CA Culprit™ for CA IDMS™

User Guide

Release 18.5.00, 2nd Edition

CA Technologies Product References

This guide references the following CA products:

- CA IDMS™/DB
- CA Culprit™ for CA IDMS™

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Chapter 1: Introduction

This guide gives you detailed information on:

- Generating CA Culprit reports from conventional files and the CA IDMS/DB database
- Creating and modifying tables in the CA-ICMS (Information Center Management System) environment
- Debugging CA Culprit report code
- Coding for efficiency

This guide is structured so that it can be used by both new users with little or no data processing background and by experienced CA Culprit users with programming backgrounds.

Chapter 2: Getting Started with CA Culprit

This section contains the following topics:

What Is CA Culprit and What Can You Do with It?

CA Culprit is a batch utility used to generate files, print reports, and create data tables from conventional and database files. You can print these reports or write them to conventional files. Tables are stored in the database as part of CA IDMS/DB and CA-ICMS.

CA Culprit provides a means for writing detailed or summary reports with a minimum of coding requirements. By using CA Culprit parameters, you can:

- Retrieve data from conventional file and database structures.
- Read and process up to 32 conventional files in one CA Culprit run.
- Produce automatically formatted or customized printed reports.
- Produce detailed or summary reports.
- Produce up to 100 reports in a single CA Culprit run.
- Produce reports on standard or special forms.
- Write reports to conventional files on cards, tape, or disk.
- Produce nonprint output in any format. (for example, packed decimal)
- Read, create, update, and store data tables in a CA-ICMS environment.
- Perform logical operations (computations, comparisons, sorting, file matching, branching, calls to external modules).
- Control processing order.

How to Produce a CA Culprit Report

Producing a CA Culprit report involves four basic steps:

1. Planning the report
2. Writing the code
3. Executing the code
4. Debugging the code

Step 1. Planning the Report

1. Define the report objectives:
   a. What information do you want in the report?
   b. Do you need each data occurrence?
   c. Do you need totals? Subtotals?
2. Identify the data source:
   a. What is the name of the file?
   b. What data is in the file?
   c. How is the file organized?
3. Define the report output:
   a. Do you need a title? Subtitles?
   b. What columns do you need?
   c. What are the column headings?
   d. Do you need total line labels?
4. Define the processing functions required to obtain the information needed in the report:
   a. Are certain data items to be selected?
   b. Should the data be sorted?
   c. What calculations (if any) are needed?
   d. Is testing (comparisons) needed between data items?
   e. Will branching be used?
   f. What logical sequence is required?
   g. Other procedures?

Step 2. Writing the Code

You tell CA Culprit what to do and when to do it by coding instructions on CA Culprit parameters. You identify each CA Culprit parameter by a word or number you code in a specific column position.

A few general rules apply to all CA Culprit coding:

- Enter code in uppercase letters.
- Enter coding in the first ten columns in exactly the correct position
  - Mnemonic code that describes input files starts in column 2:

    ```
    IN  200 F 400

    REC  EMP-NAME
    ```

  - Numeric code starts in column 2:

    ```
    0151*010 '   '
    ```

  - Mnemonic code that indicates copying and modifying stored code starts in column 1:

    ```
    USE

    =COPY

    =MACRO
    =MEND
    ```

  - Continuation lines start in column 1:

    ```
    * ...
    ```

- Entries following column 10 need not begin in a specific column, but must be separated by a comma or at least one space.

Step 3. Executing the Code

You execute CA Culprit code with Job Control Language (JCL). Consult your data-processing department for the JCL used to run CA Culprit reports at your site.

Step 4. Debugging the Code

No matter how careful you are, errors in your code will occur from time to time. At the end of each run, CA Culprit provides listings that flag errors:

- The Sequential Parameter Listing
- The Input Parameter Listing
- Run-Time Messages

The appendix Debugging a CA Culprit Report describes the CA Culprit listings and how to use them to debug CA Culprit code.

What You Should Know Before You Begin

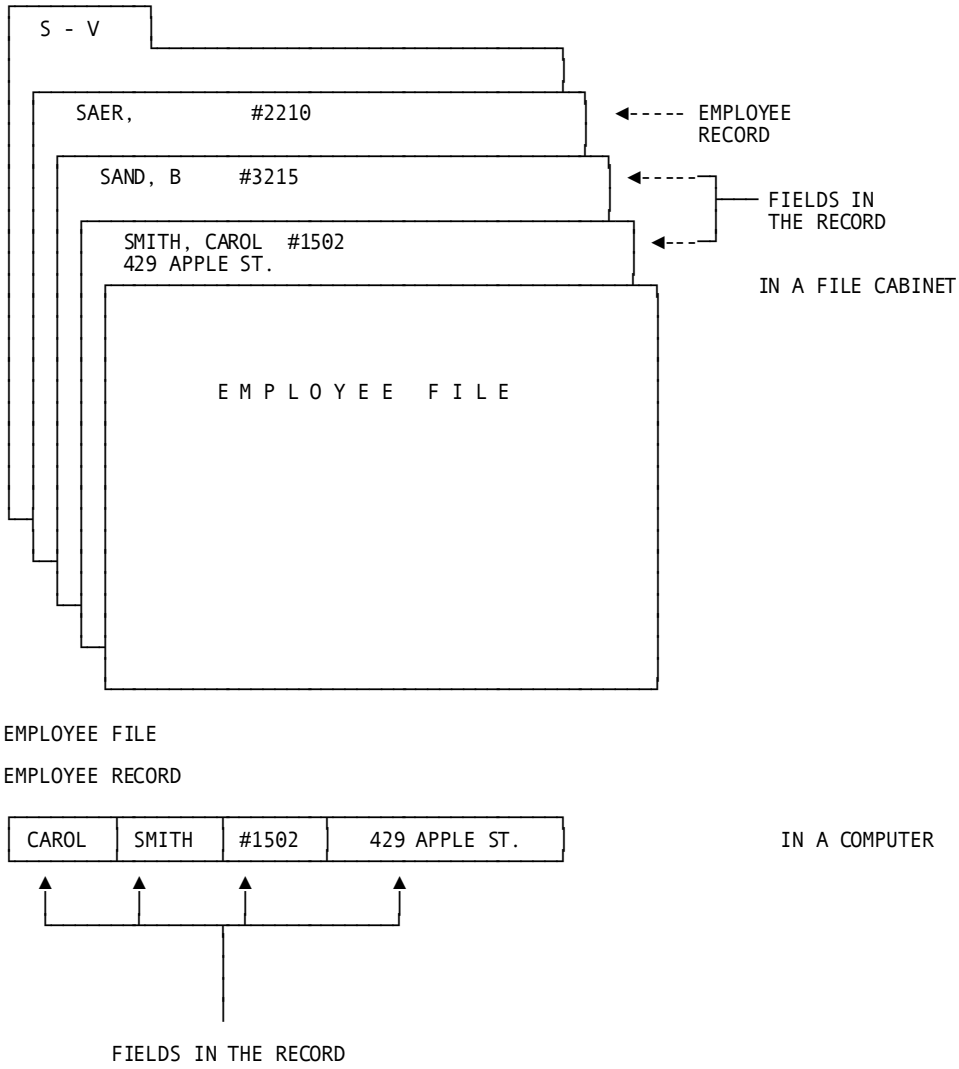
You do not need to be an expert to write CA Culprit reports. You do not need to be a computer programmer. A few basic data processing concepts are enough to get you started. From there, you can learn as you go.

How Information Is Organized in a Computer

Information is organized in a computer in much the same way written information is organized in a file cabinet:

- Collections of related information, called *files*, are analogous to file folders. For example, most companies have personnel files.
- Each file has subdivisions called *records*, which are analogous to the papers in a folder. For example, the personnel file contains employee records.
- Each record contains basic units of data called *fields*, which are analogous to related fragments of information contained on the papers in a folder. For example, an employee record contains a name field.

The figure below illustrates the relationships between files, records, and fields:



What a File Description Tells You

When you obtain a description of the data file you are going to use for your report, you will notice that the file is described in these terms:

- **Record size**

  Indicates the length of a single record measured in characters or *bytes*.

- **Block size**

  Indicates the number of records stored next to each other before there is a spacing interval. The block size is also measured in bytes.

- **Record format**

  Indicates whether the records in the file equal (fixed) in length, vary in length, or have an undefined length.

- **File type**

  Indicates how the records are organized in the file. The possibilities are a sequential file, an ISAM file, a card file, a VSAM file, or a database.

The file description also gives size and location of each data field:

- **Start position**

  Indicates the beginning location of the field.

- **Length**

  Indicates is the amount of space allocated for the particular field. The field length is expressed in bytes.

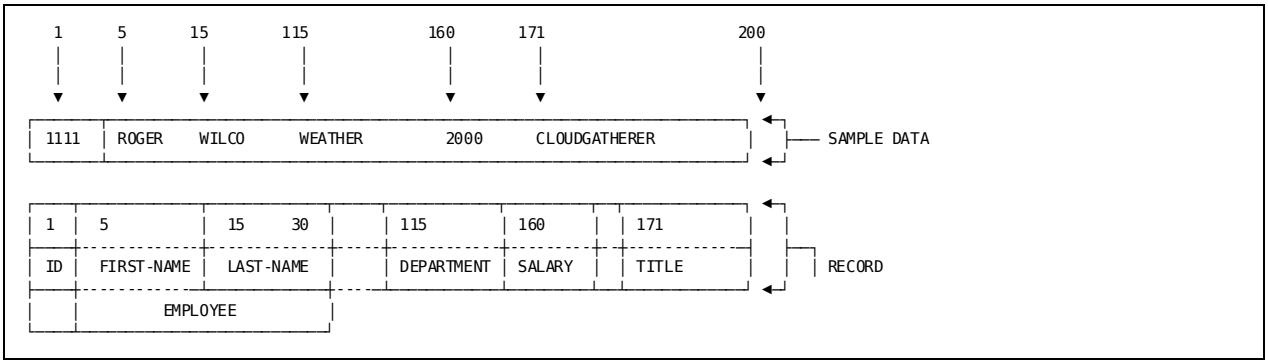
- **Data type**

  Identifies the data as: alphanumeric (a combination of alphabetic characters and numbers) or numeric (zoned decimal, packed decimal, unsigned packed decimal, binary, or bit).

How to Use Information in a File Description

You don't have to understand the differences between the data types to use CA Culprit, but you must identify them correctly. You just have to read the information off of the file description and enter it correctly into your code.

The figure below shows the layout of a record within an employee data file. Sample data illustrates how an occurrence of the employee record might appear:



The sample record above has six data fields that can be used for a report. Note that the record is always 200 bytes long, even if all the space is not needed by a particular word or number. The data field lengths also remain constant, with blanks used to fill out the space.

For example, the record allocates a 10-byte space for FIRST-NAME; therefore, the five characters in ROGER are followed by five blanks so that WILCO begins in position 15, the starting position of LAST-NAME.

Chapter 3: Generating a Basic Report from Standard Files

This section contains the following topics:

Introduction

This chapter takes you step by step through the process of writing a simple CA Culprit report. This report, like all the sample reports in this manual, can be used as a report model for your documents or as a hands-on exercise.

Any terms used in Volume I of this manual that are not discussed in --Heading SECT 1--are defined within the context of the subject matter under discussion.

For our first report we will create the listing of employee names and salaries shown in the report below, created with just five lines of code:

The Report

```
JUNE       BLOOMER                                  15,000.00
EDWARD     HUTTON                                   44,000.00
RUPERT     JENSON                                   82,000.00
MARIANNE   KIMBALL                                  45,000.00
DORIS      KING                                     14,500.00
BRIAN      NICEMAN                                  14,000.00
HERBERT    CRANE                                    75,000.00
JANE       FERNDALE                                 22,500.00
KATHERINE  O'HEARN                                  42,500.00
RALPH      TYRO                                     20,000.00
HENRIETTA  HENDON                                  240,000.00
THEMIS     PAPAZEUS                                100,000.00
JOHN       RUPEE                                    80,000.00
ROBBY      WILDER                                   90,000.00

                                                 2,522,500.00
```

Locating the Data

The data for our report is stored in the personnel file of the Commonweather Corporation. The figure below describes part of the file. The complete description is in the appendix "The Personnel File Description".

Information about the data you will use to create your CA Culprit report is contained in a file description similar to the one above. The description is usually provided by your data-processing department.

```
RECORD SIZE    200 bytes
BLOCK SIZE     400 bytes
RECORD FORMAT  FIXED (F)
FILE TYPE      SEQUENTIAL (PS)
```

Data Field	Start Position	Length (bytes)	Data Type
EMPLOYEE-NAME	5	25	Alphanumeric
FIRST-NAME	5	10	Alphanumeric
LAST-NAME	15	15	Alphanumeric
DEPT-NAME	115	45	Alphanumeric
SALARY-AMOUNT	160	7	Packed Decimal
TITLE	171	20	Alphanumeric

Information about the data you will use to create your CA Culprit report is contained in a file description similar to the one above. The description is usually provided by your data-processing department.

Coding the Report

A simple CA Culprit report is produced with three instructions (**parameters**):

- The **INPUT (IN)** parameter, which tells CA Culprit how the file containing the data is organized
- **REC** parameters, which tell CA Culprit what data to use
- **Type 5** parameters, which tell CA Culprit what and where to print the data

It is important to remember that one INPUT parameter with at least one REC parameter and one type 5 parameter are minimal requirements for any CA Culprit report produced from standard files.

Our first report lists the names of employees and their salaries from the data stored in the personnel file. We will create the report from the three required parameters.

How to Define the Input

To define the input data, code:

1. An INPUT (IN) parameter to describe the file
2. A REC parameter for each data field used in the report

Sample Parameters

IN 200 F 400 PS(TAPE)

200 tells CA Culprit that each record in the personnel file contains 200 characters (bytes).

F indicates fixed-length records.

400 indicates that the file is blocked in 400 byte segments.

PS(TAPE) specifies a physical sequential file on a tape device.

REC EMPLOYEE-NAME 5 25

EMPLOYEE-NAME 5 25 directs CA Culprit to use the data stored in positions 5 through 25 of each record.

REC SALARY-AMOUNT 160 7 3 DP=2

SALARY-AMOUNT 160 7 directs CA Culprit to use the data from positions 160 through 166 for salary information.

3 tells CA Culprit that the salary data is stored as packed decimal.

DP=2 tells CA Culprit that SALARY-AMOUNT has two decimal places.

How to Define the Output

To define the report output, code a **type 5** parameter for each data item. The information on a type 5 parameter is coded in the following order, from left to right:

1. A 2-digit report number
2. The parameter type (**5**)
3. A 1-digit print-row identifier
4. The column placement, consisting of either an asterisk (*) followed by a 3-digit number for relative placement or a 4-digit number for specific placement.
5. A spacing indicator consisting of a blank for a single space, a zero (0) for a double space, or a dash (-) for a triple space
6. The name of the data item to appear in the column

Sample Parameters

0151*010 EMPLOYEE

01 is the assigned report number.

5 specifies a type 5 parameter.

1 specifies that the employee name appears on the first print row.

***010** specifies that CA Culprit determines the placement of the employee name on the page.

Low-number columns print on the left-hand side of the page; high-number columns print progressively to the right of the first column. The **blank** in column 10 specifies single spacing.

EMPLOYEE directs CA Culprit to print the employee's name in this column.

0151*020 SALARY

0151 specifies the report number, parameter type, and first print row.

***020** directs CA Culprit to print SALARY to the right of the employee name.

SALARY directs CA Culprit to print the salary amount in this column.

Demonstration

Complete Code

```
col. 2
▼
IN 200 F 400 PS(TAPE)
REC EMPLOYEE      5   25
REC SALARY      160    5  3  DP=2
0151*010 EMPLOYEE
0151*020 SALARY
```

Result

```
JUNE      BLOOMER                                  15,000.00
EDWARD    HUTTON                                   44,000.00
RUPERT    JENSON                                   82,000.00
MARIANNE  KIMBALL                                  45,000.00
DORIS     KING                                     14,500.00
BRIAN     NICEMAN                                  14,000.00
HERBERT   CRANE                                    75,000.00
JANE      FERNDALE                                 22,500.00
GEORGE    FONRAD                                   14,750.00
ROBIN     GARDNER                                  14,000.00
DOUGLAS   KAHALLY                                  20,000.00
TERENCE   KLWELLEN                                 43,000.00
SANDY     KRAAMER                                  14,000.00
HERBERT   LIPSICH                                  18,500.00
NANCY     TERNER                                   13,000.00
BETH      CLOUD                                    52,750.00
ALAN      DONOVAN                                  33,500.00
DANIEL    MOON                                     72,000.00
ROY       ANDALE                                   33,500.00
HARRY     ARM                                      46,000.00
C.        BREEZE                                   38,000.00
CAROLYN   CROW                                     37,500.00
BURT      LANCHESTER                               54,500.00
RENE      MAKER                                    85,000.00
RICHARD   MUNYON                                   36,000.00
RICHARD   WAGNER                                   47,000.00
TOM       FITZHUGH                                 13,000.00
CYNTHIA   JOHNSON                                  13,500.00
MADELINE  ORGRATZI                                 39,000.00
ELEANOR   PEOPLES                                  80,000.00
```

MICHAEL	ANGELO	18,000.00
MONTE	BANK	80,000.00
CHARLES	BOWER	38,500.00
JOCK	JACKSON	34,000.00
CAROL	MCDOUGALL	18,000.00
LAURA	PENMAN	39,000.00
BETSY	ZEDI	37,000.00
TERRY	CLOTH	38,000.00
PHINEAS	FINN	45,000.00
JOE	KASPAR	31,000.00
MARK	TIME	33,000.00
ROGER	WILCO	80,000.00
JANE	DOUGH	33,000.00
JAMES	GALLWAY	33,000.00
JENNIFER	GARFIELD	65,000.00
PERCY	GRANGER	34,500.00
VLADIMIR	HEAROWITZ	33,000.00
JAMES	JACOBI	55,000.00
JULIE	JENSEN	37,000.00
LARRY	LITERATA	37,500.00
KATHERINE	O'HEARN	42,500.00
RALPH	TYRO	20,000.00
HENRIETTA	HENDON	240,000.00
THEMIS	PAPAZEUS	100,000.00
JOHN	RUPEE	80,000.00
ROBBY	WILDER	90,000.00
		2,522,500.00

Chapter 4: Enhancing the Basic Report

This section contains the following topics:

Introduction

CA Culprit provides optional parameters and codes you can use to make a report easier to read. In this chapter, some the CA Culprit most commonly used enhancement and numeric formatting options are introduced.

Adding a Title

What You Can Do

You can supply a title for your report. CA Culprit automatically prints this title at the top of each page, along with the report number, current date, and page number.

How to Do It

To add a title, code a **type 3** parameter in the following order, from left to right:

1. A 2-digit report number
2. The parameter type (**3**)
3. A title (not to exceed 50 characters, including spaces)

Demonstration

Objective

This example adds a title EMPLOYEE SALARY LISTING to the report.

Parameters

013 EMPLOYEE SALARY LISTING

01 is the report number.

3 specifies a type 3 parameter.

EMPLOYEE SALARY LISTING is the title for the printed report.

Complete Code

```
col. 2
▼
IN  200 F 400 PS(TAPE)
REC EMPLOYEE      5   25
REC SALARY      160    5  3  DP=2
013 EMPLOYEE SALARY LISTING.
0151*010 EMPLOYEE
0151*020 SALARY
```

Result

```
REPORT NO. 01        EMPLOYEE SALARY LISTING      mm/dd/yy PAGE     1
       ROY       ANDALE                            $33,500.00
       HARRY     ARM                               $46,000.00
       MONTE     BANK                              $80,000.00
       CHARLES   BOWER                             $38,000.00
       C.        BREEZE                            $38,000.00
       TERRY     CLOTH                             $38,000.00
       BETH      CLOUD                             $52,750.00
       HERBERT   CRANE                             $75,000.00
       CAROLYN   CROW                              $37,500.00
       ALAN      DONOVAN                           $33,500.00
       JANE      DOUGH                             $33,000.00
       JANE      FERNDALE                          $22,500.00
       PHINEAS   FINN                              $45,000.00
       JAMES     GALLWAY                           $33,000.00
       JENNIFER  GARFIELD                          $65,000.00
       PERCY     GRANGER                           $34,500.00
```

Adding Column Headings

What You Can Do

You can direct CA Culprit to obtain column headings from:

- Field names supplied on REC parameters
- Text added to REC parameter lines
- Text added to type 5 parameter lines
- Text added to type 4 parameter lines

How to Do It

You can use type 5 or type 4 parameters to create heading lines.

Method 1: Use any of the following codes on **type 5** parameters:

- **HF**, which directs CA Culprit to the associated field name:

```
REC EMP-NAME     1    25
0151*020 EMP-NAME     HF

or

010 EMP-NAME
0151*020 EMP-NAME     HF

             Column heading is EMP-NAME.
```

- **HR**, which directs CA Culprit to heading text that is enclosed in single quotation marks on the record description (REC) line:

```
REC EMP-NAME     1    25    'EMPLOYEE'

             Column heading is EMPLOYEE.
```

- **HH**, which directs CA Culprit to the text enclosed in single quotation marks following the HH option on the type 5 line:

```
0151*020 EMP-NAME        HH 'EMPLOYEE NAME'

                  Column heading is EMPLOYEE NAME.
```

A multiple-line heading is generated by enclosing the text for each line within a separate set of quotation marks:

```
0151*020 EMP-NAME        HH 'EMPLOYEE' 'NAME'
```

or

```
REC EMP-NAME                'EMPLOYEE' 'NAME'
0151*020 EMP-NAME        HR

             Column heading is: EMPLOYEE
                                NAME
```

Method 2: Use type 4 parameters to create the headings. The type 4 parameter, typically used for special-purpose heading lines, is coded in the following order, from left to right:

1. A 2-digit report number
2. The parameter type (**4**)
3. A numeral to identify the level of the line
4. A column placement indicator consisting of either an asterisk (*) followed by a 3-digit number for relative placement or a 4-digit number for specific placement
5. A spacing indicator, such as a blank for single spacing, a zero (0) for double spacing, or a dash (-) for triple spacing
6. The text of the heading enclosed in single quotation marks or a field name

Demonstration (1): Formatting Multiple Line Column Headings

Objective

This report prints a 2 line heading for the employee column and a 3 line heading for the salary column.

Parameters

REC EMPLOYEE 5 25 'EMPLOYEE' 'NAME'

'EMPLOYEE' is the first line of the EMPLOYEE column heading.

'NAME' is the second line.

0151*020 SALARY HH 'ANNUAL' 'SALARY' 'AMOUNT'

'ANNUAL' is the first line of the salary column heading.

'SALARY' is the second line.

'AMOUNT' is the third line.

Complete Code

```
col. 2
▼
IN  200 F 400 PS(TAPE)
REC EMPLOYEE      5   25        'EMPLOYEE'  'NAME'
REC SALARY      160    5  3  DP=2
013 EMPLOYEE SALARY LISTING
0151*010 EMPLOYEE               HR
0151*020 SALARY                 HH 'ANNUAL' 'SALARY' 'AMOUNT'
```

Result

```
REPORT NO. 01        EMPLOYEE SALARY LISTING      mm/dd/yy PAGE     1
       ROY       ANDALE                            $33,500.00
       HARRY     ARM                               $46,000.00
       MONTE     BANK                              $80,000.00
       CHARLES   BOWER                             $38,000.00
       C.        BREEZE                            $38,000.00
       TERRY     CLOTH                             $38,000.00
       BETH      CLOUD                             $52,750.00
       HERBERT   CRANE                             $75,000.00
       CAROLYN   CROW                              $37,500.00
       ALAN      DONOVAN                           $33,500.00
       JANE      DOUGH                             $33,000.00
       JANE      FERNDALE                          $22,500.00
       PHINEAS   FINN                              $45,000.00
       JAMES     GALLWAY                           $33,000.00
       JENNIFER  GARFIELD                          $65,000.00
       PERCY     GRANGER                           $34,500.00
```

Demonstration (2): Adding Subtitles

Objective

This example adds heading lines that function as subtitles, not column headings.

Parameters

01410054 'FROM mm/dd/yy TO mm/dd/yy'

01 is the report number.

4 specifies a type 4 parameter.

1 specifies that 'FROM ...' is printed on the first row of the subtitle.

0054 indicates that this row of text begins exactly 54 spaces from the left margin. *Your parameter would contain dates in mm/dd/yy format.

0142*001 'ALL DEPARTMENTS'

014 specifies the report number and the parameter type, respectively.

2 specifies that 'ALL DEPARTMENTS' is printed on the second row of the subtitle.

***001** specifies that this row of text is left justified.

0143*010-' '

014 specifies the report number and the parameter type, respectively.

3 specifies the third line of the subtitle.

***010** specifies a left-hand column position.

- tells CA Culprit to skip two lines before printing the next line.

'' prints a blank space, which in this case creates a blank line.

Complete Code

```
col. 2
▼
IN  200 F 400 PS(TAPE)
REC EMPLOYEE      5   25
REC SALARY      160    5  3  DP=2
013 EMPLOYEE SALARY LISTING
01410054 'FROM mm/dd/yy TO mm/dd/yy'
0142*001 'ALL DEPARTMENTS'
0143*010- ' '
0151*010 EMPLOYEE
0151*020 SALARY
```

Note: Parameter would contain dates in mm/dd/yy format.

