFTER</td>
<td>ALIAS (1)</td>
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<tr>
<td>ALL</td>
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<td>ALPHABETIC</td>
<td>ALPHABETIC-LOWER</td>
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<td>ALPHABETIC-UPPER</td>
<td>ALPHANUMERIC</td>
</tr>
<tr>
<td>ALPHANUMERIC-EDITED</td>
<td>ALSO</td>
</tr>
<tr>
<td>ALTER</td>
<td>ALTERNATE</td>
</tr>
<tr>
<td>AND</td>
<td>ANY (2)</td>
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<td>ARE</td>
<td>AREA</td>
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**ILE COBOL Reserved Word List**

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### ILE COBOL Reserved Word List

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