Result

```
REPORT NO. 01        EMPLOYEE SALARY LISTING       mm/dd/yy PAGE     1
                                                      FROM mm/dd/yy TO mm/dd/yy
                     ALL DEPARTMENTS

                                          JUNE      BLOOMER                          15,000.00
                                          EDWARD    HUTTON                           44,000.00
                                          RUPERT    JENSON                           82,000.00
                                          MARIANNE  KIMBALL                          45,000.00
                                          DORIS     KING                             14,500.00
                                          BRIAN     NICEMAN                          14,000.00
                                          HERBERT   CRANE                            75,000.00
                                          JANE      FERNDALE                         22,500.00
                                          GEORGE    FONRAD                           14,750.00
                                          ROBIN     GARDNER                          14,000.00
                                          DOUGLAS   KAHALLY                          20,000.00
                                          TERENCE   KLWELLEN                         43,000.00
                                          SANDY     KRAAMER                          14,000.00
                                          HERBERT   LIPSICH                          18,500.00
                                          NANCY     TERNER                           13,000.00
                                          BETH      CLOUD                            52,750.00
                                          ALAN      DONOVAN                          33,500.00
                                          DANIEL    MOON                             72,000.00
                                          ROY       ANDALE                           33,500.00
                                          HARRY     ARM                              46,000.00
                                          C.        BREEZE                           38,000.00
                                          CAROLYN   CROW                             37,500.00
                                          BURT      LANCHESTER                       54,500.00
                                          RENE      MAKER                            91,000.00
                                          RICHARD   MUNYON                           36,000.00
                                          RICHARD   WAGNER                           47,000.00
                                          TOM       FITZHUGH                         13,000.00
                                          CYNTHIA   JOHNSON                          13,500.00
                                          MADELINE  ORGRATZI                         39,000.00
                                          ELEANOR   PEOPLES                          80,000.00
                                          MICHAEL   ANGELO                           18,000.00
                                          MONTE     BANK                             80,000.00
                                          CHARLES   BOWER                            38,500.00
                                          JOCK      JACKSON                          34,000.00
                                          CAROL     MCDOUGALL                        18,000.00
                                          LAURA     PENMAN                           39,000.00
                                          BETSY     ZEDI                             37,000.00
                                          TERRY     CLOTH                            38,000.00
                                          PHINEAS   FINN                             45,000.00
                                          JOE       KASPAR                           31,000.00
                                          MARK      TIME                             33,000.00
                                          ROGER     WILCO                            80,000.00
                                          JANE      DOUGH                            33,000.00
                                          JAMES     GALLWAY                          33,000.00
                                          JENNIFER  GARFIELD                         65,000.00
                                          PERCY     GRANGER                          34,500.00
                                          VLADIMIR  HEAROWITZ                        33,000.00
                                          JAMES     JACOBI                           55,000.00
                                          JULIE     JENSEN                           37,000.00
                                          LARRY     LITERATA                         37,500.00
                                          KATHERINE O'HEARN                          42,500.00
                                          RALPH     TYRO                             20,000.00
                                          HENRIETTA HENDON                          240,000.00
                                          THEMIS    PAPAZEUS                        100,000.00
                                          JOHN      RUPEE                            80,000.00
                                          ROBBY     WILDER                           90,000.00

                                                                                  2,522,500.00
```

Modifying Column Widths

What You Can Do

You can control the number of characters or digits printed in a column.

How to Do It

To place a specified number of characters or digits in a column, code:

1. A type 5 line for the field that is to be printed.
2. A **SZ=** expression indicating the number of characters or digits you want to print on the report. This expression follows the field name and precedes any column headings.

Demonstration

Objective

We are going to modify our report by:

- Printing the employee last name
- Printing the first initial of the employee's first name
- Decreasing the size of the SALARY column

Parameters

REC FIRST-NAME 5 10

FIRST-NAME 5 10 defines the first-name field separately from the last-name field to allow separate processing.

REC LAST-NAME 15 15

LAST-NAME 15 15 defines the last-name field separately from the first-name field to allow separate processing.

0251*010 LAST-NAME SZ=10 HH ' EMPLOYEE'

SZ=10 sets the column width to ten characters.

0251*020 FIRST-NAME SZ=1

SZ=1 sets the column width to accommodate one character, which will truncate all but the first letter of the employee's first name.

0251*030 SALARY SZ=9 HH 'SALARY'

SZ=9 sets the column width for 9 numbers; without sizing, the column saves space for 13 digits plus commas and decimal points. When reducing the size, be sure to allow enough room for totals to print without truncation.

Complete Code

```
col. 2
▼
IN  200 F 400 PS(TAPE)
REC FIRST-NAME    5   10
REC LAST-NAME    15   15
REC SALARY         160    5  3  DP=2
023 EMPLOYEE SALARY LISTING
0251*010 LAST-NAME  SZ=10  HH '   EMPLOYEE'
0251*020 FIRST-NAME  SZ=1
0251*030 SALARY  SZ=9      HH 'SALARY'
```

Result

```
REPORT NO. 02        EMPLOYEE SALARY LISTING       mm/dd/yy PAGE     1
                              EMPLOYEE                                                SALARY

                         BLOOMER                              J                        15,000.00
                         HUTTON                               E                        44,000.00
                         JENSON                               R                        82,000.00
                         KIMBALL                              M                        45,000.00
                         KING                                 D                        14,500.00
                         NICEMAN                              B                        14,000.00
                         CRANE                                H                        75,000.00
                         FERNDALE                             J                        22,500.00
                         FONRAD                               G                        14,750.00
                         GARDNER                              R                        14,000.00
                         KAHALLY                              D                        20,000.00
                         KLWELLEN                             T                        43,000.00
                         KRAAMER                              S                        14,000.00
                         WILDER                               R                        90,000.00

                                                                                    2,522,500.00
```

Formatting Numeric Data

What You Can Do

You can format numeric data automatically by using format codes supplied by CA Culprit or by using your own patterns.

How to Do It

Use a format code on the type 5 line. Useful format codes for printed output are:

- **FN**—Prints leading zeros and omits commas in numbers such as those used for employee identification.
- **FS**—Inserts dashes in social security numbers.
- **FD**—Inserts slashes in dates.
- **F$**—Inserts dollar signs in monetary information.
- **FM**—Formats fields according to a specified pattern. The numeric field is symbolically represented as follows:
  - **9**s and **Z**s represent digits. The Z suppresses leading zeroes.
  - Periods (.) represent decimal points.
  - Special characters (for example, slashes or asterisks) are preceded by a printable digit.

Demonstration (1): Using Formatting Codes

Objective

This example uses codes for automatically formatting the employee identification, social security numbers, salaries, and employment dates.

Parameters

0251*020 ID FN HH 'ID'

FN prints leading zeros and omits commas.

0251*030 SS-NUMBER **FS** HH 'SOCIAL SECURITY' 'NUMBER'

FS inserts dashes into the social security number and suppresses automatic totaling.

0251*040 START-DATE **FD** HH 0251*050 END-DATE **FD** HH

FD inserts slashes into the start and end date and suppresses automatic totaling.

0251*060 SALARY **F$** HH

F$ suppresses leading zeros and inserts a floating dollar sign.

Complete Code

```
col. 2
▼
IN  200 F 400 PS(TAPE)
REC ID            1    4  2
REC EMPLOYEE      5   25
REC SS-NUMBER    84    9  2
REC START-DATE   93    6  2
REC END-DATE     99    6  2
REC SALARY      160    5  3  DP=2
023 PERSONNEL LISTING
0251*010 EMPLOYEE  SZ=20    HH 'EMPLOYEE'
0251*020 ID             FN  HH 'ID'
0251*030 SS-NUMBER      FS  HH 'SOCIAL SECURITY' 'NUMBER'
0251*040 START-DATE     FD  HH 'START' 'DATE'
0251*050 END-DATE       FD  HH 'END' 'DATE'
0251*060 SALARY  SZ=11  F$  HH 'SALARY'
```

Result

```
REPORT NO. 02                      PERSONNEL LISTING                    mm/dd/yy PAGE     1
                                                    SOCIAL SECURITY        START            END
              EMPLOYEE                 ID                NUMBER            DATE            DATE              SALARY

          JUNE      BLOOMER          0069          039-55-7818          80/05/05        00/00/00          $15,000.00
          EDWARD    HUTTON           0100          011-22-3333          77/09/07        00/00/00          $44,000.00
          RUPERT    JENSON           0011          022-34-7891          80/09/29        00/00/00          $82,000.00
          MARIANNE  KIMBALL          0067          022-77-8878          78/09/19        00/00/00          $45,000.00
          DORIS     KING             0106          067-84-5516          80/08/16        00/00/00          $14,500.00
          BRIAN     NICEMAN          0101          033-45-6110          80/05/06        00/00/00          $14,000.00
          HERBERT   CRANE            0004          016-77-7451          77/05/14        00/00/00          $75,000.00
          JANE      FERNDALE         0032          034-56-7891          79/09/09        00/00/00          $22,500.00
          GEORGE    FONRAD           0045          092-34-8763          80/04/14        00/00/00          $14,750.00
          ROBIN     GARDNER          0053          022-33-4444          81/06/15        00/00/00          $14,000.00
          DOUGLAS   KAHALLY          0049          029-66-1234          79/09/29        00/00/00          $20,000.00
          TERENCE   KLWELLEN         0016          010-20-1239          78/01/06        00/00/00          $43,000.00
```

Demonstration (2): Using Formatting Patterns

Objective

The next sample report uses user-supplied patterns to format employee identification numbers with asterisks (*) and consecutive data fields with dashes.

Parameters

0251*020 ID FM '9*999' HH 'ID'

FM specifies that a user-supplied pattern formats the data.

'9*999' is the format pattern.

0251*040 DATES FM '99/99/99-99/99/99' HH 'EMPLOYMENT DATES'

FM specifies that a user-supplied pattern formats the data.

99/99/99-99/99/99' is the format pattern.

Complete Code

```
col. 2
▼
IN  200 F 400 PS(TAPE)
REC ID          1   4  2
REC EMPLOYEE    5  25
REC SOC-SEC    84   9  2
REC DATES      93  12  2
REC SALARY    160   7  3  DP=2
013 PERSONNEL LISTING REPORT
0151*010 EMPLOYEE SZ=20                    HH 'EMPLOYEE'
0151*020 ID       FM '9*999'               HH 'ID'
0151*030 SOC-SEC  FS                       HH 'SOCIAL SECURITY' 'NUMBER'
0151*040 DATES    FM '99/99/99-99/99/99'   HH 'EMPLOYMENT DATES'
0151*050 SALARY   F$                       HH 'SALARY'
```

Result

```
REPORT NO. 01       PERSONNEL LISTING  REPORT     mm/dd/yy PAGE     1
                                                    SOCIAL SECURITY
              EMPLOYEE                  ID              NUMBER             EMPLOYMENT DATES              SALARY

         JUNE      BLOOMER           0*069          039-55-7818          80/05/05-00/00/00                    $.00
         EDWARD    HUTTON            0*100          011-22-3333          77/09/07-00/00/00                    $.00
         RUPERT    JENSON            0*011          022-34-7891          80/09/29-00/00/00                    $.00
         MARIANNE  KIMBALL           0*067          022-77-8878          78/09/19-00/00/00                    $.00
         DORIS     KING              0*106          067-84-5516          80/08/16-00/00/00                    $.00
         BRIAN     NICEMAN           0*101          033-45-6110          80/05/06-00/00/00                    $.00
         HERBERT   CRANE             0*004          016-77-7451          77/05/14-00/00/00                    $.00
         JANE      FERNDALE          0*032          034-56-7891          79/09/09-00/00/00                    $.00
         GEORGE    FONRAD            0*045          092-34-8763          80/04/14-00/00/00                    $.00
         ROBIN     GARDNER           0*053          022-33-4444          81/06/15-00/00/00                    $.00
         DOUGLAS   KAHALLY           0*049          029-66-1234          79/09/29-00/00/00                    $.00
         TERENCE   KLWELLEN          0*016          010-20-1239          78/01/06-00/00/00                    $.00
```

Adjusting Line Length and Page Depth

What You Can Do

You can specify line length and page depth by using **OUTPUT (OUT)** parameter options. When the options are not used, CA Culprit automatically prints 132 characters to a line and 55 lines to a page, not including title lines and headings.

How to Do It

OUTPUT parameter options that adjust report size are coded by:

- A numeral to specify the number of characters on a line
- **LP=** immediately followed by a numeral to specify the number of lines on a page

Demonstration

Objective

We are going to print a report with a 60-character line length and a 19-line page size by using OUTPUT parameter options.

The report is shown printed without the OUTPUT parameter specifications and again with the specifications.

Parameters

01OUT 60 LP=19

01 is the report number.

OUT specifies the OUTPUT parameter.

60 specifies the number of characters to be printed on a report line.

LP=19 specifies a page length of 19 lines.

Complete Code

```
col. 2
▼
IN  200 F 400 PS(TAPE)
REC EMPLOYEE      5   25           'EMPLOYEE NAME'
REC SALARY      160    5  3  DP=2
013 EMPLOYEE SALARY LIST
01OUT 60 LP=19
0151*010 EMPLOYEE   HR
0151*020 SALARY     HF
```

Result BEFORE

```
REPORT NO. 01                EMPLOYEE SALARY LIST          mm/dd/yy PAGE     1
                  EMPLOYEE                            SALARY

             MICHAEL   ANGELO                          18,000.00
             DONTE     BANK                            80,000.00
             ALBERT    BREEZE                          38,000.00
             BETH  M.  CLOUD                           52,750.00
             ALAN      DONOVAN                         33,500.00
             PERCY     EINSTEIN                        34,500.00
             JANE      FERNDALE                        22,500.00
             TOM       FITZHUGH                        13,000.00
             ROBIN     GARDNER                         14,000.00
             JENNIFER  GARFIELD                        65,000.00
             VLADIMIR  HEAROWITZ                       33,000.00
             EDWARD    HUTTON                          44,000.00
             JOCK      JACKSON                         34,000.00
             JAMES     JACOBI                          55,000.00
             JULIE     JANSSEN                         37,000.00
             RUPERT    JENSON                          82,000.00
             MARYLOU   JOHNSON                             12.00
             CYNTHIA   JOHNSON                         13,500.00
             DOUGLAS   KAHALLY                         20,000.00
             MICHAEL   ANGELO                          18,000.00
             DONTE     BANK                            80,000.00
             ALBERT    BREEZE                          38,000.00
             BETH  M.  CLOUD                           52,750.00
             ALAN      DONOVAN                         33,500.00
             PERCY     EINSTEIN                        34,500.00
             JANE      FERNDALE                        22,500.00
             TOM       FITZHUGH                        13,000.00
             ROBIN     GARDNER                         14,000.00
             JENNIFER  GARFIELD                        65,000.00
             EDWARD    HUTTON                          44,000.00
             JOCK      JACKSON                         34,000.00
             JAMES     JACOBI                          55,000.00
             JULIE     JANSSEN                         37,000.00
             RUPERT    JENSON                          82,000.00
             MARYLOU   JOHNSON                             12.00
             CYNTHIA   JOHNSON                         13,500.00
             DOUGLAS   KAHALLY                         20,000.00
```

Result AFTER

```
REPORT NO. 01                EMPLOYEE SALARY LIST          mm/dd/yy PAGE     1
                  EMPLOYEE                            SALARY

             MICHAEL   ANGELO                          18,000.00
             DONTE     BANK                            80,000.00
             ALBERT    BREEZE                          38,000.00
             BETH  M.  CLOUD                           52,750.00
             ALAN      DONOVAN                         33,500.00
             PERCY     EINSTEIN                        34,500.00
             JANE      FERNDALE                        22,500.00
             TOM       FITZHUGH                        13,000.00
             ROBIN     GARDNER                         14,000.00
             JENNIFER  GARFIELD                        65,000.00
             VLADIMIR  HEAROWITZ                       33,000.00
             EDWARD    HUTTON                          44,000.00
             JOCK      JACKSON                         34,000.00
             JAMES     JACOBI                          55,000.00
             JULIE     JANSSEN                         37,000.00
             RUPERT    JENSON                          82,000.00
             MARYLOU   JOHNSON                             12.00
             CYNTHIA   JOHNSON                         13,500.00
             DOUGLAS   KAHALLY                         20,000.00
```

Chapter 5: Additional Standard Options

This section contains the following topics:

Introduction

After you have created your basic CA Culprit report, you can use some of the CA Culprit optional capabilities to produce multiple reports in a single run, sequence report output, select data for processing, and specify multiple detail lines.

Multiple Reports

What You Can Do

In a single CA Culprit run, you can produce up to 100 reports that use the same data set.

How to Do It

1. Assign a 2-digit report number to each report you want to create.
2. Code the report number on report-specific parameters.

Demonstration

Objective

We are going to produce three different reports in one run from the Commonweather personnel file.

Parameters

01OUT 60 013 EMPLOYEE SALARIES 0151*010 EMPLOYEE SZ=20 HR 0151*020 SALARY SZ=11 F$ HR

All parameters having **01** coded in columns 2 and 3 belong to report 01.

OUT 60 specifies 60-character lines.

EMPLOYEE SALARIES is the title.

EMPLOYEE and SALARY are the two data fields printed for this report. Both columns have a specified width. SALARY is formatted with dollar signs.

02OUT 80 023 DEPARTMENT PERSONNEL LIST 0251*010 DEPARTMENT SZ=25 HR 0251*020 TITLE HR 0251*030 EMPLOYEE SZ=20 HR

All parameters having **02** coded in columns 2 and 3 belong to report 02.

OUT 80 specifies 80-character lines.

DEPARTMENT PERSONNEL LISTING is the title for report 02.

Report 02 uses information from the DEPARTMENT, TITLE, and EMPLOYEE input fields.

03OUT 80 033 EMPLOYEE DEPARTMENTS 0351*010 EMPLOYEE SZ=20 HR 0351*020 DEPARTMENT SZ=25 HR

All parameters having **03** coded in columns 2 and 3 belong to report 03.

OUT 80 specifies 80-character lines.

EMPLOYEE DEPARTMENTS is the title for report 03.

Report 03 uses information from the EMPLOYEE and DEPARTMENT input fields.

Complete Code

```
col. 2
▼
IN  200 F 400 PS(TAPE)
REC EMPLOYEE      5   25           'EMPLOYEE NAME'
REC DEPARTMENT  115   45           '       DEPARTMENT'
REC SALARY      160    5  3  DP=2  'ANNUAL SALARY'
REC TITLE       171   20           '      TITLE'
01OUT 60
013 EMPLOYEE SALARIES
0151*010 EMPLOYEE  SZ=20         HR
0151*020 SALARY  SZ=11  F$       HR
02OUT 80
023 DEPARTMENT PERSONNEL LISTING
0251*010 DEPARTMENT  SZ=25       HR
0251*020 TITLE                   HR
0251*030 EMPLOYEE  SZ=20         HR
03OUT 80
033 EMPLOYEE DEPARTMENTS
0351*010 EMPLOYEE  SZ=20         HR
0351*020 DEPARTMENT  SZ=25       HR
```

Results

```
REPORT NO. 01        EMPLOYEE SALARIES  mm/dd/yy PAGE     1
           EMPLOYEE NAME             ANNUAL SALARY

        JUNE      BLOOMER               $15,000.00
        EDWARD    HUTTON                $44,000.00
        RUPERT    JENSON                $82,000.00
        MARIANNE  KIMBALL               $45,000.00
        DORIS     KING                  $14,500.00
        BRIAN     NICEMAN               $14,000.00
        HERBERT   CRANE                 $75,000.00
        JANE      FERNDALE              $22,500.00
        GEORGE    FONRAD                $14,750.00
        ROBIN     GARDNER               $14,000.00
        DOUGLAS   KAHALLY               $20,000.00
        TERENCE   KLWELLEN              $43,000.00
        ROBBY     WILDER                $90,000.00
                                     $2,522,500.00
```

```
REPORT NO. 02             DEPARTMENT PERSONNEL LISTING      mm/dd/yy PAGE     1
              DEPARTMENT                 TITLE           EMPLOYEE NAME

    ACCOUNTING AND PAYROLL      PAYROLL CLERK          JUNE      BLOOMER
    ACCOUNTING AND PAYROLL      FINANCIAL ANALYST      EDWARD    HUTTON
    ACCOUNTING AND PAYROLL      MGR ACCTNG/PAYROLL     RUPERT    JENSON
    ACCOUNTING AND PAYROLL      ACCOUNTANT             MARIANNE  KIMBALL
    ACCOUNTING AND PAYROLL      AR CLERK               DORIS     KING
    ACCOUNTING AND PAYROLL      AP CLERK               BRIAN     NICEMAN
    COMPUTER OPERATIONS         MGR COMPUTER OPS       HERBERT   CRANE
    COMPUTER OPERATIONS         COMPUTER OPERATOR      JANE      FERNDALE
    COMPUTER OPERATIONS         DATA ENTRY CLERK       GEORGE    FONRAD
    COMPUTER OPERATIONS         DATA ENTRY CLERK       ROBIN     GARDNER
    COMPUTER OPERATIONS         COMPUTER OPERATOR      DOUGLAS   KAHALLY
    COMPUTER OPERATIONS         SYSTEMS PROGRAMMER     TERENCE   KLWELLEN
    EXECUTIVE ADMINISTRATION    DIR CORP CONFUSION     ROBBY     WILDER
```

```
REPORT NO. 03                EMPLOYEE DEPARTMENTS          mm/dd/yy PAGE     1
              EMPLOYEE NAME                            DEPARTMENT

            JUNE      BLOOMER             ACCOUNTING AND PAYROLL
            EDWARD    HUTTON              ACCOUNTING AND PAYROLL
            RUPERT    JENSON              ACCOUNTING AND PAYROLL
            MARIANNE  KIMBALL             ACCOUNTING AND PAYROLL
            DORIS     KING                ACCOUNTING AND PAYROLL
            BRIAN     NICEMAN             ACCOUNTING AND PAYROLL
            HERBERT   CRANE               COMPUTER OPERATIONS
            JANE      FERNDALE            COMPUTER OPERATIONS
            GEORGE    FONRAD              COMPUTER OPERATIONS
            ROBIN     GARDNER             COMPUTER OPERATIONS
            DOUGLAS   KAHALLY             COMPUTER OPERATIONS
            TERENCE   KLWELLEN            COMPUTER OPERATIONS
            ROBBY     WILDER              EXECUTIVE ADMINISTRATION
```

Sequencing Report Output

What You Can Do

You can sequence alphanumeric and numeric data in your report in ascending or descending order.

How to Do It

Code the **SORT** parameter line with the following information, from left to right:

1. The 2-digit report number.
2. The word SORT. There is no space after the report number.
3. The name of the field to be sorted.
4. The sort order:
   - **Blank** or **A** for ascending order
   - **D** for descending order
5. Repeat steps 3 and 4 for any additional sort fields, separating entries by at least one space.

Demonstration

Objective

The next report lists employees in alphabetical order by performing a sort on employee last name.

Parameters

01SORT LAST-NAME

01 is the report number.

The **SORT** parameter is coded in columns 4 to 8, immediately after the report number.

LAST-NAME is the sort field. This field is also defined to the report by appearing on the REC parameter.

Complete Code

```
col. 2
▼
IN 200 F 400 PS(TAPE)
REC EMPLOYEE        5   25
REC LAST-NAME      15   15
REC SALARY        160    5  3  DP=2
013 EMPLOYEE SALARY LISTING
01SORT LAST-NAME
0151*010 EMPLOYEE SZ=20  HH 'EMPLOYEE'
0151*020 SALARY          HH 'SALARY'
```

Result

```
REPORT NO. 01                EMPLOYEE SALARY LIST          mm/dd/yy PAGE     1
                    EMPLOYEE                            SALARY

              MICHAEL   ANGELO                          18,000.00
              DONTE     BANK                            80,000.00
              ALBERT    BREEZE                          38,000.00
              BETH  M.  CLOUD                           52,750.00
              ALAN      DONOVAN                         33,500.00
              PERCY     EINSTEIN                        34,500.00
              JANE      FERNDALE                        22,500.00
              TOM       FITZHUGH                        13,000.00
              ROBIN     GARDNER                         14,000.00
              JENNIFER  GARFIELD                        65,000.00
              VLADIMIR  HEAROWITZ                       33,000.00
              EDWARD    HUTTON                          44,000.00
              JOCK      JACKSON                         34,000.00
              JAMES     JACOBI                          55,000.00
              JULIE     JANSSEN                         37,000.00
              RUPERT    JENSON                          82,000.00
              MARYLOU   JOHNSON                             12.00
              CYNTHIA   JOHNSON                         13,500.00
              DOUGLAS   KAHALLY                         20,000.00
```

Selective Processing

What You Can Do

You can refine the scope of your processing by choosing only those records that meet certain criteria.

How to Do It

You can use either a **SELECT** or **BYPASS** parameter. The choice depends on which option allows for the clearest statement of the condition controlling the choice. You can specify more than one selection criterion on a single SELECT or BYPASS parameter. However, the two parameters cannot be applied together.

To use SELECT or BYPASS:

1. Code the SELECT or BYPASS parameter immediately after the REC parameters that describe the file.
2. Enter the data item and test condition that the data must meet; such as, **EQ** (equal to), **GT** (greater than), **LT** (less than).
3. Join multiple criteria with logical operators:
   - **AND**, to indicate that all conditions must be true
   - **OR**, to indicate that only one condition need be true

Demonstration (1): Selecting Records with Single Criteria

Objective

We are going to modify our report by listing only employees earning $50,000.00 and over.

The following code selects the appropriate records:

Parameters

SEL SALARY GE 50000.00

SEL SALARY GE 50000.00 specifies selection of salaries equal to or greater than 50,000.00.

or

BYP SALARY LT 50000.00

BYP SALARY LT 50000.00 specifies omission of salaries less than 50,000.00.

Complete Code

```
col. 2
▼
IN 200 F 400 PS(TAPE)
REC EMPLOYEE        5   25
REC LAST-NAME      15   15
REC SALARY        160    5  3  DP=2
SEL SALARY GE 50000.00
013 EMPLOYEE SALARY LISTING
01SORT LAST-NAME
0151*010 EMPLOYEE      HH 'EMPLOYEE'
0151*020 SALARY SZ=10  HH 'SALARY'
```

Result

```
REPORT NO. 01                EMPLOYEE SALARY LISTING       mm/dd/yy PAGE     1
                                       EMPLOYEE                                    SALARY

                              MONTE      BANK                                      80,000.00
                              BETH       CLOUD                                     52,750.00
                              HERBERT    CRANE                                     75,000.00
                              JENNIFER   GARFIELD                                  65,000.00
                              HENRIETTA  HENDON                                   240,000.00
                              JAMES      JACOBI                                    55,000.00
                              RUPERT     JENSON                                    82,000.00
                              BURT       LANCHESTER                                54,500.00
                              RENE       MAKER                                     85,000.00
                              DANIEL     MOON                                      72,000.00
                              THEMIS     PAPAZEUS                                 100,000.00
                              ELEANOR    PEOPLES                                   80,000.00
                              JOHN       RUPEE                                     80,000.00
                              ROGER      WILCO                                     80,000.00
                              ROBBY      WILDER                                    90,000.00

                                                                                1,291,250.00
```

Demonstration (2): Selecting Records with Multiple Criteria

Objective

Our next report selects employees earning $15,000 or less and those earning between $35,000 and $50,000.

Parameters

SEL SALARY EQ (35000 TO 50000) OR SALARY LE 15000

SEL SALARY EQ (35000 TO 50000) specifies the first selection criteria.

OR relates the first test to the to the second by allowing selection of a record that meets only one of the specified conditions.

SALARY LE 15000 specifies the alternative record selection criteria.

The following BYPASS parameter achieves the same results:

Parameters

BYP SALARY EQ (15000.01 TO 34999.99) OR SALARY GT 50000

BYP SALARY EQ (15000.01 TO 34999.99) specifies the first record bypass criteria.

OR relates the first test to the second by allowing bypass of a record that meets only one of the specified conditions.

SALARY GT 50000 specifies the alternative record bypass criteria.

Complete Code

```
col. 2
▼
IN 200 F 400 PS(TAPE)
REC EMPLOYEE        5   25
REC LAST-NAME      15   15
REC SALARY        160    5  3  DP=2
SEL SALARY EQ (35000 TO 50000) OR SALARY LE 15000
013 EMPLOYEE SALARY LISTING
01SORT LAST-NAME
0151*010 EMPLOYEE      HH 'EMPLOYEE'
0151*020 SALARY SZ=10  HH 'SALARY'
```

Result

```
REPORT NO. 01              EMPLOYEE SALARY LISTING       mm/dd/yy PAGE     1
                                    EMPLOYEE                                    SALARY

                           HARRY     ARM                                      46,000.00
                           JUNE      BLOOMER                                  15,000.00
                           CHARLES   BOWER                                    38,500.00
                           C.        BREEZE                                   38,000.00
                           TERRY     CLOTH                                    38,000.00
                           CAROLYN   CROW                                     37,500.00
                           PHINEAS   FINN                                     45,000.00
                           TOM       FITZHUGH                                 13,000.00
                           GEORGE    FONRAD                                   14,750.00
                           ROBIN     GARDNER                                  14,000.00
                           EDWARD    HUTTON                                   44,000.00
                           JULIE     JENSEN                                   37,000.00
                           CYNTHIA   JOHNSON                                  13,500.00
                           MARIANNE  KIMBALL                                  45,000.00
                           DORIS     KING                                     14,500.00
                           TERENCE   KLWELLEN                                 43,000.00
                           SANDY     KRAAMER                                  14,000.00
                           LARRY     LITERATA                                 37,500.00
                           RICHARD   MUNYON                                   36,000.00
                           BRIAN     NICEMAN                                  14,000.00
                           KATHERINE O'HEARN                                  42,500.00
                           MADELINE  ORGRATZI                                 39,000.00
                           LAURA     PENMAN                                   39,000.00
                           NANCY     TERNER                                   13,000.00
                           RICHARD   WAGNER                                   47,000.00
                           BETSY     ZEDI                                     37,000.00

                                                                             815,750.00
```

Multiple Detail Lines

What You Can Do

Up to this point we have used the type 5 parameter to assign several pieces of information to a single print line. In CA Culprit this is called a **detail line**. For example,

```
MAX DELANO  12 ORCHARD LANE  LIPTON  NJ  07080
```

You can also assign information to multiple detail lines that print as a single block of information. For example,

```
MAX DELANO          ◄ first detail line
12 ORCHARD LANE     ◄ second detail line
LIPTON  NJ  07080   ◄ third detail line
```

How to Do It

To specify multiple detail lines on a type 5 parameter, change the number in *column 5* to indicate the line on which the information should appear:

```
0151*010   NAME            ◄ first detail line

0152*010   STREET-ADDRESS  ◄ second detail line

0153*010   TOWN            ◄ third detail line
0153*015   STATE
0153*020   ZIPCODE
```

Demonstration

Objective

Our next report uses multiple detail lines to produce an employee address list. The employee name, street number, city, state, and zip code appear on three separate lines.

Parameters

```
0151*010 LAST-NAME
0151*012 FIRST-NAME
```

1 specifies placement of the last name and first name on the first detail line.

```
0152*020 STREET
```

2 specifies placement of the street on the second detail line.

```
0153*020 CITY
0153*025 STATE
0153*030 ZIP-CODE
```

3 specifies placement of the city, state, and zip code on the third detail line.

Complete Code

```
col. 2
▼
IN 200 F 400 PS(TAPE)
REC FIRST-NAME      5   10
REC LAST-NAME      15   15
REC STREET         30   20
REC CITY           50   15
REC STATE          65    2
REC ZIP-CODE       67    5
01OUT 80
013 EMPLOYEE ADDRESS LIST
01SORT LAST-NAME
0151*010 LAST-NAME
0151*012 FIRST-NAME
0152*020 STREET
0153*020 CITY  SZ=10
0153*025 STATE
0153*030 ZIP-CODE
```

Result

```
REPORT NO. 01              EMPLOYEE ADDRESS LIST         mm/dd/yy PAGE     1
     ANGELO         MICHAEL
                                  507 CISTINE DR
                                       WELLESLEY          MA     01568
     BABBIT         HERBIE
                                  30 HERON AVE
                                       KINGSTON           NJ     21341
     BANK           DONTE
                                  45 EAST GROVE DR
                                       HANIBAL            MA     02415
     BLOOMER        DUDY
                                  14 ZITHER TERR
                                       LEXINGTON          MA     01675
     BREEZE         ALBERT
                                  100 BOARDWALK
                                       OCEAN CITY         NJ     03461
```

Chapter 6: Adding Programming Logic to a Report

This section contains the following topics:

Introduction

Special CA Culprit instructions allow you to produce reports that are more sophisticated than the formatted file listings we have done so far. You can count specific items, perform arithmetic operations, test data against specified conditions, and direct the flow of processing.

How to Code Programming Logic

We are going to process data as it is read from the input file. To do this, we use **type 7** parameters on which to code our logic.

Type 7 parameters are coded from left to right, as follows:

1. A 2-digit report number
2. The parameter type (**7**)
3. A 3-digit sequence number indicating the order in which the parameter is executed
4. The instruction that will be executed

Using Counters

What You Can Do

You can count occurrences, or the number of times an event happens during processing.

How to Do It

- Conditionally, by coding:
  1. A numeric work field:

     ```
     010 COUNTER-A
     ```

  2. A computation that adds 1 to the value of the work field whenever counting should occur:

     ```
     017100 COUNTER-A + 1  COUNTER-A
     ```

- Automatically, by coding:
  1. A numeric work field.

     ```
     010 COUNTER-B
     ```

  2. A value you want assigned each time counting occurs. Typically, this value is 1:

     ```
     010 COUNTER-B 1
     ```

  3. The name of the work field on a type 5 parameter:

     ```
     0151*010 COUNTER-B (Prints the value each time)

     or

     0151*000 COUNTER-B (Does not print the value)
     ```

  4. The name of the work field on a type 6 parameter when the total count should be printed on the report.

     ```
     0161*010 COUNTER-B
     ```

     Type 6 parameters are coded the same way as type 5.

     For more information see the chapter "Controlling Total Lines".

Demonstration (1): Printing the Count of each Occurrence

Objective

This report assigns a number to each employee in the public relations department by adding 1 to the value of a numeric work field. The value of the work field is printed out each time a new employee is processed.

Parameters

01OUT D

01OUT D suppresses the automatic total of the employee number column.

010 COUNT

010 COUNT establishes the numeric work field COUNT.

0151*030 COUNT

0151*030 COUNT prints the value of the work field COUNT.

017010 COUNT + 1 COUNT

017010 COUNT + 1 COUNT adds 1 to the value contained in the work field COUNT.

Complete Code

```
col. 2
▼
IN 200 F 400 PS(TAPE)
REC EMPLOYEE        5   20
REC DEPARTMENT    115   25
SEL DEPARTMENT EQ 'PUBLIC RELATIONS'
013 EMPLOYEE COUNT
010UT D
010 COUNT
0151*010 DEPARTMENT      HH 'DEPARTMENT'
0151*020 EMPLOYEE        HH '  EMPLOYEE NAME'
0151*030 COUNT SZ=3      HH 'EMPLOYEE NUMBER'
017010   COUNT + 1 COUNT
```

Result

```
REPORT NO. 01        EMPLOYEE COUNT                mm/dd/yy PAGE     1
          DEPARTMENT            EMPLOYEE NAME                              EMPLOYEE NUMBER
                                                                                  1
   PUBLIC RELATIONS          MICHAEL   ANGELO                                     2
   PUBLIC RELATIONS          DONTE     BANK                                       3
   PUBLIC RELATIONS          JOCK      JACKSON                                    4
   PUBLIC RELATIONS          CAROL     MCDOUGALL                                  5
   PUBLIC RELATIONS          LAURA     PENMAN                                     6
   PUBLIC RELATIONS          BETSY     ZEDI
```

Demonstration (2): Printing a Total Count

Objective

This report counts the number of employees processed by adding 1 to the value of the numeric work field. The final value of the work field is printed out by using a type 6 parameter.

See the chapter "Controlling Total Lines" for details about type 6 parameters.

Parameters

010 COUNT

010 COUNT establishes the numeric work field.

0161*040 'NUMBER OF EMPLOYEES' 0161*050 COUNT

0161*040 and 0161*050 are type 6 parameters used to label the print line and obtain the last value in the work field COUNT.

017010 COUNT + 1 COUNT

017010 COUNT + 1 COUNT adds 1 to the value contained in the work field COUNT.

Complete Code

```
col. 2
▼
IN 200 F 400 PS(TAPE)
REC EMPLOYEE        5   20
REC DEPARTMENT    115   25
SEL DEPARTMENT EQ 'PUBLIC RELATIONS'
013 EMPLOYEE COUNT
010 COUNT
0151*010 DEPARTMENT      HH 'DEPARTMENT'
0151*020 EMPLOYEE        HH '  EMPLOYEE NAME'
0161*040 'NUMBER OF EMPLOYEES'
0161*050 COUNT
017010   COUNT + 1 COUNT
```

Result

```
REPORT NO. 01        EMPLOYEE COUNT                mm/dd/yy PAGE     1
          DEPARTMENT            EMPLOYEE NAME

   PUBLIC RELATIONS          MICHAEL   ANGELO
   PUBLIC RELATIONS          DONTE     BANK
   PUBLIC RELATIONS          JOCK      JACKSON
   PUBLIC RELATIONS          CAROL     MCDOUGALL
   PUBLIC RELATIONS          LAURA     PENMAN
   PUBLIC RELATIONS          BETSY     ZEDI
                                       NUMBER OF EMPLOYEES         6
```

Demonstration (3): Using the Value of a Work Field

Objective

This report counts the number of employees processed by adding 1 to the value of the numeric work field. The final value of the work field is printed out by using a type 6 parameter. See the chapter "Controlling Total Lines" for details about type 6 parameters.

Parameters

010 COUNT 1

010 COUNT 1 establishes a numeric work field having the value of 1.

0151*000 COUNT

01**5**1 identifies the work field COUNT on a type 5 parameter. An automatic running total is kept.

000 suppresses the printing of the field value (1) on the report. (More than one such type 5 parameter can be used, if needed.)

```
0161*040 'NUMBER OF EMPLOYEES'
0161*050 COUNT
```

01**6**1*040 and 01**6**1*050 are type 6 parameters used to label the print line and obtain the last value in the work field COUNT.

Complete Code

```
col. 2
▼
IN 200 F 400 PS(TAPE)
REC EMPLOYEE        5   20
REC DEPARTMENT    115   25
SEL DEPARTMENT EQ 'PUBLIC RELATIONS'
013 EMPLOYEE COUNT
010 COUNT 1
0151*000 COUNT
0151*010 DEPARTMENT      HH 'DEPARTMENT'
0151*020 EMPLOYEE        HH '  EMPLOYEE NAME'
0161*040 'NUMBER OF EMPLOYEES'
0161*050 COUNT
```

Result

```
REPORT NO. 01       EMPLOYEE COUNT                mm/dd/yy PAGE     1
          DEPARTMENT            EMPLOYEE NAME

   PUBLIC RELATIONS          MICHAEL   ANGELO
   PUBLIC RELATIONS          DONTE     BANK
   PUBLIC RELATIONS          JOCK      JACKSON
   PUBLIC RELATIONS          CAROL     MCDOUGALL
   PUBLIC RELATIONS          LAURA     PENMAN
   PUBLIC RELATIONS          BETSY     ZEDI
                                       NUMBER OF EMPLOYEES                6
```

Performing Arithmetic Operations

What You Can Do

You can perform arithmetic operations in your CA Culprit report.

How to Do It

For **simple, one-step operations,** code the following:

1. The numeric field being used as the operand
2. An operator that must have a space on either side
3. The work field that is to contain the results

```
017010 YR-SALARY / 52  WK-SALARY
```

For **complex (two or more operations) statements,** code the following:

1. The word **COMPUTE**

```
017010 COMPUTE (SALARY + 2000) X 0.10  BONUS
```

Arithmetic operations can be used

- Alone:

```
017100 SALARY / 52  WK-SALARY
```

- As the result of a conditional statement when the condition is met:

```
017010 IF SALARY LE 19000  100
017020 ...
017100 SALARY / 52  WK-SALARY
```

Demonstration

Objective

This report compares employee annual earnings to a base of $19,000. Employees earning more than the base amount are considered salaried; those earning less are considered hourly. The report calculates an hourly wage for all nonsalaried employees.

Testing and calculations for this report are on type 7 parameters.

Parameters

01OUT D

D suppresses totals

010 AMOUNT DP=2

AMOUNT is a work field that holds computation results containing two decimal places.

017010 IF SALARY LE 19000 500

IF SALARY LE 19000 500 is a conditional statement that tests for a range less than or equal to 19000. If the test is true, pro- cessing skips to line 500 of the type 7 parameters. If not true, the type 7 state- ments are processed in sequence until TAKE is executed.

017 MOVE 'SALARIED' TO MESSAGE

MOVE 'SALARIED' TO MESSAGE places SALARIED in the MESSAGE work field when SALARY is greater than 19000.

017 MOVE SALARY TO AMOUNT

MOVE SALARY TO AMOUNT places the salary amount in the work field.

017 TAKE

TAKE causes all the type 5 parameter fields to be written to a work file (the extract file) for use in later processing.

017500 MOVE 'HOURLY ' TO MESSAGE

MOVE 'HOURLY ' TO MESSAGE places the word HOURLY in the MESSAGE work field when the salary is less than 19000.

017 COMPUTE (SALARY / 52) / 40 AMOUNT

COMPUTE specifies a two-step computation. The result is placed in the AMOUNT work field.

TAKE

This is an implied TAKE that causes all type 5 fields to be written to a work file (the extract file) for use in later processing. This TAKE is supplied by CA Culprit; it is not required in the code.

Complete Code

```
col. 2
▼
IN 200 F 400 PS(TAPE)
REC EMPLOYEE        5   25
REC LAST-NAME      15   15
REC DEPARTMENT    115   25
REC SALARY        160    5  3  DP=2
01OUT  D
01SORT LAST-NAME
013 EMPLOYEE COMPENSATION STATUS
010 MESSAGE '        '
010 AMOUNT DP=2
0151*010 EMPLOYEE SZ=20    HH 'EMPLOYEE' 'NAME'
0151*020 MESSAGE           HH 'STATUS'
0151*030 AMOUNT SZ=10  F$  HH 'SALARY'
017010 IF SALARY LE 19000 500
017    MOVE 'SALARIED' TO MESSAGE
017    MOVE SALARY TO AMOUNT
017    TAKE
017500 MOVE 'HOURLY  ' TO MESSAGE
017    COMPUTE (SALARY / 52) / 40  AMOUNT
```

Result

```
REPORT NO. 01       EMPLOYEE COMPENSATION STATUS    mm/dd/yy PAGE     1
                           EMPLOYEE
                             NAME                          STATUS                      SALARY

                     ROY       ANDALE                      SALARIED                  $33,500.00
                     MICHAEL   ANGELO                      HOURLY                        $8.65
                     HARRY     ARM                         SALARIED                  $46,000.00
                     MONTE     BANK                        SALARIED                  $80,000.00
                     JUNE      BLOOMER                     HOURLY                        $7.21
                     CHARLES   BOWER                       SALARIED                  $38,500.00
                     C.        BREEZE                      SALARIED                  $38,000.00
                     RALPH     TYRO                        SALARIED                  $20,000.00
                     RICHARD   WAGNER                      SALARIED                  $47,000.00
                     ROGER     WILCO                       SALARIED                  $80,000.00
                     ROBBY     WILDER                      SALARIED                  $90,000.00
                     BETSY     ZEDI                        SALARIED                  $37,000.00
```

Directing Processing Flow

What You Can Do

You can code a repeated procedure just once and direct CA Culprit to repeat it wherever needed.

How to Do It

To direct the processing flow, code:

- The word **PERFORM** on a processing parameter (type 7 or type 8). Type 8 parameters are discussed in chapter "Controlling Total Lines".
- The parameter sequence number where processing of the repetitive statements starts.
- The word **RETURN** at the end of the block of repetitive statements. Keep the related PERFORM/RETURN within the same parameter type.

Demonstration

Objective

This report calculates employee bonuses based upon individual salary and longevity.

The repetitive computation based on longevity is executed by using PERFORM/RETURN statements.

Parameters

```
017    IF SALARY GT 15000 100
017    COMPUTE SALARY X 0.02  BONUS
017    PERFORM 500
```

100 directs processing to sequence line 100 when SALARY is greater than $15,000.

PERFORM 500 directs processing to sequence line 500 to calculate the longevity factor.

```
017    IF BONUS LT 500  010
017    MOVE 500 TO BONUS
017010     TAKE
```

010 directs processing to sequence line 010 if the calculated bonus is less than $500.

TAKE causes the type 5 line to be extracted.

```
017100 IF SALARY GT 25000  200
017    COMPUTE SALARY X 0.03  BONUS
017    PERFORM 500
```

200 directs processing to sequence line 200 when SALARY is greater than $25,000.

PERFORM 500 directs processing to sequence line 500 to calculate the longevity factor.

```
017    IF BONUS LT 1200  110
017    MOVE 1200 TO BONUS
017110     TAKE
```

110 directs processing to sequence line 110 if the calculated bonus is less than $1200.

TAKE causes the type 5 line to be extracted.

017 PERFORM 500

PERFORM 500 directs processing to sequence line 500 to calculate the longevity factor.

```
017500 IF START-YEAR LT 81  510
017    BONUS + 100 BONUS
017    RETURN
017510 BONUS + 300  BONUS
017520 RETURN
```

500 tests START-YEAR. Employees who started before 1981 receive an additional $300 bonus. Those starting after 1981 receive an additional $100 bonus.

017**520 RETURN** directs processing back to the statement following the last PERFORM statement executed.

Complete Code

```
col. 2
▼
IN 200 F 400 PS(TAPE)
REC EMPLOYEE        5   25
REC LAST-NAME      15   15
REC START-YEAR     97    2  2
REC SALARY        160    5  3  DP=2
01SORT LAST-NAME
013 EMPLOYEE BONUS REPORT
010 BONUS DP=2
0151*010 EMPLOYEE  SZ=20     HH 'EMPLOYEE' 'NAME'
0151*020 SALARY    SZ=10  F$ HH '   SALARY'
0151*030 BONUS     SZ=7   F$ HH ' BONUS'
017    IF SALARY GT 15000 100
017    COMPUTE SALARY X 0.02  BONUS
017    PERFORM 500
017    IF BONUS LT 500  010
```

```
017    MOVE 500 TO BONUS
017010     TAKE
017100 IF SALARY GT 25000  200
017    COMPUTE SALARY X 0.03  BONUS
017    PERFORM 500
017    IF BONUS LT 1200  110
017    MOVE 1200 TO BONUS
017110     TAKE
017200 COMPUTE SALARY X 0.04  BONUS
017    PERFORM 500
017    IF BONUS LT 1800  210
017    MOVE 1800 TO BONUS
017210 TAKE
017500 IF START-YEAR LT 81  510
017    BONUS + 100 BONUS
017    RETURN
017510 BONUS + 300  BONUS
017520 RETURN
```

Result

```
REPORT NO. 01        EMPLOYEE BONUS REPORT          mm/dd/yy PAGE     1
                          EMPLOYEE
                            NAME                                  SALARY                          BONUS

                      ROY       ANDALE                          $33,500.00                    $1,640.00
                      MICHAEL   ANGELO                          $18,000.00                      $840.00
                      HARRY     ARM                             $46,000.00                    $1,800.00
                      MONTE     BANK                            $80,000.00                    $1,800.00
                      JUNE      BLOOMER                         $15,000.00                      $500.00
                      CHARLES   BOWER                           $38,500.00                    $1,800.00
                      C.        BREEZE                          $38,000.00                    $1,800.00
                       RALPH     TYRO                            $20,000.00                      $900.00
                      RICHARD   WAGNER                          $47,000.00                    $1,800.00
                      ROGER     WILCO                           $80,000.00                    $1,800.00
                      ROBBY     WILDER                          $90,000.00                    $1,800.00
                      BETSY     ZEDI                            $37,000.00                    $1,780.00

                                                              $2,522,500.00                   $81,950.00
```

Chapter 7: Generating Reports From Database Files

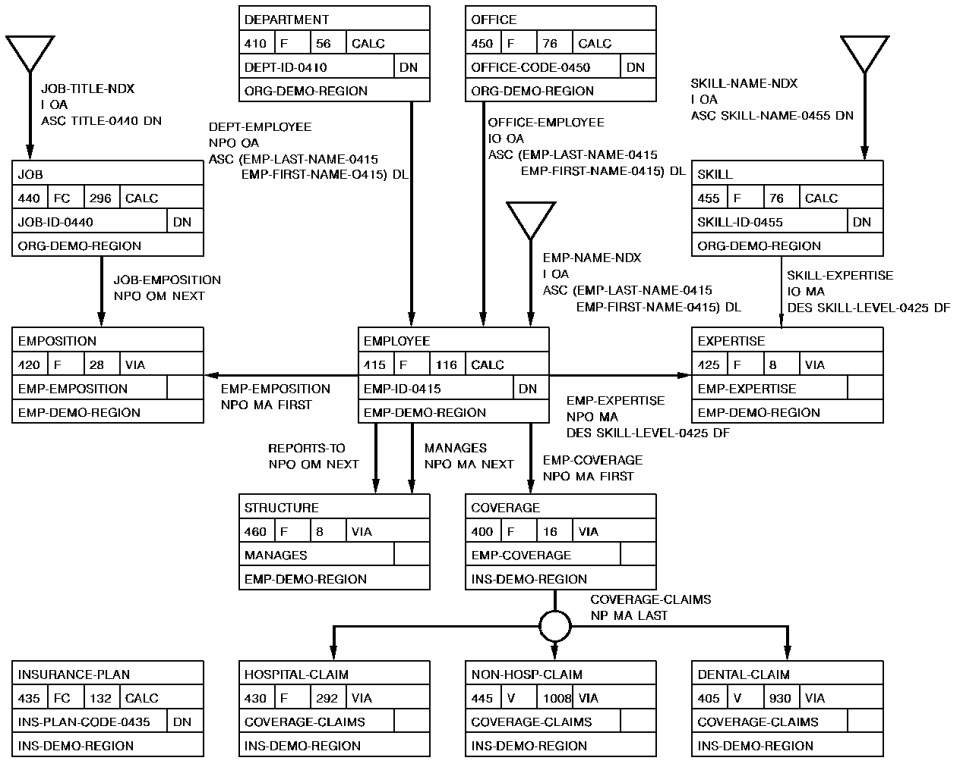
This section contains the following topics:

Introduction

CA Culprit reports can be written from data stored in a database as well as from data stored in standard files.

You need to obtain the following information about your CA IDMS/DB database before you code your report:

- The **data dictionary name**, if you are not using the primary dictionary of your installation
- The name of the **subschema** that describes the database record types and fields that CA Culprit accesses to build the report
- A **data structure diagram**, similar to that shown in the following figure



Listing Data

What You Can Do

You can list related occurrences of records in the database.

How to Do It

To access the database, code:

1. A **DATABASE** parameter with the **DICTNAME=** option if you are using an alternate dictionary
2. An **INPUT** parameter with the following information:
   a. **DB** to specify that the report is accessing a database
   b. **SS=** with the name of the subschema you are using
   c. The path name (PATH-ID)
   d. The name of each record as it is encountered on the path
3. **Type 5** parameters with appropriate field names (as listed in the subschema)

Note: CA Culprit automatically generates REC parameters from the definitions stored in the data dictionary. REC parameters do not have to be coded unless you want field names or data types that are different from those given in the subschema.

Demonstration

Objective

This report lists all employee name, ID, start date, and job title information stored in the Personnel database. Any employee having more than one job title in the course of employment is listed each time the job title changes. Numeric fields are not edited.

Parameters

DATABASE DICTNAME=DOCUDICT

DATABASE specifies the database parameter. If used, it must always be the first parameter.

DICTNAME=DOCUDICT specifies DOCUDICT as the dictionary used for the report.

IN DB SS=EMPSS01

DB specifies a database as the data source.

SS=EMPSS01 specifies EMPSS01 as the subschema used.

PATHAA EMPLOYEE EMPOSITION JOB

PATH specifies the PATH parameter.

AA names the path.

EMPLOYEE EMPOSITION JOB specifies the related database records used as a path through the database.

```
0151*010 EMP-NAME-0415
0151*020 EMP-ID-0415
0151*030 START-DATE-0420
0151*040 TITLE-0440
```

The field names are the same as those used in the database.

Complete Code

```
col. 2
▼
DATABASE DICTNAME=DOCUDICT
IN DB SS=EMPSS01
PATHAA EMPLOYEE EMPOSITION JOB
010UT 80 D
013 EMPLOYEE LISTING
0151*010 EMP-NAME-0415          HH ' ' 'EMPLOYEE' 'NAME'
0151*020 EMP-ID-0415             HH 'EMPLOYEE' 'ID'
0151*030 START-DATE-0420        HH 'START' 'DATE'
0151*040 TITLE-0440              HH 'JOB' 'TITLE'
```

Result

```
REPORT NO. 01       EMPLOYEE LISTING           mm/dd/yy PAGE     1

             EMPLOYEE            EMPLOYEE    START            JOB
               NAME                ID        DATE           TITLE

    KATHERINE O'HEARN               23      790505    PROGRAMMER/ANALYST
    KATHERINE O'HEARN               23      780504    PROGRAMMER TRAINEE
    ROBBY     WILDER               472      790716    DIR CORP CONFUSION
    BURT      LANCHESTER           301      800203    RAINMAKER
    BURT      LANCHESTER           301      770203    RAINMAKER
    BURT      LANCHESTER           301      750203    RAINMAKER
    VLADIMIR  HEAROWITZ             27      810909    PROGRAMMER/ANALYST
    THEMIS    PAPAZEUS             471      820101    DIR WEATHER
    THEMIS    PAPAZEUS             471      780907    MGR BRAINSTORMING
    MONTE     BANK                   7      780430    MGR PUBLIC RELATIONS
    CAROLYN   CROW                334      790617    RAINDANCE CONSULTANT
    CAROL     MCDOUGALL            127      800607    PASTE-UP ARTIST
    JULIE     JENSEN                19      820929    PROGRAMMER/ANALYST
```

Using Logical Records

What You Can Do

Logical records allow reports to be created from data stored in the database with no concern for where the information is located. All you need to know is the name of the logical record and the fields contained in the record.

How to Do It

When using logical records, code:

1. A **DATABASE** parameter with the DICTNAME= option if an alternate dictionary is being used
2. An **INPUT DB** parameter with the SS= keyword and the subschema name
3. **Type 5** parameters with appropriate field names

Demonstration

Objective

This report lists employee information from data contained in the logical record EMP-JOB-LR.

Parameters

REC START-DATE 79 6 2

REC START-DATE redefines the date field as numeric to allow automatic formatting.

PATHAA EMP-JOB-LR

EMP-JOB-LR is the logical record containing data from the database.

01OUT D

D suppresses totaling of the EMP-ID-0415 field.

Complete Code

```
col. 2
▼
REC START-DATE  79  6  2
PATHAA EMP-JOB-LR
010UT D
013 EMPLOYEE LISTING
0151*005 EMP-ID-0415            HH 'ID'
0151*010 EMP-NAME-0415          HH ' ' 'EMPLOYEE' 'NAME'
0151*020 TITLE-0440             HH 'JOB TITLE'
0151*030 START-DATE       FD    HH 'START DATE'
```

Result

```
REPORT NO. 01       EMPLOYEE LISTING           mm/dd/yy PAGE     1

                                          EMPLOYEE
                ID                          NAME                      JOB TITLE          START DATE

                 23                  KATHERINE O'HEARN            PROGRAMMER/ANALYST       79/05/05
                 23                  KATHERINE O'HEARN            PROGRAMMER TRAINEE       78/05/04
                472                  ROBBY     WILDER             DIR CORP CONFUSION       79/07/16
                301                  BURT      LANCHESTER         RAINMAKER                80/02/03
                301                  BURT      LANCHESTER         RAINMAKER                77/02/03
                301                  BURT      LANCHESTER         RAINMAKER                75/02/03
                 27                  VLADIMIR  HEAROWITZ          PROGRAMMER/ANALYST       81/09/09
                471                  THEMIS    PAPAZEUS           DIR WEATHER              82/01/01
                471                  THEMIS    PAPAZEUS           MGR BRAINSTORMING        78/09/07
                  7                  MONTE     BANK               MGR PUBLIC RELATION      78/04/30
                334                  CAROLYN   CROW               RAINDANCE CONSULTAN      79/06/17
                127                  CAROL     MCDOUGALL          PASTE-UP ARTIST          80/06/07
                 19                  JULIE     JENSEN             PROGRAMMER/ANALYST       82/09/29
```

Selective Processing

What You Can Do

Data that meets specified criteria can be selected for a report by applying selection criteria to logical records.

How to Do It

Data can be selected:

1. With conditional statements set up by a **WHERE** clause. This retrieves only those records with a job ID equal to 3051.
2. By searching for defined values with **CONTAINS** or **MATCHES** patterns:
   - Retrieves employee records where the character set CAS appears somewhere in the name.
   - Retrieves employee records where the first three characters of the employee name are CAS.
   - Retrieves employee records where names start with CA followed by any alphabetic character.
   - Retrieves employee records where ids start with 02 followed by any two digits.

Demonstration

Objective

This report lists information about those employees with both the word ENTRY in their job title and ids in the ranges 0001 to 0048 and 0999 to 9999.

Parameters

```
PATHAA EMPLOYEE-TABLE WHERE
(EMP-ID-0415 LE '0048' OR
*   EMP-ID-0415 GT '0999')
*   AND DEPT-ID-0410 GT '1000'
```

EMPLOYEE-TABLE names the logical record containing database data.

WHERE forms a compound conditional statement to specify the criteria for record retrieval.

***** specifies a continuation line.

Complete Code

```
 col. 2
 ▼
 DATABASE DICTNAME=DOCUDICT
 IN DB SS=EMPSS09
 PATHAA EMPLOYEE-TABLE WHERE (EMP-ID-0415 LE '0048' OR
*                        EMP-ID-0415 GT '0999')
*                  AND DEPT-ID-0410 GT '1000'
 01OUT D
 013 EMPLOYEE LISTING
 0151*005 EMP-ID-0415            HH 'ID'
 0151*010 EMP-NAME-0415          HH ' ' 'EMPLOYEE' 'NAME'
 0151*020 DEPT-ID-0410           HH 'DEPT ID'
```

Result

```
REPORT NO. 01       EMPLOYEE LISTING           mm/dd/yy PAGE     1

                                                 EMPLOYEE
                        ID                         NAME                          DEPT ID

                         7                    MONTE     BANK                       4000
                         4                    HERBERT   CRANE                      3200
                        24                    JANE      DOUGH                      3100
                        32                    JANE      FERNDALE                   3200
                        45                    GEORGE    FONRAD                     3200
                        29                    JAMES     GALLWAY                    3100
                         3                    JENNIFER  GARFIELD                   3100
                        28                    PERCY     GRANGER                    3100
                        27                    VLADIMIR  HEAROWITZ                  3100
                        20                    JAMES     JACOBI                     3100
                        19                    JULIE     JENSEN                     3100
                        11                    RUPERT    JENSON                     2000
                        16                    TERENCE   KLWELLEN                   3200
                        31                    HERBERT   LIPSICH                    3200
                        35                    LARRY     LITERATA                   3100
                        15                    RENE      MAKER                      5100
                        23                    KATHERINE O'HEARN                    3100
                        48                    NANCY     TERNER                     3200
                        21                    RALPH     TYRO                       3100
```

Chapter 8: Building and Using Data Tables

This section contains the following topics:

Introduction

CA Culprit is used in a CA IDMS/DB environment to create, retrieve, and manipulate data tables. CA Culprit:

- Creates tables from:
  - Conventional files
  - The database
  - Other tables
- Retrieves tables
- Updates and regenerates tables
- Consolidates tables
- Deletes tables

For a general discussion about tables, see the *CA IDMS ASF User Guide*.

Creating Tables

What You Can Do

You can:

- Create a table from data stored
  - On conventional files (sequential, ISAM, or VSAM)
  - On a database (CA IDMS/DB, IMS, RDMS, or TOTAL)
  - In an already existing table
- Store rows in ascending or descending order
- Find errors in your code by using the data table reports that are automatically generated in the Input Parameter and Run-Time Message Listings of the CA Culprit run

How to Do It

To create a table:

1. **Define the incoming data** using input definition parameters (shown in the table below).
2. **Define the table** using the OUTPUT parameter and the keywords listed in the table below.
3. **Define the columns of the table** using type 5 or type 6 parameters.
4. **Specify special options**, as needed, using the options listed in the table below.

You can find complete descriptions of the parameters and keywords in the *CA Culprit for CA IDMS Reference Guide*.

Required Parameters and Keywords for Creating a Table

If the data source is...	the required parameters and keywords are...
A conventional file (sequential, ISAM, and VSAM)	An INPUT parameter, including the file type (PS, IS, CARD, or VS) REC parameters (at least one) An OUTPUT parameter with: TABLE= TYPE=CREATE USER= PW= CATALOG= Type 5 parameters (at least one) Type 6 parameters to create a totals-only table
A CA IDMS/DB database	A DATABASE PARAMETER with DICTNAME= An INPUT DB SS= parameter A PATH parameter An OUTPUT parameter with: TABLE= TYPE=CREATE USER= PW= CATALOG= Type 5 parameters (at least one) Type 6 parameters to create a totals-only table

If the data source is...	the required parameters and keywords are...
An existing table	An INPUT parameter with: TABLE= TYPE=COPY USER= PW= CATALOG= An OUTPUT parameter with: TABLE= TYPE=CREATE USER= PW= CATALOG= Type 5 parameters (at least one) Type 6 parameters to generate a totals-only table

Options Available when Creating a Table

The option ...	used on this parameter ...	specifies ...
IX=	type 5 or type 6	table row storage indexed in ascending (A) or descending (D) order 0151*001 CUST-NUM IX=A
COLUMN=	type 5 or type 6	absolute field placement for tables extending beyond column 9999 0151 NAME COL=13001
T/D	OUTPUT	a totals-only (T) or a details-only (D) report
COMMENT=' '	OUTPUT	ASF comment field update
AREA=	OUTPUT	ASF area name field update
ONLINE=YES/NO	OUTPUT	Whether to create dialogs and maps for table viewing
DISPLAY=YES/NO	OUTPUT	The ability to retrieve data from the table
LOAD=YES/NO	OUTPUT	The ability to store data on the table
CHANGE=YES/NO	OUTPUT	The ability to update data from the table
ERASE=YES/NO	OUTPUT	The ability to erase rows of data

For more information about ASF, see the *CA IDMS ASF User Guide*.

Demonstration (1): Creating a Table from a Sequential File

Objective

This example creates a table from a sequential file containing customer information. The rows in the table are placed in ascending order based on the customer number (CUST-NUM). Generated data table reports that appear in the Input Parameter and Run Time Message Listing are shown.

Parameters

IN 80 F 4000 PS(TAPE)

IN 80 F 4000 PS(TAPE) defines a sequential input file with fixed length 80- byte records, a block size of 4000 bytes, which is stored on tape.

```
REC CUST-NUM   1  5
REC CUST-NAME 19 20
```

REC parameters define the fields of the sequential file.

```
01OUTPUT TABLE=CUSTOMER- FILE TYPE=CREATE USER=DOC1 PW=DOC1 *CATALOG=ASFDICT
ONLINE=YES
```

OUTPUT identifies the OUTPUT parameter, which specifies options to define the output table.

TABLE=CUSTOMER-FILE names the table. TABLE= must be the first keyword on the OUTPUT parameter.

TYPE=CREATE defines a new table. TYPE= must be the second keyword on the OUTPUT parameter.

USER=DOC1 PW=DOC1 identifies the user and password for signing on to the catalog.

CATALOG=ASFDICT identifies the catalog (dictionary) containing the table definition.

ONLINE=YES creates dialogs and maps to view the table online through ASF.

```
0151*001 CUST-NUM  IX=A
0151*002 CUST-NAME
```

***001** and ***002**, specify the sequence of column placement.

CUST-NUM and **CUST-NAME** are the column names. The fields named on the type 5 parameters determine the data type and column size.

IX=A indexes the rows in ascending order on customer number.

Complete Code

```
 col. 2
 ▼
 REC CUST-NAME 19 20
 01OUTPUT TABLE=CUSTOMER-FILE TYPE=CREATE USER=DOC1 PW=DOC1
*CATALOG=ASFDICT ONLINE=YES
 0151*001 CUST-NUM  IX=A
 0151*002 CUST-NAME
```

Results

```
mm/dd/yy              INPUT PARAMETER LISTING  volser Vnn.n  PAGE     2
********
OUTPUT   DATA TABLE
********
  01 OUT  TABLE-NAME:      CUSTOMER-FILE
          FUNCTION TYPE:   CREATE    DETAILS ONLY          COMMIT:        100
          LR-NAME:         CUSTOMER-FILE                 SUBSCHEMA:  RU000276
          USER:            QAC                           OWNER:      QAC
          CATALOG:         QASFDICT                      SYSCTL:     SYSCTL          LOCATION:
          AREA:            IDMSR-AREA2                   COMMENT:
          SIZE- PRIMARY:             SECONDARY:          MAXIMUM:
          ONLINE: Y        DISPLAY: Y       LOAD: Y      CHANGE: Y         ERASE: Y
********
EDIT     LINE CC COLUMN  VALUE OR FIELD-NAME AND EDIT OPTIONS...
********
  01  5     1       *001   CUST-NUM
  01  5     1       *002   CUST-NAME
 I TABLE SUCCESSFULLY GENERATED: CUSTOMER-FILE
  EXTRACT WILL BE PERFORMED
  PROFILE OPTION IN EFFECT: RELEASE =  6
mm/dd/yy              RUN TIME MESSAGES       volser Vnn.n  PAGE     1

**********  END OF FILE  **************************************************
          17 INPUT RECORDS READ
      DATA TABLE UPDATE STATISTICS
                                                          TABLE           ROWS
       REPORT     FUNCTION         LR-NAME               DEFINITION      STORED
       ______     ________         _______               __________      ______
         01       CRE        CUSTOMER-FILE            GENERATED             17
```

Demonstration (2): Creating a Table from the Database

Objective

This example creates a table from the employee database. Column headings different from the database field names are created by moving field names to work fields. The work field names are specified on the type 5 lines.

Parameters

DATABASE DICTNAME=TSTDICT

DICTNAME=TSTDICT defines the dictionary containing the subschema definition.

IN DB SS=EMPSS01

IN DB SS=EMPSS01 specifies database input and identifies the subschema.

PATHAA EMPLOYEE

PATHAA EMPLOYEE defines the database path.

```
010UTPUT TABLE=EMPLOYEES TYPE=CREATE USER=DOC1 PW=DOC1 *CATALOG=ASFDICT ONLINE=YES
```

OUTPUT identifies the OUTPUT parameter, which specifies options to define the output table.

TABLE=EMPLOYEES names the table. TABLE= must be the first keyword on the OUTPUT parameter.

TYPE=CREATE specifies that a new table is to be defined. TYPE= must be the second keyword on the OUTPUT parameter.

USER=DOC1 PW=DOC1 identifies the authorized user and password for signing on to the catalog.

CATALOG=ASFDICT identifies the catalog containing the table definition.

ONLINE=YES creates dialogs and maps to view the table online through ASF.

```
077010 MOVE EMP-ID-0415 TO ID 077     MOVE EMP-NAME-0415 TO NAME
```

MOVE places the database fields into work fields having different names. (The work-field names match those listed on type 5 parameters.)

Complete Code

```
 col. 2
 ▼
 DATABASE DICTNAME=TSTDICT
 IN DB SS=EMPSS01,EMPSCHM,100
 PATHAA EMPLOYEE
 070UTPUT TABLE=EMPLOYEES TYPE=CREATE USER=DOC1 PW=DOC1
*CATALOG=ASFDICT ONLINE=YES
 070 ID
 070 NAME '                          '
 0751*001 ID
 0751*002 NAME
 077010 MOVE EMP-ID-0415 TO ID
 077    MOVE EMP-NAME-0415 TO NAME
```

Demonstration (3): Creating a Table from an Existing Table

Objective

This example selects all part-time workers from a table (ALL-EMPLOYEES) and creates a new table (PART-TIME) for part-time employees.

The required keywords for the INPUT parameter are similar to those shown earlier in this chapter for the OUTPUT parameter.

Parameters

```
INPUT TABLE=ALL- EMPLOYEES TYPE=COPY USER=DOC1 PW=DOC1 *CATALOG=ASFDICT
```

INPUT identifies the incoming data.

TABLE=ALL-EMPLOYEES names the table. TABLE= must be the first keyword on the INPUT parameter.

TYPE=COPY copies the EMPLOYEE table. TYPE= must be the second keyword on the INPUT parameter.

USER=DOC1 PW=DOC1 identifies the user and password for signing on to the catalog (dictionary).

CATALOG=ASFDICT identifies the catalog containing the table definition.

SELECT EMPLOYEES WHEN STATUS EQ 'PT'

SELECT retrieves only part-time employees.

```
02OUTPUT TABLE=PART-TIME TYPE=CREATE USER=DOC1 PW=DOC1 *CATALOG=ASFDICT ONLINE=YES
```

OUTPUT identifies the OUTPUT parameter, which includes the CREATE instruction.

TABLE=PART-TIME names the new table. TABLE= must be the first keyword on the OUTPUT parameter.

TYPE=CREATE specifies a new table.

USER=DOC1 PW=DOC1 identifies the authorized user and password for signing on to the catalog.

CATALOG=ASFDICT identifies the catalog (dictionary) containing the table definition.

ONLINE=YES creates dialogs and maps to view the table online through ASF.

02SORT NAME

SORT alphabetizes the names.

Complete Code

```
 DATABASE DICTNAME=TSTDICT
 INPUT TABLE=ALL-EMPLOYEES TYPE=COPY USER=DOC1 PW=DOC1
*CATALOG=ASFDICT
 SELECT EMPLOYEES WHEN STATUS EQ 'PT'
 02OUTPUT TABLE=PART-TIME TYPE=CREATE USER=DOC1 PW=DOC1
*CATALOG=ASFDICT ONLINE=YES
 02SORT NAME
 0251*001 ID
 0251*002 NAME
```

Demonstration (4): Creating a Totals-only Table

Objective

In this example, the output table contains a summary of monthly receipts for each branch of a bank. Type 6 parameters define the name, size, and position of the table columns. One type 5 parameter accumulates daily receipts.

```
01OUT  T ...
*       ONLINE=YES
*       COMMENT='TOTAL MONTHLY RECEIPTS FOR EACH BRANCH'
```

T specifies a totals-only report.

ONLINE=YES directs ASF to create dialogs and maps for this data table.

COMMENT=' ... ' updates the comment field on the ASF Table Definition screen.

```
0161*001  BRANCH  FZ
0161*002  MONTH   FZ
0161*003  YEAR    FZ
0161*004  MONTHLY-RECEIPTS SZ=5 FP DP=2
```

0161*... parameters define the name, size, and position of the table columns.

FZ and **FP** specify zoned and packed numeric fields respectively.

Complete Code

```
 IN     80   F   80
 REC    DAILY-RECEIPTS  8 10  2  DP=2
 REC    DAY      18  2  2
 REC    MONTH    20  2  2
 REC    YEAR     22  2  2
 REC    BRANCH   24  2  2
 01OUT  T  TABLE=RECEIPT-TOTALS TYPE=CREATE USER=DOC1 PW=DOC1
*          CATALOG=ASFDICT ONLINE=YES
*          COMMENT='TOTAL MONTHLY RECEIPTS FOR EACH BRANCH'
 01SORT BRANCH  YEAR  MONTH +
 010    MONTHLY-RECEIPTS
 0151*000  DAILY-RECEIPTS
 0161*001  BRANCH     FZ
 0161*002  MONTH      FZ
 0161*003  YEAR       FZ
 0161*004  MONTHLY-RECEIPTS  SZ=5  FP  DP=2
 018001    IF LEVL EQ 2   DROP
 018       MOVE DAILY-RECEIPTS TO MONTHLY-RECEIPTS
```

Retrieving Data Tables

What You Can Do

You can retrieve a copy of your data table and print a listing or a report based on the table contents. The table can also be viewed or modified with ASF.

How to Do It

A data table is retrieved by coding the following statements:

1. An **INPUT** parameter that specifies at least the following information:
   a. The name of the table being copied (**TABLE=**)
   b. The copy function (**TYPE=COPY**)
   c. A valid user ID (**USER=**)

      If you are not the table owner, you must have authorization to access the table.
   d. A valid password (**PW=**)
   e. The catalog (dictionary) in which the table definition resides (**CATALOG=**)

Demonstration

Objective

This report retrieves and prints a listing of the part-time employees from the PART-TIME table, which was created earlier in this chapter.

Parameters

```
INPUT TABLE=PART-TIME
TYPE=COPY USER=DOC1
PW=DOC1
*CATALOG=ASFDICT
```

INPUT identifies the INPUT parameter, which includes the COPY instruction.

TABLE=PART-TIME specifies the table used for input. TABLE= must be the first keyword on the INPUT parameter.

TYPE=COPY specifies copying the PART-TIME table. TYPE= must be the second keyword on the INPUT parameter.

USER=DOC1 PW=DOC1 identifies the user and password for signing on to the catalog.

CATALOG=ASFDICT identifies the catalog that contains the table definition.

01OUTPUT 60

OUTPUT 60 specifies printed output with 60 character lines.

Complete Code

```
 col. 2
 ▼
 INPUT TABLE=PART-TIME TYPE=COPY USER=DOC1 PW=DOC1
*CATALOG=ASFDICT
 01OUTPUT 60
 013 PART-TIME EMPLOYEE LISTING
 0151*010 ID                    HH 'EMPLOYEE ID'
 0151*020 NAME                  HH 'EMPLOYEE NAME'
```

Result

```
REPORT NO. 01    PART-TIME EMPLOYEE LIST mm/dd/yy PAGE     1
              EMPLOYEE ID     EMPLOYEE NAME

                  476      BETSY     ZEDI
                   51      CYNTHIA   JOHNSON
                   49      DOUGLAS   KAHALLY
                  457      HARRY     ARM
```

Modifying Data Tables

What You Can Do

You can:

- **Add** rows of data to an existing table
- **Replace** rows of data in an existing table
- **Delete** a table
- **Generate** a modified table
- Use tables located in different dictionaries, DDS nodes, or central versions

How to Do It

When modifying an existing table, specify:

1. **The source of the input data** on the INPUT parameter
2. **The modified table name** and the function to be performed (TYPE=ADD/REPLACE/DELETE/GENERATE) on the OUTPUT parameter
3. **The columns of the table** with type 5 or type 6 parameters

   Note: At least one type 5 parameter is required. A dummy type 5 parameter can be used when necessary.

Demonstration (1): Adding Rows to an Existing Table

Objective

This example adds the contents of the NEW-CUSTOMER table to the CUSTOMER-LIST table. Note that the type 5 parameters must match the column definitions for the CUSTOMER-LIST table.

Parameters

```
INPUT TABLE=NEW-CUSTOMERS
TYPE=COPY  USER=DOC1 PW=DOC1
*         CATALOG=ASFDICT
```

INPUT identifies the INPUT parameter, which includes the COPY instruction.

TABLE=NEW-CUSTOMERS specifies the table that will be added to CUSTOMER-LIST.

TYPE=COPY specifies copying rows from the input table NEW-CUSTOMERS.

```
05OUTPUT TABLE=CUSTOMER-LIST
TYPE=ADD USER=DOC1 PW=DOC1
*         CATALOG=ASFDICT
```

OUTPUT identifies the OUTPUT parameter, which includes the ADD instruction.

TABLE=CUSTOMER-LIST specifies the table receiving the additional rows.

TYPE=ADD adds new rows to the CUSTOMER-LIST table.

```
0551*001 CUST-NUMBER
0551*002 CUST-NAME
0551*003 CUST-ADDRESS
```

1, **2**, and **3** define three table columns.

Complete Code

```
 col. 2
 ▼
 INPUT TABLE=NEW-CUSTOMERS TYPE=COPY USER=DOC1 PW=DOC1
*         CATALOG=ASFDICT
 05OUTPUT TABLE=CUSTOMER-LIST TYPE=ADD USER=DOC1 PW=DOC1
*        CATALOG=ASFDICT
 0551*001 CUST-NUMBER    FZ   SZ=5
 0551*002 CUST-NAME
 0551*003 CUST-ADDRESS
```

Results

The contents of NEW-CUSTOMER:

```
25060SUSAN     ARMITAGE  56725 OAK STREET    PITTSFIELD     MA02956
27056ALLEN     KOHN      22651 POLK STREET   SAN FRANCISCO  CA09809
39557HENRY     TRUMBLE    2102 WASHINGTON ST BROOKLINE      MA02147
30415MARY      SMYTH      5999 SANDY LANE    LONG BEACH     CA09743
33480VICKY     KNIGHT     5678 PINE ROAD     PORTLAND       ME06895
69879BRUNO     THOR      22002 PEACHS AVE    FRESNO         CA96543
99983ELLEN     SANDS         1 APPLE ORCHARD BISCOE         NC64321
```

The contents of CUSTOMER-LIST before the ADD modification:

```
15060SHARON    ARMSTRONG    25 CEDAR STREET  WAYLAND        MA02756
21056AMOS      JOHNSON   22651 MASS AVENUE   SAN FRANCISCO  CA09801
29557IRWIN     TRIMBLE     102 COLBOURNE ST  BROOKLINE      MA02147
30115IRMA      DOONES     5656 SANDHILL ROAD OCEAN CITY     CA09743
33470VICTORIA  DAY        1234 OAK HILL ROAD EVERGREEN      MI07895
69876BRUCE     THORPE    11002 PEACHTREE LA  ATLANTA        GA76543
99083HELEN     SANTOVEC      3 APPLE ORCHARD CHARLOTTE      NC64321
```

The contents of CUSTOMER-LIST after the ADD modification:

```
15060SHARON    ARMSTRONG    25 CEDAR STREET  WAYLAND        MA02756
21056AMOS      JOHNSON   22651 MASS AVENUE   SAN FRANCISCO  CA09801
29557IRWIN     TRIMBLE     102 COLBOURNE ST  BROOKLINE      MA02147
30115IRMA      DOONES     5656 SANDHILL ROAD OCEAN CITY     CA09743
33470VICTORIA  DAY        1234 OAK HILL ROAD EVERGREEN      MI07895
69876BRUCE     THORPE    11002 PEACHTREE LA  ATLANTA        GA76543
99083HELEN     SANTOVEC      3 APPLE ORCHARD CHARLOTTE      NC64321
25060SUSAN     ARMITAGE  56725 OAK STREET    PITTSFIELD     MA02956
27056ALLEN     KOHN      22651 POLK STREET   SAN FRANCISCO  CA09809
39557HENRY     TRUMBLE    2102 WASHINGTON ST BROOKLINE      MA02147
30415MARY      SMYTH      5999 SANDY LANE    LONG BEACH     CA09743
33480VICKY     KNIGHT     5678 PINE ROAD     PORTLAND       ME06895
69879BRUNO     THOR       2002 PEACHS AVE    FRESNO         CA96543
99983ELLEN     SANDS         1 APPLE ORCHARD BISCOE         NC64321
```

Demonstration (2): Replacing Rows of an Existing Table

Objective

This example updates customer numbers by replacing the rows in the NEW-CUSTOMERS table with data read in from a sequential file. Note that the type 5 parameters must match the column definitions for the CUSTOMER-LIST table.

Parameters

IN 80

IN 80 defines an 80-byte sequential file containing the new customer numbers.

```
05OUTPUT TABLE=NEW- CUSTOMERS
TYPE=REPLACE  USER=DOC1 PW=DOC1
*      CATALOG=ASFDICT
```

OUTPUT identifies the OUTPUT parameter, which includes the REPLACE instruction.

TABLE=NEW-CUSTOMERS names the table in which data is replaced.

TYPE=REPLACE replaces existing table rows with new data.

```
0551*001 CUST-NUMBER
0551*002 CUST-NAME
0551*003 CUST-ADDRESS
```

1, **2**, and **3** define three table columns.

Complete Code

```
 col. 2
 ▼
 IN 80
 REC CUST-NUMBER    1   5  2
 REC CUST-NAME      6  20
 REC CUST-ADDRESS  26  42
 05OUTPUT TABLE=NEW-CUSTOMERS TYPE=REPLACE USER=DOC1 PW=DOC1
*      CATALOG=ASFDICT
 0551*001 CUST-NUMBER
 0551*002 CUST-NAME
 0551*003 CUST-ADDRESS
```

Results

Previous contents of NEW-CUSTOMER:

```
25060SUSAN     ARMITAGE  56725 OAK STREET    PITTSFIELD     MA02956
27056ALLEN     KOHN      22651 POLK STREET   SAN FRANCISCO  CA09809
39557HENRY     TRUMBLE    2102 WASHINGTON ST BROOKLINE      MA02147
30415MARY      SMYTH      5999 SANDY LANE    LONG BEACH     CA09743
33480VICKY     KNIGHT     5678 PINE ROAD     PORTLAND       ME06895
69879BRUNO     THOR      22002 PEACHS AVE    FRESNO         CA96543
99983ELLEN     SANDS         1 APPLE ORCHARD BISCOE         NC64321
```

The contents of NEW-CUSTOMERS after REPLACE:

```
New
 data
  |
  ▼
251  SUSAN     ARMITAGE  56725 OAK STREET    PITTSFIELD     MA02956
272  ALLEN     KOHN      22651 POLK STREET   SAN FRANCISCO  CA09809
393  HENRY     TRUMBLE    2102 WASHINGTON ST BROOKLINE      MA02147
304  MARY      SMYTH      5999 SANDY LANE    LONG BEACH     CA09743
335  VICKY     KNIGHT     5678 PINE ROAD     PORTLAND       ME06895
696  BRUNO     THOR      22002 PEACH AVE     FRESNO         CA96543
997  ELLEN     SANDS         1 APPLE ORCHARD BISCOE         NC64321
```

Demonstration (3): Deleting a Table

Objective

This example deletes the definition and data of a table containing old customer information.

IN 80

IN 80 is used to meet the CA Culprit INPUT parameter requirement.

```
05OUTPUT TABLE=OLD- CUSTOMERS
TYPE=DELETE  USER=DOC1 PW=DOC1
         CATALOG=ASFDICT
```

OUTPUT identifies the OUTPUT parameter, which includes the DELETE instruction.

TABLE=OLD-CUSTOMERS names the table to be deleted.

TYPE=DELETE specifies deleting the table.

```
0551*001 ' '
```

5 specifies a type 5 parameter, which is used to meet CA Culprit's coding requirements.

057001 DROP

DROP on the type 7 parameter stops unnecessary input processing.

Complete Code

```
 col. 2
 ▼
 IN 80
 REC INFIELD  1  80
 05OUTPUT TABLE=OLD-CUSTOMERS TYPE=DELETE USER=DOC1 PW=DOC1
*       CATALOG=ASFDICT
 0551*001 ' '
 057001   DROP
```

Results

```
mm/dd/yy             RUN TIME MESSAGE0       volser Vnn.n  PAGE     1

**********  END OF FILE  ***************************************************
          7 INPUT RECORDS READ
      DATA TABLE UPDATE STATISTICS
                                                          TABLE           ROWS
       REPORT     FUNCTION         LR-NAME               DEFINITION      STORED
       ______     ________         _______               __________      ______
         05       DEL        OLD-CUSTOMERS            DELETED                0
```

Demonstration (4): Regenerating a Table

Objective

This example modifies the existing NEW-CUSTOMERS table so that it can be viewed online through ASF. The ONLINE=YES and the TYPE=GENERATE instructions cause ASF to construct a dialog and regenerate the table.

Parameters

INPUT 80

INPUT is used to meet CA Culprit's INPUT parameter requirement.

```
05OUTPUT TABLE=NEW-
CUSTOMERS TYPE=GENERATE
USER=DOC1 PW=DOC1
*      CATALOG=ASFDICT
ONLINE=YES
COMMENT='REGENERATED WITH CA Culprit'
```

OUTPUT identifies the OUTPUT parameter, which includes the GENERATE instruction.

TABLE=NEW-CUSTOMERS identifies the table to be generated.

TYPE=GENERATE regenerates the table.

ONLINE=YES creates a dialog to allow viewing of NEW-CUSTOMERS online with ASF.

COMMENT='REGENERATED WITH CA Culprit specifies the ASF comment line text for the table.

```
055*001 ' '
```

5 specifies a type 5 parameter to meet the CA Culprit coding requirements.

057001 DROP

DROP on the type 7 parameter stops unnecessary input processing.

Complete Code

```
 col. 2
 ▼
 INPUT 80
 REC FIELDA   1   1
 05OUTPUT TABLE=NEW-CUSTOMERS TYPE=GENERATE USER=DOC1 PW=DOC1
*      CATALOG=ASFDICT ONLINE=YES COMMENT='REGENERATED WITH CA-Culprit'
 055*001 ' '
 057001   DROP
```

Results: Viewing the Table Through ASF

Before regenerating the table:

The ASF ASEL Screen

```
                    CA                    volser
ASEL   CA - Automatic System Facility  nn.n     ** Activity Selection **
DC560017 NO DIALOG EXISTS FOR GENERATED TABLE

User Name: DOC1

_ PF1 - Help                  _ PF5 - Select Data     _ PF13  - Query
_ PF2 - Define Table          _ PF7 - Page Backward   _ PF14  - Signon
_ PF3 - Load Data             _ PF8 - Page Forward    _ PA1   - Prior Level
_ PF4 - Display/Change Data   _ PF9 - Passkey         _ CLEAR - Leave ASF
                                                      _ PF15  - Administrator

Table Name.:
Table Owner:
                                                              Page:  1  of  1

_ APPLICANT
_ EMPLOYEES
_ JOB
_ JOBS AND APPLICANTS
```

After regenerating the table:

The ASF TDEF Screen

```
                    CA                                                volser
TDEF   CA - Automatic System Facility  nn.n      ** Table Definition **
DC560005 MODIFY AND/OR SELECT NEXT ACTIVITY

       _ PF1 - Help                    _ PF4 - Extended Table Definition
       _ PF2 - Define Columns          _ PF5 - Delete Table Definition
       _ PF3 - Generate                _ PF6 - Message Screen

Table Name.: NEW-CUSTOMERS
Table Owner: DOC1                                 Defn Number:    190
View/Stored: STORED                              Status.....: GENERATED
Comments...:REGENERATED WITH Culprit

                          Table Derivation
Source Table #1
 Table Name.:
 Table Owner:

Source Table #2
 Table Name.:
 Table Owner:

Column #1:
Column #2                                  Where Column #1 EQ Column #2
```

The first row of data in the table as viewed online through ASF:

Output Online

```
                      CA
PF1 = ADD; PF2 = CHANGE; PF3 = DELETE; ENTER = NEXT; CLEAR = EXIT
 NEW CUSTOMERS
 CUST-NUMBER                    251
 CUST-NAME                      SUSAN     ARMITAGE
 CUST-ADDRESS                   56725 OAK STREET    PITTSFIELD     MA02956
```

Consolidating Tables

What You Can Do

You can process data from more than one input table in a single CA Culprit run by reading the data tables as one logical file with the TYPE=CONSOLIDATION option. In addition, rows can be selected with WHERE or SELECT/BYPASS criteria.

Table data can be consolidated from:

- The same dictionary
- Different dictionaries
- Different DDS nodes
- Different central versions

How to Do It

To consolidate tables:

1. **Check the column definitions** of each table to be used. The definitions must be identical.
2. **Define each table on an INPUT parameter** using the keywords listed in the table below.
   - TYPE=COPY must appear on the first INPUT parameter to identify the primary data table.

     The primary data table is the source for:

     - The generated PATH parameter and all necessary REC parameters for the run
     - The specification of selection criteria (SELECT/BYPASS or the WHERE clause)
   - TYPE=CONSOL must appear on subsequent INPUT parameters to identify the secondary data tables.

     The order of appearance of the INPUT parameters determines the processing order of the tables.
3. **Specify the output** by using:
   - An OUTPUT parameter, if needed
   - At least one type 5 parameter
   - Type 6, type 7, and type 8 parameters as needed.
4. **Reference tables**, if needed, in a table consolidation run by using the reserved words shown in the table below. These reserved words are valid on SELECT/BYPASS, edit, SORT, and process parameters.

Required Keywords:

TABLE=

The table name

TYPE=COPY/CONSOL

The primary and secondary tables to be consolidated

USER=

The individual having authority to sign on to the catalog (dictionary)

PW=

The user's password

OWNER=

The owner of the table

CATALOG=

The catalog or dictionary containing the table definition

Optional Keywords:

LOCATION=

Overrides DATABASE DICTNODE=

SYSCTL= (z/OS and OS/390 Users)

Names the SYSCTL file that controls the system accessing the table.

VALIDATE=FIRST/ALL

Compares column definitions of secondary tables to definitions of the primary table.

WHERE

Applies WHERE clause criteria to all tables being consolidated.

Reserved Words to Reference Tables

Reserved word	What it is	What it does
TABLE-ID	A 3-byte zoned decimal field	Indicates the data table currently being accessed
TABLE-NAME	A 56-byte alphanumeric field	Contains the name of the table currently being accessed
SUBSCHEMA-NAME	An 8-byte alphanumeric field	Contains the subschema name of the table being accessed

Demonstration

Objective

This example reads employee data from three tables that reside in different central versions and different dictionaries to produce a selected listing of employees in the data processing departments of three offices.

The SYSCTL= keyword values refer to ddnames that appear in an z/OS job control language stream:

```
//SYSTEM84 DD DSN=DBDC.SYSTEM84.SYSCTL,DISP=SHR
//SYSTEM85 DD DSN=DBDC.SYSTEM85.SYSCTL,DISP=SHR
//SYSTEM86 DD DSN=DBDC.SYSTEM86.SYSCTL,DISP=SHR
```

Parameters

```
INPUT TABLE=BOSTON-
EMPLOYEES TYPE=COPY
USER=DOC1 PW=DOC1
*       OWNER=DRH
CATALOG=ASFDICT
SYSCTL=SYSTEM84
*       WHERE DEPT-ID
EQ '1234'
```

TABLE=BOSTON-EMPLOYEES is the first required keyword on the INPUT parameter and specifies BOSTON-EMPLOYEES as the first table to be retrieved.

TYPE=COPY copies the BOSTON-EMPLOYEES table.

CATALOG=ASFDICT identifies the catalog that contains the table definition.

SYSCTL=SYSTEM84 specifies the central version z/OS that contains ASFDICT. (VM/ESA users should use CVMACH= option.)

WHERE DEPT-ID EQ '1234' specifies selection criteria applicable to all tables read.

```
INPUT TABLE=CHICAGO-
EMPLOYEES TYPE=CONSOL
USER=DOC1 PW=DOC1
*       OWNER=DDR
CATALOG=TSTDICT
SYSCTL=SYSTEM85
```

TABLE=CHICAGO-EMPLOYEES is the first required keyword on the INPUT parameter and specifies CHICAGO-EMPLOYEES as a secondary table.

TYPE=CONSOL specifies consolidation of CHICAGO-EMPLOYEES with BOSTON-EMPLOYEES.

CATALOG=TSTDICT identifies the catalog that contains the table definition.

SYSCTL=SYSTEM85 specifies the central version that contains TSTDICT.

```
INPUT TABLE=DENVER-
EMPLOYEES TYPE=CONSOL
USER=DOC1 PW=DOC1
*       OWNER=ADR
CATALOG=PRODICT
SYSCTL=SYSTEM86
```

TABLE=DENVER-EMPLOYEES is the first required keyword on the INPUT parameter and specifies DENVER-EMPLOYEES as a secondary table.

TYPE=CONSOL specifies consolidation of DENVER-EMPLOYEES with CHICAGO-EMPLOYEES.

CATALOG=PRODICT identifies the catalog that contains the table definition.

SYSCTL=SYSTEM86 specifies the central version that contains PRODICT.

Complete Code

```
 col. 2
 ▼
 INPUT TABLE=BOSTON-EMPLOYEES TYPE=COPY USER=DOC1 PW=DOC1
*       OWNER=DRH CATALOG=ASFDICT SYSCTL=SYSTEM84
*       WHERE DEPT-ID EQ '1234'
 INPUT TABLE=CHICAGO-EMPLOYEES TYPE=CONSOL USER=DOC1 PW=DOC1
*       OWNER=DDR CATALOG=TSTDICT SYSCTL=SYSTEM85
 INPUT TABLE=DENVER-EMPLOYEES TYPE=CONSOL USER=DOC1 PW=DOC1
*       OWNER=ADR CATALOG=PRODICT SYSCTL=SYSTEM86
 010UTPUT D
 013EMPLOYEES IN DATA PROCESSING
 0151*010 TABLE-ID   HH 'TABLE-ID'
 0151*020 TABLE-NAME SZ=20 HH 'TABLE-NAME'
 0151*030 EMP-NAME   HH 'EMPLOYEE'
 0151*040 JOB-TITLE  HH 'TITLE'
```

Result

```
REPORT NO. 01         EMPLOYEES IN DATA PROCESSING    mm/dd/yy PAGE     1
             TABLE-ID                TABLE-NAME                      EMPLOYEE                      TITLE

                 1              BOSTON-EMPLOYEES              JOHN SMYTH                  PROGRAMMER
                 1              BOSTON-EMPLOYEES              MARY JONES                  DBA
                 1              BOSTON-EMPLOYEES              JOE GREEN                   PROGRAMMER
                 2              CHICAGO-EMPLOYEES             JOAN WHITE                  DATA ENTRY CLERK
                 2              CHICAGO-EMPLOYEES             JAN HUBBARD                 DBA
                 2              CHICAGO-EMPLOYEES             DAVID KELLY                 REGIONAL MGR
                 3              DENVER-EMPLOYEES              MEL SMITH                   DATA ENTRY CLERK
                 3              DENVER-EMPLOYEES              MARIO JENI                  DBA
```

Table Extraction Statistics

```
mm/dd/yy              RUN TIME MESSAGES        volser Vnn.n  PAGE     1

         DATA TABLE EXTRACTION STATISTICS                                          ROWS
                                                                                    OBTAINED
                    TABLE-NAME                                        TABLE-ID     FROM IDMS/DB
                    __________                                        ________     ____________
          BOSTON-EMPLOYEES                                             001              3
          CHICAGO-EMPLOYEES                                            002              3
          DENVER-EMPLOYEES                                             003              2
                                                                                       _____
          CONSOLIDATION TOTALS                                                         8

**********  END OF FILE  **************************************************
           8 INPUT RECORDS READ
```

Chapter 9: Totals Processing Techniques

This section contains the following topics:

Introduction

CA Culprit processes data in two input/output phases. The first phase executes type 7 logic against the input data and outputs a temporary work file (the extract file). The second phase reads the extract file after it has been sorted and performs final calculations on accumulated totals, executes control breaks, and generates report output.

Within the CA Culprit final processing phase you can perform calculations on accumulated totals, obtain multiple level subtotals, and access current values of work fields that do not appear on SORT or type 5 parameters.

A detailed description of the CA Culprit final processing phase is presented in Appendix G.

Calculations on Accumulated Totals

What You Can Do

You can obtain subtotals, perform calculations on totals, and perform logical operations on totals.

How to Do It

Use:

- **Control breaks** on the SORT parameter to obtain subtotals
- **Type 8** logic to:
  - Test control break levels
  - Issue TAKE or DROP instructions
  - Perform total-time computations and logical operations
- **Type 6** parameters to select the total lines to be printed

Demonstration

Objective

This report prints account balances for several branch offices and computes an average branch balance.

Procedure

- The branch number is the sort key value obtained when a control break occurs on **BRANCH** (LEVL=1).
- Branch account totals are automatically obtained by the control break.
- An average balance is computed in type 8 logic from the automatic grand total amount and a count of the branch control breaks.

Complete Code

```
col. 2
▼
REC CURRENT-BAL    4   8   2  DP=2
01OUT T
01SORT BRANCH 0                          $Control break for branch number
010 PRINT1  'BRANCH'
010 COUNT
010 AVERAGE DP=2
013 SUMMARY REPORT OF AVERAGE TRANSACTIONS
0141*001 ' '
0151*010   CURRENT-BAL
01610020   PRINT1
01610027   BRANCH                        $Prints BRANCH value
01610031   'TOTAL BALANCE'
01610045   CURRENT-BAL SZ=11
016200310  'TOTAL BALANCE'
01620045   CURRENT-BAL SZ=11             $Prints branch totals
```

```
016300310  'AVERAGE PER BRANCH'
01630050   AVERAGE     SZ=11            $Prints the average
018        IF LEVL EQ 2  200             $Test for grand-total time
018        COUNT + 1  COUNT
018        TAKE 1                        $Prints branch information
018200     CURRENT-BAL / COUNT AVERAGE  $Uses the grand total of CURRENT-BAL
018        TAKE (2 3)                    $Prints type 6 lines 2 and 3
```

Result

```
REPORT NO. 01      SUMMARY REPORT OF AVERAGE TRANSACTIONS     mm/dd/yy PAGE     1

                    BRANCH 001 TOTAL BALANCE     999,999.99

                    BRANCH 010 TOTAL BALANCE   1,358,349.11

                    BRANCH 011 TOTAL BALANCE     345,678.90

                    BRANCH 020 TOTAL BALANCE     345,575.18

                               TOTAL BALANCE   3,049,603.18

                               AVERAGE PER BRANCH     762,400.80
```

Multiple-level Subtotals

What You Can Do

You can obtain automatically calculated subtotals for each control-break level.

After the extract file is sorted, records are read into the output (CULE) phase of CA Culprit. When a control break occurs, the type 8 logic is executed and the subtotal accumulators for the level with the control break are reinitialized after the break. If no control break occurs, the values of the numeric fields appearing on type 5 lines are added to the accumulators.

How to Do It

1. Code the **control break** on the **SORT** parameter.
2. Specify the type 5 parameter field name on a **type 6** parameter.
3. Test control break levels in **type 8** logic.
4. Specify the type 6 line to be printed with the **TAKE** command in type 8 logic.

Demonstration

Objective

This report lists the sales for each plant and prints subtotals by plant and division.

Procedure

- **Control break levels** are printed on the report to show where accumulator initialization occurs. (The contents of the accumulators during processing are shown in the table below.)
- **COUNT**, a numeric work field on a type 5 line, produces a subtotal of the number of records processed:
  - The subtotal for each plant is obtained on the first type 6 line.
  - The subtotal for each division is obtained on the second type 6 line.
  - The total number of records for all divisions is obtained on the third type 6 line.
- **DIVISION** and **PLANT**, are alphanumeric sort keys:
  - The sort key value (division and plant number) is obtained at the appropriate control break levels.
  - Omission of DIVISION on the third type 6 line results in the division number on the grand total line being left out.
- **AMOUNT** is a numeric input item:
  - On a type 5 line, AMOUNT prints on detail lines.
  - On the first type 6 line, AMOUNT prints the subtotal for each plant.
  - On the second type 6 line, AMOUNT prints the subtotal for each division.
  - On the third type 6 line, AMOUNT prints the grand total.

Accumulated Total Values

The figure below shows the total values that occur during the processing of the code for the sales report:

Accumulated Total Values for Sales Report

SORT KEY VALUES		TYPE 5 FIELDS			
LEVL 2 DIVISION	LEVL 1 PLANT	AMT INPUT	LEVL 3 ACCUMULATED TOTALS	LEVL 2	LEVL 1
01	01	50	50	50	50
01	01	20	70	70	70
01	01	10	80	80	80*
01	02	40	120	120	40
01	02	50	170	170*	90*
02	02	20	190	20	20
02	02	0	190	20	20
02	02	40	230	60*	60*
06	03	40	270	40	40

* denotes initialization of the bucket to zero after the control break

LEVL 1 -- PLANT
LEVL 2 -- DIVISION
LEVL 3 -- GRAND TOTAL

The values of the accumulators during the output processing of the Sales by Division and Plant code are incremented until a control break occurs. A control break causes initialization of the accumulators for the level having the control break.

Complete Code

```
col. 2
▼
REC PLANT       3  2
REC AMOUNT      5  4  2  DP=2
REC TYPE        9  1
REC COMPL-DATE 10  6  2
01SORT DIVISION 1  PLANT 0
013 SALES BY DIVISION AND PLANT
010 COUNT 1
014100200 'DIVISION NUMBER:'
01410037  DIVISION
0151*000  COUNT               $Printing on detail line suppressed
0151*010  PLANT
0151*020  AMOUNT F2 SZ=7
0161*0050 DIVISION
0161*010  PLANT         HH 'PLANT'
0161*020  AMOUNT  SZ=7  HH 'AMOUNT'
0161*021  COUNT   SZ=2  HH 'COUNT TOTALS'
0162*0050 DIVISION
0162*020  AMOUNT  SZ=7
0162*021  COUNT   SZ=2
0163*005  'GRAND TOTAL:'
0163*020  AMOUNT  SZ=7
0163*021  COUNT   SZ=2
018       IF LEVL EQ 3  300      $Grand total test
018       IF LEVL EQ 2  200      $Division total test
018100    TAKE 1                $Print first type 6 line
018200    TAKE 2                $Print second type 6 line
018300    TAKE 3                $Print third type 6 line
```

Result

```
REPORT NO. 01      SALES BY DIVISION AND PLANT     mm/dd/yy PAGE     1

                    DIVISION NUMBER: 01
                                                 PLANT                  AMOUNT                 COUNT TOTALS

                                                   01                    50.00
                                                   01                    20.00
                                                   01                    20.00

                        01                         01                    90.00                       3

                                                   02                    40.00
                                                   02                    50.00

                        01                         02                    90.00                       2

                        01                                               180.00                       5
```

```
REPORT NO. 01      SALES BY DIVISION AND PLANT     mm/dd/yy PAGE     2

                    DIVISION NUMBER: 02
                                                 PLANT                  AMOUNT                 COUNT TOTALS

                                                   02                    20.00
                                                   02                      .00
                                                   02                    40.00

                        02                         02                    60.00                       3

                        02                                               60.00                       3
```

```
REPORT NO. 01      SALES BY DIVISION AND PLANT     mm/dd/yy PAGE     3

                    DIVISION NUMBER: 06
                                                 PLANT                  AMOUNT                 COUNT TOTALS

                                                   03                    40.00

                        06                         03                    40.00                       1

                        06                                               40.00                       1

                    GRAND TOTAL:                                         280.00                       9
```

Creating a Sparse Listing

What You Can Do

You can eliminate repeated occurrences of selected fields on printed output by forcing a control break on a work field that is not tied to input data.

How to Do It

1. Define a numeric **work field**.
2. Code the work field on a **SORT** parameter as a low-order sort key with a control break.
3. Code a type 7 statement that increments the control-break work field by 1. (A control break will then occur on each extract record when the value of the work field changes.)
4. Code **type 8** instructions for processing the control break.

Demonstration

Objective

This report uses a forced control break to make individual plant and division codes available for labeling print lines.

Procedure

- A numeric work field **(WORK-X)** is placed on a SORT parameter to force a control break each time the value of the work field changes.
- The value of WORK-X is incremented in type 7 logic.
- The control break on WORK-X causes:
  - **Type 8** statements to be processed for every extract record. Type 8 logic checks for a control break at LEVL 4, 3, or 2.
  - If one of the type 8 conditions is true, processing branches to the appropriate **type 6** subtotal or total print line.

Complete Code

```
col. 2
▼
REC PLANT       3  2
REC AMOUNT      5  4  2  DP=2
01SORT DIVISION 0  PLANT 0  WORK-X +   $Forced control break
013 SALES BY PLANT AND DIVISION
010 COUNT 1
010 PLANT-SAVE '  '
010 DIV-SAVE '  '
010 WORK-X
01OUT T
0151*0000 COUNT
0151*020  AMOUNT F2 SZ=7
017100    WORK-X + 1  WORK-X         $Increment work field value
0161*005  DIVISION      HH 'DIVISION'    $Headings and first detail line
0161*010  PLANT         HH 'PLANT'
0161*020  AMOUNT  SZ=7  HH '  AMOUNT'
0161*025  ' '           HH 'COUNT'
0162*0100 PLANT                          $Plant subtotal
0162*020  AMOUNT  SZ=7
0162*025  COUNT   SZ=2                    $Plant records processed
0163*0050 DIVISION                       $Division subtotal
0163*021  AMOUNT  SZ=7
0163*025  COUNT   SZ=2                    $Division records processed
0164*0050'GRAND TOTAL'                  $Grand total
0164*022  AMOUNT  SZ=7
0164*025  COUNT   SZ=2                    $Total number of record processed
0165*020  AMOUNT  SZ=7                    $Unlabeled detail lines
018010    IF LEVL = 4  400               $Go to grand total print routine
018020    IF LEVL = 3  300               $Go to the division print routine
018030    IF LEVL = 2  200               $Go to the plant print routine
018040    IF DIVISION = DIV-SAVE AND PLANT = PLANT-SAVE 100
018050    MOVE PLANT TO PLANT-SAVE
018055    MOVE DIVISION TO DIV-SAVE
018060    TAKE 1
018100    TAKE 5
018200    TAKE 2
018300    TAKE 3
018400    TAKE 4
```

Result

```
REPORT NO. 01      SALES BY PLANT AND DIVISION     mm/dd/yy PAGE     1
             DIVISION            PLANT              AMOUNT                                                  COUNT

                01                 01               50.00
                                                    20.00
                                                    20.00

                                   01               90.00                                                     3

                01                 02               40.00
                                                    50.00

                                   02               90.00                                                     2

                01                                                    180.00                                 5

                02                 02               20.00

                                                    40.00

                                   02               60.00                                                     3

                02                                                     60.00                                 3

                06                 03               40.00

                                   03               40.00                                                     1

                06                                                     40.00                                 1

           GRAND TOTAL                                                                  280.00                9
```

Obtaining Work Field Values

Work fields that do not appear on SORT or type 5 parameters are not part of the extract record. Any references made to such work fields during output processing return only the most current value of the work field.

To obtain the value of a subscripted work field, see the chapter "Getting Started with CA Culprit".

Demonstration

Objective

The Summary Report of Account Totals is repeated here to show the use of the work field AVERAGE.

Procedure

- **AVERAGE** is computed in type 8 logic.
- The computation results are stored in the work field AVERAGE.
- The current value of AVERAGE is printed by using a type 6 parameter reference.

Complete Code

```
col. 2
▼
IN 80 F 320 PS(TAPE)
REC BRANCH         1   3
REC CURRENT-BAL    4   8   2  DP=2
01OUT T
01SORT BRANCH,0
010 PRINT1  'BRANCH'
010 COUNT
010 AVERAGE DP=2               $Work field holding computation results
013 SUMMARY REPORT OF AVERAGE TRANSACTIONS
0141*001 ' '
0151*010   CURRENT-BAL
01610020   PRINT1
01610027   BRANCH
01610031   'TOTAL BALANCE'
01610045   CURRENT-BAL SZ=11
016200310  'TOTAL BALANCE'
01620045   CURRENT-BAL SZ=11
016300260  'AVERAGE PER BRANCH'
01630045   AVERAGE SZ=11             $Print the value of the work field
018        IF LEVL EQ 2  200
018        COUNT + 1  COUNT
018        TAKE 1
018200     CURRENT-BAL / COUNT AVERAGE $Compute the work field value
018        TAKE (2 3)
```

Result

```
REPORT NO. 01      SUMMARY REPORT OF AVERAGE TRANSACTIONS    mm/dd/yy PAGE     1

                    BRANCH 001 TOTAL BALANCE     999,999.99

                    BRANCH 010 TOTAL BALANCE   1,358,349.11

                    BRANCH 011 TOTAL BALANCE     345,678.90

                    BRANCH 020 TOTAL BALANCE     345,575.18

                               TOTAL BALANCE   3,049,603.18

                          AVERAGE PER BRANCH     762,400.80
```

Chapter 10: Using Subscripts

This section contains the following topics:

Introduction

Subscripts define and provide access to particular occurrences of repeating data fields. References can be made to work field occurrences, segments of a field, and fixed or variable repeating input fields.

Explicit Subscripts

What You Can Do

You can reference a field occurrence directly by:

- Defining an explicit number of occurrences in a given work field:

  ```
  010 CHARACTERS.3 'A' 'B' 'C'
  ```

- Referencing a specific work field occurrence by a number or integer name:

  ```
  0151*010 CHARACTERS.2   (By a number)


  010 INDEX                      (By an integer)
  0151*020 CUSTOMER-NAME.INDEX
  ```

How to Do It

Code a work field parameter with:

1. The name of the repeating field
2. A period (.) immediately followed by a numeric literal that specifies the number of repeating elements
3. Optional initialization of each occurrence of the field

Demonstration (1): Using a Literal Subscript

Objective

This report lists the interest due on loans. Based on the size of the loan, there are three possible interest rates. Literal subscripts are used to reference each specific interest rate occurrence.

Procedure

- Interest rates are stored in a work field **INTEREST.3**.
- **Type 7** logic references each occurrence of the work field.
- INTEREST.3 has a **DP=4** specification, which translates each occurrence into a 16-byte packed decimal.
- The size of the printed interest rate is controlled by using **SZ=4** on line **0151*030**.

Complete Code

```
col. 2
▼
IN 200 F 400 PS(TAPE)
REC NAME      5 20
REC LOAN    160  7  3  DP=2
01OUT D
010 INTEREST.3  DP=4 0.0525  0.0550  0.0575 $The subscripted work field
010 AMOUNT DP=2
010 INT DP=4
0151*010 NAME              HH 'CUSTOMER'
0151*020 LOAN   SZ=8       HH 'LOAN AMOUNT'
0151*030 INT    SZ=4  DP=4  HH 'INTEREST' 'RATE'
0151*040 AMOUNT SZ=7  DP=2  HH 'INTEREST' 'AMOUNT'
```

```
017    IF LOAN GT 50000.00 100
017    IF LOAN EQ (20000.00 TO 49999.99) 200
017    IF LOAN LT 20000.00 300
017100 COMPUTE ROUND (LOAN X INTEREST.1)  AMOUNT $Use the first occurrence
017    MOVE INTEREST.1 TO INT
017    TAKE
017200 COMPUTE ROUND (LOAN X INTEREST.2)  AMOUNT $Use the second occurrence
017    MOVE INTEREST.2 TO INT
017    TAKE
017300 COMPUTE ROUND (LOAN X INTEREST.3)  AMOUNT $Use the third occurrence
017    MOVE INTEREST.3 TO INT
017    TAKE
```

Result

CUSTOMER		LOAN AMOUNT	RATE	AMOUNT
JUNE	BLOOMER	15,000.00	.0575	862.50
EDWARD	HUTTON	44,000.00	.0550	2,420.00
RUPERT	JENSON	82,000.00	.0525	4,305.00
MARIANNE	KIMBALL	45,000.00	.0550	2,475.00
DORIS	KING	14,500.00	.0575	833.75
BRIAN	NICEMAN	14,000.00	.0575	805.00
HERBERT	CRANE	75,000.00	.0525	3,937.50
JANE	FERNDALE	22,500.00	.0550	1,237.50
GEORGE	FONRAD	14,750.00	.0575	848.13
ROBIN	GARDNER	14,000.00	.0575	805.00
DOUGLAS	KAHALLY	20,000.00	.0550	1,100.00
TERENCE	KLWELLEN	43,000.00	.0550	2,365.00
SANDY	KRAAMER	14,000.00	.0575	805.00
HERBERT	LIPSICH	18,500.00	.0575	1,063.75
NANCY	TERNER	13,000.00	.0575	747.50
BETH	CLOUD	52,750.00	.0525	2,769.38
ALAN	DONOVAN	33,500.00	.0550	1,842.50
DANIEL	MOON	72,000.00	.0525	3,780.00
ROY	ANDALE	33,500.00	.0550	1,842.50
HARRY	ARM	46,000.00	.0550	2,530.00
C.	BREEZE	38,000.00	.0550	2,090.00
CAROLYN	CROW	37,500.00	.0550	2,062.50
BURT	LANCHESTER	54,500.00	.0525	2,861.25
RENE	MAKER	85,000.00	.0525	4,462.50
RICHARD	MUNYON	36,000.00	.0550	1,980.00
RICHARD	WAGNER	47,000.00	.0550	2,585.00
TOM	FITZHUGH	13,000.00	.0575	747.50
CYNTHIA	JOHNSON	13,500.00	.0575	776.25
MADELINE	ORGRATZI	39,000.00	.0550	2,145.00
ELEANOR	PEOPLES	80,000.00	.0525	4,200.00

```
MICHAEL   ANGELO                18,000.00              .0575              1,035.00
MONTE     BANK                  80,000.00              .0525              4,200.00
CHARLES   BOWER                 38,500.00              .0550              2,117.50
JOCK      JACKSON               34,000.00              .0550              1,870.00
CAROL     MCDOUGALL             18,000.00              .0575              1,035.00
LAURA     PENMAN                39,000.00              .0550              2,145.00
BETSY     ZEDI                  37,000.00              .0550              2,035.00
TERRY     CLOTH                 38,000.00              .0550              2,090.00
PHINEAS   FINN                  45,000.00              .0550              2,475.00
JOE       KASPAR                31,000.00              .0550              1,705.00
MARK      TIME                  33,000.00              .0550              1,815.00
ROGER     WILCO                 80,000.00              .0525              4,200.00
JANE      DOUGH                 33,000.00              .0550              1,815.00
JAMES     GALLWAY               33,000.00              .0550              1,815.00
JENNIFER  GARFIELD              65,000.00              .0525              3,412.50
PERCY     GRANGER               34,500.00              .0550              1,897.50
VLADIMIR  HEAROWITZ             33,000.00              .0550              1,815.00
JAMES     JACOBI                55,000.00              .0525              2,887.50
JULIE     JENSEN                37,000.00              .0550              2,035.00
LARRY     LITERATA              37,500.00              .0550              2,062.50
KATHERINE O'HEARN               42,500.00              .0550              2,337.50
RALPH     TYRO                  20,000.00              .0550              1,100.00
HENRIETTA HENDON               240,000.00              .0525             12,600.00
THEMIS    PAPAZEUS              100,000.00              .0525              5,250.00
JOHN      RUPEE                 80,000.00              .0525              4,200.00
ROBBY     WILDER                90,000.00              .0525              4,725.00
```

Demonstration (2): Using a Counter as a Subscript

Objective

This report lists data occurrences that are stored in a work field.

Procedure

The value of the counter **INDEX** is used as a subscript on a type 5 parameter.

Complete Code

```
 col. 2
 ▼
 IN 80
 REC CODE 1 2  2
 020 FOREIGN-MAKES.30  'ROLLS ROYCE' 'ALPHA ROMEO' 'FIAT'
*'VOLKSWAGEN' 'PORCHE' 'LANCIA' 'BMW' 'AUDI' 'DATSUN' 'TOYOTA'
*'MERCEDES' 'MASERATI' 'LADA' 'SAAB' 'HONDA' 'MAZDA' 'RENAULT'
*'VOLVO' 'LAMBORGHINI' 'TRIUMPH' 'LOTUS' 'FERRARI' ' '
 020 INDEX                              $Counter work field
 02OUT 80
 0251*010 FOREIGN-MAKES.INDEX
 027010   INDEX + 1  INDEX              $Increment counter
 027020   IF INDEX GT 30  STOP-RPT        $Check for subscript value
 027      RELS
 027      B 10
```

Result

```
ROLLS ROYCE
ALPHA ROMEO
FIAT
VOLKSWAGEN
PORCHE
LANCIA
BMW
DATSUN
MERCEDES
SAAB
HONDA
MAZDA
VOLVO
LAMBORGHINI
TRIUMPH
LOTUS
FERRARI
```

Zero Subscripts

What You Can Do

You can define an alphanumeric work field, redefine adjacent storage to contain segments of the work field, and reference the segments with explicit subscripts.

How to Do It

1. Define the subscripted work field by coding a work field parameter (0) with:
   a. The name of the primary work field that redefines the adjacent fields
   b. A period (.) followed immediately by zero (0)
   c. Spaces (enclosed in single quotation marks) to indicate the length of the primary work field

   ```
   010 NAME-0.0 '          '
   ```

2. Redefine the storage area that immediately follows the zero-subscripted work field by coding on one or more work field parameters (in alphabetical or numerical order):
   a. The prefix of the field name being defined
   b. Spaces (enclosed in single quotation marks) to indicate the length of the redefined field:

   ```
   010 NAME-0.0 '          '
   010 NAME-1 '  '
   ```

3. Reference a zero-subscripted work field by using:
   a. The name of the work field
   b. An explicit subscript

```
010 FIELD-0.0 '         '
010 FIELD-1 ' '
010 FIELD-2 '     '
010 FIELD-3 '   '
0151*010 FIELD-0.1  $References the first occurrence of FIELD-0.0
```

Demonstration

Objective

This report lists the name, password, and address of employees. The passwords are created from the first, third, and fifth letters of the employees' first names.

Procedure

- The NAME-1 work field is redefined into 1-byte segments.
- WRKFLD-1, -2, and -3 are combined into a single field (WRKFLD-0.0).
- The five address segments are combined into one field (ADDRESS-0.0).

Complete Code

```
col. 2
▼
IN 200
REC NAME          5     20
REC FIRST-NAME    5     10
REC LAST-NAME    15     10
REC STREET       30     20
REC CITY         50     15
REC STATE        65      2
REC ZIP-CODE     67      5
SEL STATE EQ 'MA'
01SORT LAST-NAME
010 NAME-0.0 ' '          $Redefines NAME-1 into 1-byte occurrences
010 NAME-1 '          '    $Holds the first name
010 WRKFLD-0.0 '    '     $3 bytes to hold the letters for the password
010 WRKFLD-1 ' '           $Holds a single letter
010 WRKFLD-2 ' '
010 WRKFLD-3 ' '
010 ADDRESS-0.0 '                                          '
010 ADDRESS-1  'STREET             '
010 ADDRESS-2  'CITY           '
010 ADDRESS-3  '  '
010 ADDRESS-4 ' '
010 ADDRESS-5  'ZIP  '
0151*010 NAME        HH 'NAME'
0151*020 WRKFLD-0.1  HH 'PASSWORD'
0151*030 ADDRESS-0.1 HH '     ADDRESS'
017020 MOVE FIRST-NAME TO NAME-1
017    MOVE NAME-0.1 TO WRKFLD-1  $First letter of the password
017    MOVE NAME-0.3 TO WRKFLD-2  $Second letter of the password
017    MOVE NAME-0.5 TO WRKFLD-3  $Third letter of the password
017    MOVE STREET TO ADDRESS-1
017    MOVE CITY TO ADDRESS-2
017    MOVE STATE TO ADDRESS-3
017    MOVE ZIP-CODE TO ADDRESS-5
```

Result

NAME		PASSWORD	ADDRESS		
ROY	ANDALE	RY	44 TRIGGER RD	FRAMINGHAM	MA 03461
MICHAEL	ANGELO	MCA	507 CISTINE DR	WELLESLEY	MA 01568
HARRY	ARM	HRY	77 SUNSET STRIP	NATICK	MA 02178
MONTE	BANK	MNE	45 EAST GROVE DR	HANIBAL	MA 02415
JUNE	BLOOMER	JN	14 ZITHER TERR	LEXINGTON	MA 01675
CHARLES	BOWER	CAL	30 RALPH ST	WELLESLEY	MA 01568
C.	BREEZE	C	200 NIGHTINGALE ST	FRAMINGHAM	MA 03461
TERRY	CLOTH	TRY	5 ASPHALT ST	EASTON	MA 05491
BETH	CLOUD	BT	3456 PINKY LN	NATICK	MA 02178
CAROLYN	CROW	CRL	891 SUMMER ST	WESTWOOD	MA 02090
ALAN	DONOVAN	AA	6781 CORNWALL AVE	MELROSE	MA 02176
JANE	DOUGH	JN	15 LOCATION DR	NEWTON	MA 02456
JANE	FERNDALE	JN	60 FOREST AVE	NEWTON	MA 02576
PHINEAS	FINN	PIE	79 HIGH ST	WESTON	MA 04371
TOM	FITZHUGH	TM	450 THRUWAY ST	MANSFIELD	MA 03458
GEORGE	FONRAD	GOG	99 VERDE ST	STOUGHTON	MA 02456
JAMES	GALLWAY	JMS	15 DAWSON ST	MEDFORD	MA 02432
ROBIN	GARDNER	RBN	68 75TH ST	LOWELL	MA 02945
JENNIFER	GARFIELD	JNI	110A FIRTH ST	STONEHAM	MA 02928
PERCY	GRANGER	PRY	14 BYTE WAY	TAUNTON	MA 02678
VLADIMIR	HEAROWITZ	VAI	19 TERRACE TERR	TAUNTON	MA 02678
HENRIETTA	HENDON	HNI	16 HENDON DR	WELLESLEY	MA 02198
EDWARD	HUTTON	EWR	781 CROSS ST	MELROSE	MA 02176
JOCK	JACKSON	JC	65 BROWN ST	WALTHAM	MA 01476
JAMES	JACOBI	JMS	555 JAKAS DR	GROVER	MA 02976
JULIE	JENSEN	JLE	15 THINGER AVE	SAUGUS	MA 02276
RUPERT	JENSON	RPR	999 HARVEY ST	MELROSE	MA 02176
CYNTHIA	JOHNSON	CNH	17 MANIFESTO DR	WALPOLE	MA 02546
DOUGLAS	KAHALLY	DUL	56 SPELLING AVE	READING	MA 02317
JOE	KASPAR	JE	133 NORTH ST	WESTBORO	MA 03156
MARIANNE	KIMBALL	MRA	561 LEXINGTON AVE	LITTLETON	MA 01239
DORIS	KING	DRS	716 MORRIS ST	MELROSE	MA 02176
TERENCE	KLWELLEN	TRN	12 RAUNCH ST., APT1	DEDHAM	MA 02034
SANDY	KRAAMER	SNY	56 NASTY WAY	WESTWOOD	MA 02090
BURT	LANCHESTER	BR	45 PINKERTON AVE	WALTHAM	MA 01476
HERBERT	LIPSICH	HRE	6 FORENOON ST	WALDEN	MA 02986
LARRY	LITERATA	LRY	123 SATURDAY TERR	WILMINGTON	MA 02476
RENE	MAKER	RN	10 DROVER DR	BOSTON	MA 02123
CAROL	MCDOUGALL	CRL	19 URITOP DR	WELLESLEY	MA 01568
DANIEL	MOON	DNE	16 SKYHIGH DR	WESTON	MA 04371
RICHARD	MUNYON	RCA	17 BLACKHILL DR	WESTWOOD	MA 02090
BRIAN	NICEMAN	BIN	60 FLORENCE AVE	MELROSE	MA 02176
KATHERINE	O'HEARN	KTE	12 EAST SPEEN ST	NATICK	MA 02364
MADELINE	ORGRATZI	MDL	67 RAINBOW DR	KENDON	MA 06182
THEMIS	PAPAZEUS	TEI	234 TRANSWORLD ST	NORTHBORO	MA 03256
LAURA	PENMAN	LUA	45 THRUSH LN	WALTHAM	MA 01476
ELEANOR	PEOPLES	EEN	756 YELLOWSTONE DR	BOSTON	MA 02834
JOHN	RUPEE	JH	114 WEST INDIA ST	METHUEN	MA 02312
NANCY	TERNER	NNY	14 TYPO TERR	READING	MA 02317
MARK	TIME	MR	44 CLOCK ST	MALDEN	MA 01776
RALPH	TYRO	RLH	888 FORTITHE ST	SINGER	MA 02254
RICHARD	WAGNER	RCA	677 GERMANY LN	NATICK	MA 02178
ROGER	WILCO	RGR	671A SNOWBANK RD	TYNGSBORO	MA 01879
ROBBY	WILDER	RBY	4567 E. GROWTH ST	SOUTHBORO	MA 03145
BETSY	ZEDI	BTY	34 VALE AVE	SOUTHBORO	MA 03145

Fixed Repeating Fields

What You Can Do

You can retrieve input data items that occur a fixed number of times.

How to Do It

Define the related items as a group of similar elements before processing takes place.

1. Define the **group** of repeating fields by coding one REC parameter with:
   a. A group name for the repeating fields
   b. The start position of the group
   c. The keyword **GROUP**
   d. A 2-character group identifier
   e. The total length (in bytes) of the group, followed by a period (.)
   f. The number of occurrences in the group
2. Define the **elements** of the group by coding a REC parameter for each element of the group with:
   a. The name of the element
   b. The start position *within the group*
   c. The length of the element
   d. The keyword **ELMNT**
   e. The same 2-character identifier as the group to which the element belongs
3. Reference the elements by using explicit subscripts.

Demonstration

Objective

This report prints interest rates in three columns.

Procedure

The input records contain three repeating rates:

- **INTEREST-RATE-DATA** defines the group.
- **INTEREST-RATE** defines the individual elements.
- Explicit subscripts reference the elements on type 5 parameters.

Complete Code

```
col. 2
▼
IN 80
REC INTEREST-RATE-DATA  1            GROUP AA 4.3
REC INTEREST-RATE       1 4  2  DP=4  ELMNT AA
00OUT 80 D
003 INTEREST RATE TABLE
0051*010 INTEREST-RATE.1  HH ' ' 'RATE CODE 1' '(ACCOUNT TYPE 1)'
0051*020 INTEREST-RATE.2  HH 'RATE CODE 2' '(ACCOUNT TYPE 2)'
0051*030 INTEREST-RATE.3  HH 'RATE CODE 3' '(ACCOUNT TYPE 3)'
```

Result

```
REPORT NO. 00                INTEREST RATE TABLE          mm/dd/yy PAGE     1

         RATE CODE 1            RATE CODE 2            RATE CODE 3
       (ACCOUNT TYPE 1)       (ACCOUNT TYPE 2)       (ACCOUNT TYPE 3)

            .0500                  .0525                  .0550
            .0525                  .0550                  .0575
            .0550                  .0575                  .0600
            .0550                  .0575                  .0625
```

Variable Repeating Groups

What You Can Do

You can retrieve occurrences of input fields that repeat a variable number of times.

How to Do It

1. Define the **group** by coding one REC parameter with:
   a. An identifying name for the group of fields
   b. The start position
   c. The keyword **GROUP**
   d. A group identifier
   e. The total length of one occurrence of the group (in bytes), followed by a period (.)
   f. The name of the field in the fixed portion of the record that contains the number of occurrences of the group
2. Define the **elements** of the group by coding a REC parameter for each element of the group with:
   a. The name of the element
   b. The start position *within the group*
   c. The length of the element
   d. The keyword **ELMNT**
   e. The identifier of the group
3. Reference the elements by using explicit subscripts.

Demonstration

Objective

This report lists insurance policy numbers and coverage dates for several store locations. The number of policies varies for each store.

Procedure

- Three fields (LOCATION-ID, LOC-EFF-DATE, and LOC-EXP-DATE) in a variable repeating data group are defined on REC parameters:
  - **LOCATION-INFO** is the assigned group name.
  - **LOCATION-NUMBER** is the input record field containing the number of occurrences.
- **INDEX**, which is used as an explicit subscript, is a work field that contains the current occurrence count.

Complete Code

```
col. 2
▼
IN 80 F 320 PS(TAPE)
REC POLICY-NUMBER      5  10  2
REC COVERAGE-CODE     15   3
REC EFFECTIVE-DATE    18   6  2
REC LOCATION-NUMBER   24   4  2
REC LOCATION-INFO 28           GROUP AA 14.LOCATION-NUMBER
REC LOCATION-ID     1  2  2     ELMNT AA
REC LOC-EFF-DATE    3  6  2     ELMNT AA
REC LOC-EXP-DATE    9  6  2     ELMNT AA
01OUT D
010 INDEX 1                      $Counter
0141*010 'POLICY NUMBER'
0141*020 'COVERAGE'
0141*030 'EFFECTIVE DATE'
0141*040 'LOCATION ID'
0141*050 'LOC-EFF-DATE'
0141*060 'LOC-EXP-DATE'
01420001 ' '
0151*010 POLICY-NUMBER  F0
0151*020 COVERAGE-CODE
0151*030 EFFECTIVE-DATE  FD
0152*040 LOCATION-ID.INDEX
0152*050 LOC-EFF-DATE.INDEX  FD
0152*060 LOC-EXP-DATE.INDEX  FD
017      RELS 1                  $Print first detail line; continue processing
017100   RELS 2                  $Print second detail line; continue processing
017      INDEX + 1  INDEX
017      IF INDEX LE LOCATION-NUMBER 100$Test subscript value
017      MOVE 1 TO INDEX         $Reset subscript value
017      DROP
```

Result

POLICY NUMBER	COVERAGE	EFFECTIVE DATE	LOCATION ID	LOC-EFF-DATE	LOC-EXP-DATE
111111	010	mm/dd/yy			
			1	mm/dd/yy	mm/dd/yy
			5	mm/dd/yy	mm/dd/yy
222222	011	mm/dd/yy			
			10	mm/dd/yy	mm/dd/yy
333333	005	mm/dd/yy			
			5	mm/dd/yy	mm/dd/yy
			3	mm/dd/yy	mm/dd/yy
			1	mm/dd/yy	mm/dd/yy
4444444	002	mm/dd/yy			
			4	mm/dd/yy	mm/dd/yy
			2	mm/dd/yy	mm/dd/yy

Note: The report would show actual dates in the format shown.

Floating Fields

What You Can Do

You can retrieve a field that occurs immediately after a variable repeating group (floating field) by creating code that is relative to the end of the variable group.

How to Do It

1. Define the floating group by coding one **REC** parameter with:
   a. The assigned group name
   b. A start position of 1
   c. The keyword **GROUP**
   d. A unique group identifier
   e. The group identifier of the last variable repeating group
   f. The length of the floating field in bytes
2. Define the field by coding a **REC** parameter with:
   a. The name of the floating field
   b. A start position of 1
   c. The length of the field
   d. The keyword **ELMNT**
   e. The identifier of the group
3. Reference the field directly.

Demonstration

Objective

This report lists insurance coverage and risk level for a series of stores from an input file containing the floating field RISK-LEVEL.

Procedure

- **OTHER-DATA** defines the floating group.
- **RISK-LEVEL** defines the floating field.
- RISK-LEVEL is referenced directly on a type 5 parameter.

Complete Code

```
col. 2
▼
IN 80
REC POLICY-NUMBER     5  10  2
REC COVERAGE-CODE    15   3
REC EFFECTIVE-DATE   18   6  2
REC LOCATION-NUMBER  24   4  2
REC LOCATION-INFO    28              GROUP AA 14.LOCATION-NUMBER
REC LOCATION-ID       1   2  2       ELMNT AA
REC LOC-EFF-DATE      3   6  2       ELMNT AA
REC LOC-EXP-DATE      9   6  2       ELMNT AA
REC OTHER-DATA    1             GROUP BB AA 1
REC RISK-LEVEL     1   1          ELMNT BB
010UT D
010 INDEX 1
0141*010 'POLICY NUMBER'
0141*020 'COVERAGE'
0141*030 'EFFECTIVE DATE'
0141*035 'RISK LEVEL'
0141*040 'LOCATION ID'
0141*050 'LOC-EFF-DATE'
0141*060 'LOC-EXP-DATE'
01420001 ' '
0151*010 POLICY-NUMBER  F0
0151*020 COVERAGE-CODE
0151*030 EFFECTIVE-DATE  FD
0151*035 RISK-LEVEL                  $The floating field
0152*040 LOCATION-ID.INDEX
0152*050 LOC-EFF-DATE.INDEX  FD
0152*060 LOC-EXP-DATE.INDEX  FD
017      RELS 1
017100   RELS 2
017      INDEX + 1  INDEX
017      IF INDEX LE LOCATION-NUMBER 100
017      MOVE 1 TO INDEX
017      DROP
```

Result

POLICY NUMBER	COVERAGE	EFFECTIVE DATE	RISK LEVEL	LOCATION ID	LOC-EFF-DATE	LOC-EXP-DATE
111111	010	mm/dd/yy				
				1	mm/dd/yy	mm/dd/yy
				5	mm/dd/yy	mm/dd/yy
222222	011	mm/dd/yy				
				10	mm/dd/yy	mm/dd/yy
333333	005	mm/dd/yy				
				5	mm/dd/yy	mm/dd/yy
				3	mm/dd/yy	mm/dd/yy
				1	mm/dd/yy	mm/dd/yy
4444444	002	mm/dd/yy				
				4	mm/dd/yy	mm/dd/yy
				2	mm/dd/yy	mm/dd/yy

Note: The report would show actual dates in the format shown.

Obtaining Accumulated Totals

What You Can Do

You can obtain the accumulated totals value for each occurrence of a subscripted field.

How to Do It

1. Name the occurrences of the subscripted field on **type 5** parameters.
2. Print the specific totals values with **type 6** parameters.

In the example below, AMT.5 is defined as a work field consisting of five repeating fields. The type 5 parameters extract the value of each occurrence of AMT.1 and AMT.2. The type 6 parameters return the sum of the occurrences of AMT.1 and the sum of the occurrences of AMT.2:

```
010 AMT.5
0151*005 AMT.1
0151*010 AMT.2
0161*005 AMT.1
0161*010 AMT.2
```

Demonstration

Objective

This report lists the quarterly gain or loss for a series of stores by retrieving the accumulated totals value for each occurrence of the subscripted work field GAIN-OR-LOSS.4.

Procedure

- Two repeating input fields are defined:
  - **INCOME** and **EXPEND** are the group names.
  - **QTR** and **AMT** are the field names.
- Gain or loss statistics for each fiscal quarter are computed from the elements (QTR - AMT), which are placed in the work field **GAIN-OR-LOSS.4**.
- Individual occurrences of the GAIN-OR-LOSS work field are retrieved by type 5 parameters.
- References to each occurrence of the GAIN-OR-LOSS work field on type 6 lines obtain the accumulated totals for each quarter.

Complete Code

```
col. 2
▼
IN 80 F 320 PS(TAPE)
REC STORE        1  3  2
REC INCOME       4                GROUP AA 8.4
REC QTR          1  8  2  DP=2    ELMNT AA
REC EXPEND      36                GROUP BB 8.4
REC AMT          1  8  2  DP=2    ELMNT BB
010 GAIN-OR-LOSS.4 DP=2
010 INDEX 1
013 PROFIT/LOSS REPORT —— yyyy
0151*010 STORE             HH 'STORE'
0151*020 GAIN-OR-LOSS.1 SZ=11 F3 HH ' FIRST QUARTER'
0151*030 GAIN-OR-LOSS.2 SZ=11 F3 HH 'SECOND QUARTER'
0151*040 GAIN-OR-LOSS.3 SZ=11 F3 HH ' THIRD QUARTER'
0151*050 GAIN-OR-LOSS.4 SZ=11 F3 HH 'FOURTH QUARTER'
0161*0200GAIN-OR-LOSS.1 SZ=11 F3                 $Quarterly totals
0161*030 GAIN-OR-LOSS.2 SZ=11 F3
0161*040 GAIN-OR-LOSS.3 SZ=11 F3
0161*050 GAIN-OR-LOSS.4 SZ=11 F3
017100 COMPUTE QTR.INDEX - AMT.INDEX  GAIN-OR-LOSS.INDEX
017    INDEX + 1  INDEX
017    IF INDEX LE 4 100
017    MOVE 1 TO INDEX
017    TAKE
```

Result

```
REPORT NO. 01          PROFIT/LOSS REPORT —— yyyy          mm/dd/yy PAGE     1
             STORE           FIRST QUARTER          SECOND QUARTER           THIRD QUARTER          FOURTH QUARTER

               1               19,900.21              10,788.50               53,899.98              19,895.00
              10                    0.21               1,388.41                   99.98               2,895.76
              11                5,099.79-              34,788.50               17,900.00              19,895.00
              21              44,900.21              10,211.50-              123,899.98              70,104.50-

                              59,700.84              36,753.91              195,799.94              27,418.74-
```

Obtaining Specific Field Values

What You Can Do

You can obtain the current value of a subscripted numeric work field in output processing when the work field is specified on type 6 or 8 parameters only.

How to Do It

Code:

- The **work field**
- A **type 6** or a **type 8** parameter with the name of the work field and the subscript indicating the occurrence to be retrieved

In the following example, AMT.1 and AMT.2 on the type 6 parameter return the current values of the first and second work field occurrences:

```
010 AMT.5
0161*005 AMT.1
0161*010 AMT.2
```

Demonstration

Objective

The following report lists the quarterly gain or loss for each of four stores. The annual gain or loss, by store, is printed across the bottom of the report.

Procedure

- **GAIN-OR-LOSS.4** is a subscripted work field that holds the quarterly income computation for each store.
- **STORE-TOTAL** is a subscripted work field that holds the annual income of each store.
- Each occurrence of STORE-TOTAL is printed out by references on **type 6** parameters.

Complete Code

```
col. 2
▼
IN 80 F 320 PS(TAPE)
REC STORE        1  3  2
REC INCOME       4                GROUP AA 8.4
REC QTR          1  8  2  DP=2    ELMNT AA
REC EXPEND      36                GROUP BB 8.4
REC AMT          1  8  2  DP=2    ELMNT BB
010 GAIN-OR-LOSS.4  DP=2                  $Quarterly income
010 INDEX 1
010 TOTAL 0
010 STORE-TOTAL.4                    $Annual income
010 COUNT 1
013 PROFIT/LOSS REPORT —— yyyy
0151*010 STORE  SZ=5       HH 'STORE'
0151*020 GAIN-OR-LOSS.INDEX SZ=11 F3 HH 'QUARTERLY' 'GAIN/LOSS'
0152*001 ' '
0161*0200GAIN-OR-LOSS.INDEX SZ=11 F3
0162*010-'STORE TOTAL SUMMARY:'
0163*010 'STORE 1:'
0163*015 STORE-TOTAL.1  SZ=11 F3  $Current value of the first occurrence
0163*020 'STORE 10:'
0163*025 STORE-TOTAL.2  SZ=11 F3  $Current value of the second occurrence
0163*030 'STORE 11:'
0163*035 STORE-TOTAL.3  SZ=11 F3  $Current value of the third occurrence
0163*050 'STORE 20:'
0163*055 STORE-TOTAL.4  SZ=11 F3  $Current value of the fourth occurrence
```

```
017100 COMPUTE QTR.INDEX - AMT.INDEX  GAIN-OR-LOSS.INDEX
017    COMPUTE TOTAL + GAIN-OR-LOSS.INDEX  TOTAL
017    RELS (1)
017175 IF INDEX EQ 4  200
017    INDEX + 1  INDEX
017    IF INDEX LE 4 100
017200 MOVE 1 TO INDEX
017    MOVE TOTAL TO STORE-TOTAL.COUNT
017    COUNT + 1  COUNT
017    RELS (2)
017    TOTAL - TOTAL  TOTAL
017    DROP
```

Result

```
REPORT NO. 01          PROFIT/LOSS REPORT — yyyy          mm/dd/yyPAGE     1
                                          QUARTERLY
             STORE                        GAIN/LOSS

                 1                          19,900.21
                 1                          10,788.50
                 1                          53,899.98
                 1                          19,895.00

                10                               0.21
                10                           1,388.41
                10                              99.98
                10                           2,895.76

                11                           5,099.79-
                11                          34,788.50
                11                          17,900.00
                11                          19,895.00

                21                          44,900.21
                21                          10,211.50-
                21                         123,899.98
                21                          70,104.50-


                                           264,835.95
-     STORE TOTAL SUMMARY:
           STORE 1:              104,484    STORE 10:             4,384  STORE 11:         67,484  STORE 20:         88,485
```

Obtaining Sort-key Values

What You Can Do

You can use one element of a subscripted field as a sort key. The value of the sort key associated with the last detail line processed before the control break is returned when type 6 or type 8 parameters reference the field.

How to Do It

Code:

1. The subscripted field on a **SORT** parameter
2. The subscripted field on a **type 6** or **type 8** parameter

The following example uses a subscripted work field, AMT.5, on the SORT parameter. The type 6 reference to the field returns the current value of AMT.5:

```
010 AMT.5
01SORT AMT.5
0151*010 ' '
0161*010 AMT.5
```

Demonstration

Objective

This report prints the third quarter profits for each of six stores.

Procedure

- The work field **GAIN-OR-LOSS.4** holds the results of quarterly income calculations.
- An occurrence of the subscripted work field **GAIN-OR-LOSS.3** is used as the sort key. The value of that particular field is written to the extract file when a control break occurs.
- A **type 6** parameter references GAIN-OR-LOSS.3 to retrieve the subscripted field value from the extract file.

Complete Code

```
col. 2
▼
IN 80 F 320 PS(TAPE)
REC STORE        1  3  2
REC INCOME       4                GROUP AA 8.4

REC QTR          1  8  2  DP=2    ELMNT AA
REC EXPEND      36                GROUP BB 8.4
REC AMT          1  8  2  DP=2    ELMNT BB
01OUT T
010 GAIN-OR-LOSS.4  DP=2              $Four quarters
010 INDEX 1
01SORT  STORE 0 GAIN-OR-LOSS.3        $Third occurrence in work field
```

```
 013 THIRD QUARTER EARNINGS —— yyyy
 0151*010 ' '                                $One type 5 line is always required
 0161*010 STORE                             HH 'STORE'
* $                                           Retrieve the value:
 0161*020 GAIN-OR-LOSS.3 SZ=11  F3 HH 'THIRD QUARTER PROFIT'
 017100   COMPUTE QTR.INDEX - AMT.INDEX  GAIN-OR-LOSS.INDEX
 017175 IF INDEX EQ 4  200                  $Load subscripted work field
 017    INDEX + 1  INDEX
 017    IF INDEX LE 4 100
 017200 MOVE 1 TO INDEX
 018010 IF LEVL EQ 1 100
 018020 IF LEVL EQ 2 200
 018100 TAKE 1
 018200 DROP
```

Note: Third Quarter Earnings would be the year in yyyy format.

Result

```
REPORT NO. 01          THIRD QUARTER EARNINGS —— yyyy       mm/dd/yyPAGE     1
                                STORE                                THIRD QUARTER PROFIT

                                  1                                        53,899.98

                                 10                                            99.98

                                 11                                       17,900.00

                                 21                                      123,899.98
```

Note: The report would show the actual dates in the format shown.

Chapter 11: File Matching

This section contains the following topics:

File Matching

Two or more *presorted* conventional files having at least one common data item between them can be compared. When a match occurs, the matching records are brought into the input buffer as a single record.

How File Matching Works

When CA Culprit encounters more than one INPUT parameter, it recognizes a match run and proceeds as follows:

1. Searches the first record on all files for a match:

   If a SELECT statement is used on any file, the SELECT logic is performed *before* any match-file processing.

   If a SELECT BUFFER statement is used, the SELECT logic is performed *after* the match processing and before type 7 logic is completed.

2. Searches the remaining file for a match:

   If a match among all files is found, the matching records are delivered to the input buffer and type 7 processing is performed.

   If a match is not found,

   a. The record with the lowest key value is moved into the input buffer.

   b. The remainder of the input buffer is nulled out by setting numeric key fields to zeros, alphanumeric key fields to spaces, and the rest of the record to spaces.

   c. Type 7 processing is performed.

The figure below shows the contents of the input buffer during a simple match-file run:

Buffer Contents During a Match-file Run

PHYSICAL RECORD SEQUENCE		INPUT BUFFER		
FILE 1 (SYS010)	FILE 2 (SYS011)	SYS010 AREA	SYS011 AREA	INPUT BUFFER NUMBER
A	A	A	A	1
C	B	*	B	2
D1	D	C	*	3
D2	E1	D1	D	4
E1	E2	D2	*	5
E2	E3	E1	E	6
G	F	E2	E	7
H	G1	*	E	8
	G2	*	F	9
		G	G	10
		*	G	11
		H	*	12

Note: D1, D2, E1, and so on, represent records with duplicate key values. An asterisk (*) indicates a null chapter of the buffer.

Keeping a Record in the Buffer

When a record needs to be processed against more than one record with a matching key value, the **MB=KEEP** option of the INPUT parameter is used. MB=KEEP is most commonly used on one file only.

The contents of the input buffer when the MB=KEEP option is used is shown in the figure below:

Buffer Contents with the KEEP Option

PHYSICAL RECORD SEQUENCE		INPUT BUFFER		
FILE 1 (SYS010)	FILE 2 (SYS011)	SYS010 AREA	SYS011 AREA	INPUT BUFFER NUMBER
A	A	A	A	1
C	B	*	B	2
D1	D	C	B	3
D2	E	D1	D	4
E1	F	D2	D	5
E2	G	E1	E	6
G		E2	E	7
H		*	F	8
		G	G	9
		H	G	10

Note: D1, D2, E1, and E2 represent records with duplicate key values. An asterisk (*) indicates a null chapter of the buffer.

Checking the File Status

When CA Culprit reformats the input buffer for a match file run, it adjusts the starting position of the input fields by inserting two additional bytes for use in checking the status of the files:

- The first byte is an input file status byte specific to each file in the run.
- The second byte, called M*ID, is a composite input file status indicator consisting of a binary combination of the file-specific status bytes for all files in the run.

If the return value of M*ID is not 0, test the file-specific status bit to locate the file or files containing an error condition:

1. Define the file-specific status bit on a REC parameter:

```
If binary: REC FILE4-STATUS 0  1  1

If bit: REC FILE4-STATUS 0  81  5
(Bit format uses a 2-digit length specification,
indicating FILE4-STATUS is a single bit that occurs
in the eighth bit position of start position 0.)
```

2. Test the value of the bit in type 7 logic for a non-zero (0) value.

The bit layout within the M*ID and the file-specific status bit fields are shown in the table below.

The Bit Layout Within M*ID

Bit position	Condition	Decimal value of M*ID
5	File(s) out of sequence	8
6	Duplicate key value	4
8	End of file(s) value	1
0	Off	0

Demonstration

The following examples list the values of the file-specific status byte and the M*ID under error conditions:

- The first example attempts a match-file run with an unsorted transaction file.
- The second example attempts a match-file run with an unsorted transaction file and an unsorted master file.

Complete Code

```
col. 2
▼
IN 80 MK=M-ACCOUNT
REC M-FILE-STATUS 0    1   1       'M-FILE' 'STATUS'
REC M-ACCOUNT             1    5           'ACCOUNT'
REC M-NAME              620
IN 80 MK=T-ACCOUNT
REC T-FILE-STATUS  0    1   1   'T-FILE' 'STATUS'
REC T-ACCOUNT          1    5           'ACCOUNT'
REC T-PAYMENT          6    8   2  DP=2 'PAYMENT'
020UT D
0251*005 M*ID                   HH 'M*ID'
0251*010 T-FILE-STATUS         HR
0251*015 M-FILE-STATUS         HR
0251*020 M-ACCOUNT               HR
```

Unsorted Transaction File

```
REPORT NO.  02    JANUARY PAYMENTS RECEIVED    mm/dd/yy PAGE 1
                  T-FILE     M-FILE
         M*ID     STATUS     STATUS     ACCOUNT
            1         1                  15060
            1         1                  21056
            1         1                  29557
            1         1                  30115
            1         1                  33470
            1         1                  69876
            1         1                  99083
            8         8
            8         8
            .         .
            .         .
            .         .
```

Unsorted Master and Transaction Files

```
REPORT NO.  02    JANUARY PAYMENTS RECEIVED   mm/dd/yy PAGE 1
                  T-FILE     M-FILE
         M*ID     STATUS     STATUS     ACCOUNT

            8         8          8
            8         8          8

            8         8          8
            4         4          4
            4         4          4
            .         .          .
            .         .          .
            .         .          .
```

How to Code Match-file Runs

Step 1

Sort all files in ascending match-key sequence.

See the chapter Additional Standard File Facilities for creating sorted files.

Step 2

Code:

1. One **INPUT** parameter with the **MK=** option for each file to be matched.

   Match keys must be either all numeric or all alphanumeric. Numeric types can be mixed:

   - Specify the DD= option on all or none of the IN parameters.
   - Specify MB=KEEP if a record is to be matched against multiple occurrences of another file.
   - Correlate the coding sequence of the CA Culprit file definitions with the sequence of JCL statements that define the files (SYS010, SYS011, and additional increments, as needed).
2. **REC** parameters immediately following the associated INPUT parameter:
   - Use unique names for all fields.
   - Use start positions that are relative to the beginning of the record (not to the beginning of the input buffer).
3. Optional SELECT/BYPASS parameters:
   - After the REC parameters of the specific file to be processed.
   - With the BUFFER option immediately after the last input file definition if the processing applies to all files after matching takes place.

Matching Single-Occurrence Files

Demonstration

Objective

This report contains account information from both a master file and a matching transaction file. Each file has a match key occurrence.

Procedure

The contents of the input buffer, represented by account number, show how the files are matched:

Master file	Transaction file
(SYS010)	**(SYS011)**
15060	15060

Master file	Transaction file
21056	21056
29557	29557
30115	30115
33470	33470
69876	69876
99083	99083

Complete Code

```
 col. 2
 ▼
 IN  80  F 320 PS(TAPE) MK=M-ACCOUNT          $Master file
 REC FILE-STATUS   0    1   1                  $Input file status
 REC M-ACCOUNT         1    5          'ACCOUNT'
 REC M-NAME            6   20          'NAME'
 REC M-ADDRESS        26   37          '            ADDRESS'
 REC M-ZIP            63    5

 IN 80  F 320 PS(TAPE) MK=T-ACCOUNT           $Transaction file
 REC T-ACCOUNT         1    5          'ACCOUNT'
 REC T-PAYMENT         6    8   2  DP=2 'PAYMENT'
 REC T-DATE           14    6   2       'DATE'
 02OUT D
 023 JANUARY PAYMENTS RECEIVED
 0251*010 M-ACCOUNT               HR
 0251*020 M-NAME                  HR
 0251*030 M-ADDRESS               HR
 0251*035 M-ZIP
 0251*040 T-PAYMENT   SZ=10       HR
 0251*050 T-DATE  FD              HR
 027010   IF FILE-STATUS EQ 1  DROP              $EOF test
```

Result

```
REPORT NO. 02        JANUARY PAYMENTS RECEIVED    mm/dd/yy PAGE     1
     ACCOUNT            NAME                                ADDRESS                                PAYMENT         DATE

       15060      SHARON ARMSTRONG            25 CEDAR STREET  WAYLAND        MA      02756          100.99      mm/dd/yy
       21056      AMOS JOHNSON             22651 MASS AVENUE   SAN FRANCISCO  CA      09801        1,000.00      mm/dd/yy
       29557      IRWIN TRIMBLE              102 COLBOURNE ST  BROOKLINE      MA      09743           50.00      mm/dd/yy
       30115      IRMA DOONES               5656 SANDHILL ROAD OCEAN CITY    CA      09743        1,009.90      mm/dd/yy
       33470      VICTORIA DAY              1234 OAK HILL ROAD EVERGREEN     MI      07895          759.00      mm/dd/yy
       69876      BRUCE THORPE             11002 PEACHTREE LA  ATLANTA       GA      76543          900.99      mm/dd/yy
       99083      HELEN SANTOVEC               3 APPLE ORCHARD CHARLOTTE     NC      64321            5.00      mm/dd/yy
```

Note: The report would show actual dates in the format shown.

Matching Multiple Transactions with a Single-Entry Master

Demonstration (1): Dropping Unmatched Records

Objective

This report lists customer transactions and current balances by matching a multiple-occurrence transaction file against a single-entry master file. Unmatched records are dropped.

Procedure

- **MB=KEEP** retains a master record in the input buffer.
- The **BYPASS** parameter eliminates unwanted master file records.
- **Type 7** logic drops all unmatched records.

The contents of the input buffer, represented by account number, show how the files are matched:

Master file	Transaction file
(SYS010)	**(SYS011)**
15060	15060
	15060
	15060
15999	
16070	16070
19235	19235
21056	21056
23055	23055
	23055
	23055
27777	
29557	29557
30115	30115
	30115
31113	31113

Master file	Transaction file
	31113
31275	31275
32115	
33470	33470
	33470
34440	34440
	34440
	34440
	34440
36682	36682
69876	69876
	69876
99083	99083
	99083

Complete Code

```
col. 2
▼
IN  80 MK=M-ACCOUNT  MB=KEEP                    $Keep the master record
REC M-ACCOUNT     1    5           'ACCOUNT'
REC M-BRANCH      6    2           'BRANCH'
REC M-NAME        19  20           'NAME'
BYP M-BRANCH NE ('32' '35' '45' '46')           $Select records

IN 80 MK=T-ACCOUNT
REC T-ACCOUNT     1     5          'ACCOUNT'
REC T-TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
REC T-TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
REC T-DATE       18     6  2       'DATE'
REC T-BRANCH     24     2          'BRANCH'
REC T-NAME       26    20          'NAME'
80OUT D
80SORT T-BRANCH - T-ACCOUNT T-DATE
803 MASTER FILE MATCHED WITH MULTIPLE TRANSACTIONS
8051*010 M-BRANCH               HR
8051*020 T-ACCOUNT              HR
8051*030 M-NAME                 HR
8051*050 T-TRANS-AMT            HR
8051*060 T-TRANS-IND            HR
8051*070 T-DATE  FD             HR
807010   IF M-ACCOUNT NE T-ACCOUNT  DROP $Drop unmatched records
```

Result

```
REPORT NO. 80   MASTER FILE MATCHED WITH MULTIPLE TRANSACTIONS  mm/dd/yy PAGE     1
                                                                 AMOUNT OF          DEPOSIT/
          BRANCH         ACCOUNT              NAME              TRANSACTION        WITHDRAWAL        DATE

            32           15060        SHARON ARMSTRONG            10,099.01          D           mm/dd/yy
            32           15060        SHARON ARMSTRONG               990.11          W           mm/dd/yy
            32           15060        SHARON ARMSTRONG           100,990.11          D           mm/dd/yy
            32           16070        ARTHUR LINK                  1,080.04          D           mm/dd/yy
            32           19235        GARY NOBLES                     80.04          W           mm/dd/yy
            32           21056        AMOS JOHNSON                     1.02          W           mm/dd/yy


            35           23055        JACK JACKSON                   500.00          W           mm/dd/yy
            35           23055        JACK JACKSON                50,000.00          D           mm/dd/yy
            35           23055        JACK JACKSON                   30.00          D           mm/dd/yy
            35           29557        IRWIN TRIMBLE              500,001.00          D           mm/dd/yy


            45           33470        VICTORIA DAY             7,590,001.30          D           mm/dd/yy
            45           33470        VICTORIA DAY                     1.30          D           mm/dd/yy
            45           34440        HELEN WRIGHT                   195.01          W           mm/dd/yy
            45           34440        HELEN WRIGHT                 2,000.01          D           mm/dd/yy
            45           34440        HELEN WRIGHT                    95.01          D           mm/dd/yy
            45           34440        HELEN WRIGHT                   100.00          D           mm/dd/yy
            45           36682        JEAN WREN                    4,000.78          W           mm/dd/yy


            46           69876        BRUCE THORPE             9,009,901.15          D           mm/dd/yy
            46           69876        BRUCE THORPE                   637.55          D           mm/dd/yy
            46           99083        HELEN SANTOVEC              50,001.30          D           mm/dd/yy
            46           99083        HELEN SANTOVEC               6,468.52          D           mm/dd/yy
```

Note: The report would show actual dates in the format shown.

Demonstration (2): Selecting Matching Account Numbers

This is the same report presented in Demonstration (1). Only this time records with matching account numbers are selected.

Procedure

- **MB=KEEP** retains a master record in the input buffer.
- The **SELECT** parameter selects master file records.
- The **SELECT** parameter with the **BUFFER** option selects only records that have matching account numbers.

Complete Code

```
 col. 2
 ▼
 IN  80 F 320 PS(TAPE) MK=M-ACCOUNT MB=KEEP     $Keep the master record
 REC M-ACCOUNT     1    5           'ACCOUNT'
 REC M-BRANCH      6    2           'BRANCH'
 REC M-NAME        19  20           'NAME'
 SEL M-BRANCH EQ ('32' '35' '45' '46')          $Select records

 IN 80  F 320 PS(TAPE) MK=T-ACCOUNT
 REC T-ACCOUNT     1     5          'ACCOUNT'
 REC T-TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
 REC T-TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
 REC T-DATE       18     6  2       'DATE'
 REC T-BRANCH     24     2          'BRANCH'
 REC T-NAME       26    20          'NAME'
 SEL BUFFER WHEN M-ACCOUNT EQ T-ACCOUNT $Select matching records
 80OUT D
 80SORT T-BRANCH - T-ACCOUNT T-DATE
 803 MASTER FILE MATCHED WITH MULTIPLE TRANSACTIONS
 8051*010 M-BRANCH               HR
 8051*020 T-ACCOUNT              HR
 8051*030 M-NAME                 HR
 8051*050 T-TRANS-AMT
 8051*060 T-TRANS-IND            HR
 8051*070 T-DATE  FD             HR
```

Result

```
REPORT NO. 80     MASTER FILE MATCHED WITH MULTIPLE TRANSACTIONS  mm/dd/yy PAGE     1

                                                                          DEPOSIT/
          BRANCH         ACCOUNT              NAME                        WITHDRAWAL          DATE

            32            15060         SHARON ARMSTRONG                 10,099.01          D          mm/dd/yy
            32            15060         SHARON ARMSTRONG                    990.11          W          mm/dd/yy
            32            15060         SHARON ARMSTRONG                100,990.11          D          mm/dd/yy
            32            16070         ARTHUR LINK                       1,080.04          D          mm/dd/yy
            32            19235         GARY NOBLES                          80.04          W          mm/dd/yy
            32            21056         AMOS JOHNSON                          1.02          W          mm/dd/yy


            35            23055         JACK JACKSON                        500.00          W          mm/dd/yy
            35            23055         JACK JACKSON                     50,000.00          D          mm/dd/yy
            35            23055         JACK JACKSON                        30.00          D          mm/dd/yy
            35            29557         IRWIN TRIMBLE                   500,001.00          D          mm/dd/yy


            45            33470         VICTORIA DAY                  7,590,001.30          D          mm/dd/yy
            45            33470         VICTORIA DAY                          1.30          D          mm/dd/yy
            45            34440         HELEN WRIGHT                        195.01          W          mm/dd/yy
            45            34440         HELEN WRIGHT                      2,000.01          D          mm/dd/yy
            45            34440         HELEN WRIGHT                         95.01          D          mm/dd/yy
            45            34440         HELEN WRIGHT                        100.00          D          mm/dd/yy
            45            36682         JEAN WREN                         4,000.78          W          mm/dd/yy


            46            69876         BRUCE THORPE                  9,009,901.15          D          mm/dd/yy
            46            69876         BRUCE THORPE                        637.55          D          mm/dd/yy
            46            99083         HELEN SANTOVEC                   50,001.30          D          mm/dd/yy
            46            99083         HELEN SANTOVEC                    6,468.52          D          mm/dd/yy
```

Note: The report would show actual dates in the format shown.

Listing Accounts Without Transactions

Demonstration

Objective

This report lists accounts that do not have transactions. The match-file run matches a multiple-transaction file against a single-occurrence master file.

Procedure

- **MB=KEEP** retains a master file in the input buffer.
- A **SELECT BUFFER** statement selects those accounts without transactions.

  Note: Type 7 logic (IF M-ACCOUNT LE T-ACCOUNT DROP) can be used instead of the SELECT BUFFER statement.

The contents of the input buffer:

Master file	Transaction file
(SYS010)	**(SYS011)**
15060	15060
15060	15060
15060	15060
15999	
16070	16070
19235	19235
21056	21056
23055	23055
23055	23055
23055	23055
27777	
29557	29557
30115	30115
30115	30115
31113	31113
31113	31113
31275	31275
32115	
33470	33470
33470	33470
34440	34440
34440	34440
34440	34440
34440	34440
36682	36682
69876	69876
69876	69876

Master file	Transaction file
99083	99083
99083	99083

Complete Code

```
col. 2
▼
IN  80 MK=M-ACCOUNT MB=KEEP              $Keep master record
REC M-ACCOUNT     1    5           'ACCOUNT'
REC M-BRANCH      6    2           'BRANCH'
REC M-NAME        19  20           'NAME'

IN 80 MK=T-ACCOUNT
REC T-ACCOUNT     1    5           'ACCOUNT'
SEL BUFFER WHEN T-ACCOUNT EQ '     ' $Accounts without transactions
80OUT D
80SORT M-BRANCH -
803 LIST OF ACCOUNTS WITHOUT TRANSACTIONS
8051*010 M-BRANCH                HR
8051*020 M-ACCOUNT               HR
8051*030 M-NAME                  HR
```

Result

```
REPORT NO. 80  LIST OF ACCOUNTS WITHOUT TRANSACTIONS      mm/dd/yy PAGE     1
                       BRANCH                        ACCOUNT                                NAME

                         32                           15999                        SHELLY BROWN

                         35                           27777                        ANDY PIGGOTT

                         40                           32115                        BOB DATO
```

Listing Transactions not on the Master File

Demonstration

Objective

This report lists transactions not on the master file. Multiple transactions are matched against a single-entry master file.

Procedure

- **MB=KEEP** retains a master file in the input buffer.
- A **SELECT BUFFER** statement selects transactions that cannot be matched with the master file.

  Note: Type 7 logic (IF M-ACCOUNT GE T-ACCOUNT DROP) can be used instead of the SELECT BUFFER statement.

The contents of the input buffer for the run (K denotes master records kept in the input buffer):

Master file	Transaction file
(SYS010)	**(SYS011)**
	15060
	15060
	15060
15999	
16070	16070
19235	19235
21056	21056
23055	23055
23055K	23055
23055K	23055
27777	
29557	29557
30115K	30115
30115K	30115

Master file	Transaction file
30115K	31113
30115K	31113
31275	31275
32115	
33470	33470
33470K	33470
34440	34440
34440K	34440
34440K	34440
34440K	34440
34440K	36682
69876	69876
69876K	69876
99083	99083
99083K	99083

Complete Code

```
col. 2
▼
IN  80 MK=M-ACCOUNT MB=KEEP
REC M-ACCOUNT     1    5           'ACCOUNT'

IN 80 MK=T-ACCOUNT
REC T-ACCOUNT     1     5          'ACCOUNT'
REC T-TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
REC T-TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
REC T-DATE       18     6  2       'DATE'
REC T-BRANCH     24     2          'BRANCH'
REC T-NAME       26    20          'NAME'
SEL BUFFER WHEN T-ACCOUNT GT M-ACCOUNT $Transactions without masters
80OUT D
80SORT T-BRANCH - T-DATE D T-ACCOUNT
803 LISTING OF TRANSACTIONS WITHOUT MASTERS
8051*010 T-BRANCH                HR
8051*020 T-ACCOUNT               HR
8051*030 T-NAME                  HR
8051*050 T-TRANS-AMT             HR
8051*060 T-TRANS-IND             HR
8051*070 T-DATE  FD              HR
```

Result

```
REPORT NO. 80  LISTING OF TRANSACTIONS WITHOUT MASTERS    mm/dd/yy PAGE     1
                                                                AMOUNT OF            DEPOSIT/
          BRANCH         ACCOUNT              NAME            TRANSACTION          WITHDRAWAL          DATE

            32           15060         SHARON ARMSTRONG          100,990.11           D            mm/dd/yy
            32           15060         SHARON ARMSTRONG              990.11           W            mm/dd/yy
            32           15060         SHARON ARMSTRONG           10,099.01           D            mm/dd/yy


            40           31113         MARY CATREY                   36.00           W            mm/dd/yy
            40           31113         MARY CATREY                   36.00           D            mm/dd/yy


            45           36682         JEAN WREN                  4,000.78           W            mm/dd/yy
```

Note: The report would show actual dates in the format shown.

Using the Match-file Facility for Table Initialization

What You Can Do

You can use match keys to control the order in which files are read in a match run. If you do not specify match keys for a file, CA Culprit assumes low key values for the missing match keys on that file and reads it first.

How to Do It

1. Omit the MK= specification on the IN parameter for the file you want read first.
2. Code the MK= specification on the IN parameter for subsequent files.

Demonstration

Objective

This example produces two reports:

- An interest rate table from the first file processed
- A listing of the first month's interest for new accounts, using the interest rate table and the input data from the second file

Procedure

- No match key is used for the interest rate file.
- A match key on ACCOUNT-NO is used for the second file.

The contents of the input buffer for this run:

File 1 (SYS010)	File 2 (SYS011)
.0500 .0525 .0550	rule=no.
.0525 .0550 .0575	rule=no.
.0550 .0575 .0600	rule=no.
.0550 .0575 .0625	rule=no.
	15060
	15999
	16070
	19235

File 1 (SYS010)	File 2 (SYS011)
	21056
	23055
	27777
	29557 . . .

Complete Code

```
col. 2
▼
IN 80                                $Read first, no match key
REC FILE-TEST            0  1  1
REC INTEREST-RATE-DATA  1            GROUP AA 4.3
REC INTEREST-RATE       1  4  2  DP=4  ELMNT AA

IN 150 MK=ACCOUNT-NO             $Read second, one match key
REC ACCOUNT-NO   1  5           'ACCOUNT' 'NUMBER'
REC ACCT-TYPE    6  2  2        'ACCOUNT' 'TYPE'
REC OPEN-BAL     8 11  2  DP=2  'OPENING' 'BALANCE'
REC NAME        19 20           'NAME'
REC DATE-OPENED 39  6  2        'DATE' 'OPENED'
GW0  RATE.12 DP=4   COUNT    ZERO
00OUT 65 D
003 INTEREST RATE TABLE          $First report
0051*010 INTEREST-RATE.1  HH ' ' 'RATE CODE 1' '(ACCOUNT TYPE 1)'
0051*020 INTEREST-RATE.2  HH 'RATE CODE 2' '(ACCOUNT TYPE 2)'
0051*030 INTEREST-RATE.3  HH 'RATE CODE 3' '(ACCOUNT TYPE 3)'
92SORT  ACCT-TYPE 0  OPEN-BAL D
92OUT  120 D
920  NTH
920  FIRST-MO-INT  DP=3
923  FIRST MONTH'S INTEREST      $Second report
9241*010 ' '
9251*010 ACCOUNT-NO        HR
9251*020 NAME              HR
9251*030 DATE-OPENED  FD   HR
9251*040 ACCT-TYPE         HR
9251*050 RATE.NTH     SZ=4 HH 'INTEREST' 'RATE'
9251*060 OPEN-BAL           HR
9251*070 FIRST-MO-INT SZ=8 HH 'INTEREST' '(FIRST' 'MONTH)'
007010   IF FILE-TEST EQ 1  DROP
007      COUNT + 1  COUNT
007      MOVE INTEREST-RATE.1 TO RATE.COUNT
007      COUNT + 1  COUNT
007      MOVE INTEREST-RATE.2 TO RATE.COUNT
007      COUNT + 1  COUNT
007      MOVE INTEREST-RATE.3 TO RATE.COUNT
007      IF COUNT GT 12  040
007      TAKE
007040   ZERO DIVIDE ZERO  ZERO  $Forced buffer dump if more than 12 entries
007      STOP-RUN                $Error, stop processing
```

```
 927      IF FILE-TEST NE 1 DROP
 927      IF DATE-OPENED GE mmddyy   100
 927      IF DATE-OPENED GE mmddyy   110
 927      IF DATE-OPENED GE mmddyy   120
 927      IF DATE-OPENED GE mmddyy   130
 927      DROP

927100   ACCT-TYPE + 9  NTH
927      B 150
927110   ACCT-TYPE + 6  NTH
927      B 150
927120   ACCT-TYPE + 3  NTH
927      B 150
927130   ACCT-TYPE + 0  NTH
927150   COMPUTE (OPEN-BAL X RATE.NTH) / 12  FIRST-MO-INT
```

Note: For 'IF DATE-OPENED GE', the code would be actual dates in the format shown.

Result

```
REPORT NO. 00         INTEREST RATE TABLE    mm/dd/yy PAGE     1

     RATE CODE 1         RATE CODE 2         RATE CODE 3
   (ACCOUNT TYPE 1)    (ACCOUNT TYPE 2)    (ACCOUNT TYPE 3)

        .0500               .0525               .0550
        .0525               .0550               .0575
        .0550               .0575               .0600
        .0550               .0575               .0625
REPORT NO. 92        FIRST MONTH'S INTEREST  mm/dd/yy PAGE     1

                                                                                    INTEREST
       ACCOUNT                                 DATE       ACCOUNT     INTEREST       OPENING        (FIRST
        NUMBER            NAME               OPENED        TYPE        RATE         BALANCE        MONTH)

        33470      VICTORIA DAY            mm/dd/yy         1        .0550          51,954.10       238.123
        16070      ARTHUR LINK             mm/dd/yy         1        .0550          10,800.45        49.502
        99083      HELEN SANTOVEC          mm/dd/yy         1        .0550           4,685.28        21.474

        69876      BRUCE THORPE            mm/dd/yy         2        .0575           6,375.58        30.550
        19235      GARY NOBLES             mm/dd/yy         2        .0575           3,800.45        18.210
        34440      HELEN WRIGHT            mm/dd/yy         2        .0575           1,950.10         9.344

        36682      JEAN WREN               mm/dd/yy         3        .0575          40,007.80       191.704
        15999      SHELLY BROWN            mm/dd/yy         3        .0550             852.45         3.907
        30115      IRMA DOONES             mm/dd/yy         3        .0625             366.29         1.908
        31113      MARY CATREY             mm/dd/yy         3        .0600             360.00         1.800
        15060      SHARON ARMSTRONG        mm/dd/yy         3        .0625
        21056      AMOS JOHNSON            mm/dd/yy         3        .0625
        23055      JACK JACKSON            mm/dd/yy         3        .0625
        27777      ANDY PIGGOTT            mm/dd/yy         3        .0625
        29557      IRWIN TRIMBLE           mm/dd/yy         3        .0625
        31275      FOR ANOTHER             mm/dd/yy         3        .0625
        32115      BOB DATO                mm/dd/yy         3        .0625
```

Note: The report would show actual dates in the format shown.

Using Files Defined to the Data Dictionary

What You Can Do

During match file runs, you can reference files defined to the data dictionary.

How to Do It

Code:

1. A **DATABASE** parameter with the DICTNAME= option if an alternate dictionary is used.
2. An **INPUT** parameter with the **FN=** option to specify the file name.
3. **INPUT parameter options** and **REC** parameters if redefinition or supplementary definitions are needed. See Accessing Non-database Files Defined in the Data Dictionary.

Demonstration

Objective

This report matches a student master file (STUDENT-MAST), which is defined to the data dictionary, with a VSAM file containing course descriptions and prerequisite courses.

Procedure

- A **DATABASE** parameter with the **DICTNAME=** option specifies the alternate dictionary DOCUDICT.
- The **FN=** option on the IN parameter specifies the STUDENT-MAST file.

Partial Code

```
col. 2
▼
DATABASE DICTNAME=DOCUDICT
IN 257        FN=STUDENT-MAST  MK=COURSE-CODE

IN 96  96  VS  MK=COURSE-NUM
REC COURSE-NUM     1   3
REC DESC           4  30
REC PREQ          34        GROUP  AA  3.4
REC COURSE         1   3    ELMNT  AA
```

Creating Unique Match-key Names

How to Do It

Use a **REC** parameter to assign a unique name to a field.

What You Can Do

You can assign unique names to reference entities in the data dictionary. You may use either the primary (data dictionary) name or the assigned name. Just be consistent.

Demonstration

Objective

This example matches two files that are defined to the data dictionary. The match key for both files is PART-NUMBER. PART-NUMBER in the PARTS-INVENTORY file is assigned STOCK-REF-NUM as a unique name.

Procedure

- A **DD=** specification on the IN parameter provides alternative file assignments for each file.
- A **REC** parameter renames the PART-NUMBER field of the PARTS-INVENTORY file.
- An **MK=** specification of the new name of the PART-NUMBER (STOCK-REF-NUM) is the match key for the PARTS-INVENTORY file.

Partial Code

```
 col. 2
 ▼
 DATABASE DICTNAME=DOCUDICT
 IN 130 DD=SYS011  FN=PARTS-INVENTORY  MK=STOCK-REF-NUM
*       WAREHOUSE-CODE  BIN-POINTER
 REC STOCK-REF-NUM  1  10

 IN 170 DD=SYS012  FN=PART-DESC  MK=PART-NUMBER  WAREHOUSE-ID
*       BIN-LOCATION
```

Qualified Fields

What You Can Do

You can associate one record name in the data dictionary with fields that are specified on two or more INPUT parameters.

How to Do It

Unique field names can be provided in a particular CA Culprit run by coding:

- The **FN=** option of the INPUT parameter with the data dictionary file name
- The **MK=** option of the INPUT parameter with the field name followed by the record name known to the data dictionary, a comma, and a level number enclosed in parentheses
- **SYS010** in the JCL for the first file (level 1); **SYS011** in the JCL for the second file (level 2), and so on

Demonstration

Objective

This example matches three files that are defined in the data dictionary. Two files have MON-TRAN-FILE as a file name and TRAN-CODE as a key field name. All three files have ACCT-NO as a key field.

Procedure

The code uses level numbers to distinguish between field references (ACCOUNT,**1**, ACCOUNT,**2**, TRANSACTION,**1**, and TRANSACTION,**2**).

Partial Code

```
 col. 2
 ▼
 DATABASE DICT NAME=DOCUDICT

 IN 100  FN=MON-TRAN-FILE  MK=ACCT-NO(ACCOUNT,1)  TRAN-CODE
*        (TRANSACTION,1)
 IN 100  FN=MON-TRAN-FILE  MK=ACCT-NO(ACCOUNT,2)  TRAN-CODE
*        (TRANSACTION,2)
 IN 150  FN=CUST-FILE      MK=ACCT-NO(ACC-REC)  MB=KEEP
```

Chapter 12: Using and Modifying Copied Code

This section contains the following topics:

Introduction

Frequently used chapters of CA Culprit code can be stored for use by several reports or users. Use of stored parameters helps to establish standard file definitions, procedures, and reports. For example, you can store INPUT and REC parameters that define a shared input file, type 7 or 8 procedural code that performs an operation needed by several reports, or a set of commonly used extract functions.

Parameters to be inserted are maintained in card-image format and in data dictionaries, partitioned data sets (z/OS), source statement libraries (z/VSE), AllFusion CA-Panvalet libraries, and AllFusion CA-Librarian libraries. Stored code can be copied and modified to meet the requirements of a particular report by using one of the copied code parameters:

- USE
- =COPY
- =MACRO

Copying Stored Code (USE Parameter)

What You Can Do

The USE parameter allows you to copy code that is stored on 80-byte records.

How to Do It

Code a basic USE parameter by entering the following in the job stream:

1. The keyword **USE**
2. The name of the file or module that contains the CA Culprit source code:

```
 USE CULCODE
/*
```

Assigning Values to Symbolic Fields (USE Parameter)

What You Can Do

You can use symbolic fields on the parameters in your stored or inline CA Culprit code for values that are likely to change.

How to Do It

Code:

1. Source code that incorporates symbolic parameter references:

```
010 START &.&1.
```

2. A standard USE parameter that names the source code to be copied:

```
 USE CULCODE
/*
```

3. The WITH VALUES keyword phrase:

```
 USE CULCODE
 WITH VALUES ...
/*
```

4. Keyword arguments (data values) or keyword expressions (labels), as needed, on the same line as WITH VALUES. The argument sequence must correspond to the parameter sequence:

```
 USE CULCODE
 WITH VALUES (mmddyy,MONTHLY REPORT)
/*
```

Note: The value would show the actual date in the format shown.

Demonstration

Objective

This is a monthly report of branch office transactions created from code stored as RPT624. The report title and the dates printed in the heading of the report change each time the report code is run.

Procedure

- The **USE** parameter copies stored code (RPT624) containing symbolic parameters for values likely to change.
- The **WITH VALUES** clause provides arguments that are substituted for the symbolic parameters.

Complete Code

Below follows the job stream and the stored code:

The Job Stream

```
 USE RPT624
 WITH VALUES (mmddyy,mmddyy,mmddyy,MONTHLY REPORT)
/*
```

Note: The value would show actual dates in the format shown.

The Stored Code

```
col. 2
▼
IN 80 F
REC ACCOUNT     1     5          'ACCOUNT'
REC TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
REC TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
REC TRANS-DATE 18     6  2       'DATE'
REC BRANCH     24     2          'BRANCH'
REC NAME       26    20          'NAME'
80OUT 80
80SORT ACCOUNT 1 BRANCH  NAME  RPT-DAY  START  END
800  START &.&1.                        $First date (mmddyy)
800  END   &.&2.                        $Second date (mmddyy)
800  RPT-DAY &.&3.                      $Third date (mmddyy)
803 &.&4.                               $Title (MONTHLY REPORT)
80410010 NAME
80410030 ACCOUNT
80410040 BRANCH
80410050 RPT-DAY          FD
80420010 'PERIOD: FROM'
```

```
80420024 START            FD
80420034 'TO'
80420038 END              FD
8051*010 TRANS-DATE       FD   HR
8051*020 TRANS-IND             HR
8051*030 TRANS-AMT             HR
8051*070 TRANS-DATE  FD        HR
8061*0200'TOTAL TRANSACTIONS'
8061*030 TRANS-AMT
```

Note: The first, second and third dates would be the actual dates in the format shown.

The sequential parameter listing, which is produced in a CA Culprit run, shows the substitutions made for the symbolic parameters.

Sequential Parameter Listing

```
mm/dd/yy             SEQUENTIAL PARAMETER LISTING     volser Vnn.n  PAGE     1

00 ** SYSIN **                          USE RPT624
                                        WITH VALUES (mmddyy,mmddyy,mmddyy,MONTHLY REPORT)
01 RPT624                               IN 80 F
  C200138 INSTALLATION SECURITY OPTION IS NO
                                        REC ACCOUNT     1     5          'ACCOUNT'
                                        REC TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
                                        REC TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
                                        REC TRANS-DATE 18     6  2       'DATE'
                                        REC BRANCH     24     2          'BRANCH'
                                        REC NAME       26    20          'NAME'
                                        80OUT 80
                                        80SORT ACCOUNT 1 BRANCH  NAME  RPT-DAY  START  END
                                        800  START mmddyy                       $First date (mmddyy)
                                        800  END   mmddyy                       $Second date (mmddyy)
                                        800  RPT-DAY mmddyy                     $Third date (mmddyy)
                                        803 MONTHLY                              $Title (MONTHLY REPORT)
                                        80410010 NAME
                                        80410030 ACCOUNT
                                        80410040 BRANCH
                                        80410050 RPT-DAY          FD
                                        80420010 'PERIOD: FROM'
                                        80420024 START            FD
                                        80420034 'TO'
                                        80420038 END              FD
                                        8051*010 TRANS-DATE       FD   HR
                                        8051*020 TRANS-IND             HR
                                        8051*030 TRANS-AMT             HR
                                        8051*070 TRANS-DATE  FD        HR
                                        8061*0200'TOTAL TRANSACTIONS'
                                        8061*030 TRANS-AMT
```

Note: The first, second and third dates would be the actual dates in the format shown.

The Report

```
REPORT NO. 80  MONTHLY                      $Title  mm/dd/yy PAGE     1
         SHARON ARMSTRONG    15060     32        mm/dd/yy
         PERIOD: FROM  mm/dd/yy  TO  mm/dd/yy
                         DEPOSIT/              AMOUNT OF
        DATE            WITHDRAWAL           TRANSACTION          DATE

      mm/dd/yy              D                     10,099.01      mm/dd/yy
      mm/dd/yy              W                        990.11      mm/dd/yy
      mm/dd/yy              D                    100,990.11      mm/dd/yy

                    TOTAL TRANSACTIONS          112,079.23
REPORT NO. 80  MONTHLY                      $Title  mm/dd/yy PAGE     2
         ARTHUR LINK         16070     32        mm/dd/yy
         PERIOD: FROM  mm/dd/yy  TO  mm/dd/yy
                         DEPOSIT/              AMOUNT OF
        DATE            WITHDRAWAL           TRANSACTION          DATE

      mm/dd/yy              D                      1,080.04      mm/dd/yy

                    TOTAL TRANSACTIONS            1,080.04
```

Note: The reports would show actual dates in the format shown.

Assigning Default Values to Symbolic Parameters (USE Parameter)

What You Can Do

You can assign default values to symbolic parameters in your stored or inline code and use keywords to provide documentation.

How to Do It

Code:

- The word **DEFAULT** on the first line of *stored* code.

  If used inline, the DEFAULT clause is entered as the last of the USE parameter clauses.

- Symbolic parameter names entered sequentially, starting with &.&1.
- A keyword for each symbolic parameter name. (Any keywords in the WITH VALUES clause must match those in the DEFAULT clause.)
- The value for the keyword.

Demonstration

Objective

This example uses a DEFAULT clause to produce the same report as the example using a WITH VALUES clause.

Procedure

- Default values are used for symbolic parameters whose values do not appear on the WITH VALUES clause.
- Keywords **START**, **END**, and **TITLE** provide documentation.
- **RPT-DAY**, the keyword for &.&3., is specified on both the **WITH VALUES** clause and the **DEFAULT** clause.

  The value given on the WITH VALUES clause (mmddyy) overrides the value on the DEFAULT clause, where mmddyy would be actual dates in this format.

Complete Code

Below follows the job stream and the stored code:

The Job Stream

```
 USE RPT627
 WITH VALUES (RPT-DAY=mmddyy)       $Overriding value
/*
```

Note: The rpt-day value would show actual dates in the format shown.

The Stored Code

```
col. 2
▼
DEFAULT &.&1=START=mmddyy.       $Default values if not overridden
        &.&2=END=mmddyy.
        &.&3=RPT-DAY=mmddyy.
        &.&4=TITLE='MONTHLY. REPORT'
IN 80
REC ACCOUNT     1     5          'ACCOUNT'
REC TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
REC TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
REC TRANS-DATE 18     6  2       'DATE'
REC BRANCH     24     2          'BRANCH'
REC NAME       26    20          'NAME'
80OUT 80
80SORT ACCOUNT 1 BRANCH  NAME  RPT-DAY  START  END
800  START &.&1.
800  END   &.&2.
```

```
800  RPT-DAY &.&3.
803 &.&4.
80410010 NAME
80410030 ACCOUNT
80410040 BRANCH
80410050 RPT-DAY          FD
80420010 'PERIOD: FROM'
80420024 START            FD
80420034 'TO'
80420038 END              FD
8051*010 TRANS-DATE       FD   HR
8051*020 TRANS-IND             HR
8051*030 TRANS-AMT             HR
8051*070 TRANS-DATE  FD        HR
8061*0200'TOTAL TRANSACTIONS'
8061*030 TRANS-AMT
```

Note: The code would show actual dates for start, end, and rpt-day in the format shown.

Result

```
REPORT NO. 80              MONTHLY REPORT            mm/dd/yy PAGE     1
         SHARON ARMSTRONG    15060     32        mm/dd/yy
         PERIOD: FROM  mm/dd/yy  TO  mm/dd/yy
                          DEPOSIT/             AMOUNT OF
        DATE             WITHDRAWAL           TRANSACTION          DATE

      mm/dd/yy              D                    10,099.01      mm/dd/yy
      mm/dd/yy              W                       990.11      mm/dd/yy
      mm/dd/yy              D                   100,990.11      mm/dd/yy

                    TOTAL TRANSACTIONS          112,079.23
REPORT NO. 80          MONTHLY REPORT             mm/dd/yy PAGE     2
         ARTHUR LINK         16070     32        mm/dd/yy
         PERIOD: FROM  mm/dd/yy  TO  mm/dd/yy
                           DEPOSIT/             AMOUNT OF
        DATE             WITHDRAWAL           TRANSACTION          DATE

      mm/dd/yy              D                     1,080.04      mm/dd/yy

                    TOTAL TRANSACTIONS            1,080.04
```

Note: The report would show actual dates in the format shown.

Nesting the USE Parameter

What You Can Do

You can nest the USE parameter. One or more USE parameters and WITH VALUES clauses can be included in stored code.

If one USE parameter appears in the stored code, it is treated as a nested parameter in the job stream at run-time.

How to Do It

Code:

1. The **USE** parameter followed by an asterisk (*****), and a **WITH VALUES** clause at the beginning of the code affected
2. **END** at the end of the code affected by the value assignments

Demonstration

Objective

This is a partial example that produces the same report as that shown earlier for the reports generated from the WITH VALUES and DEFAULT clauses.

Procedure

- A **USE** parameter in the job stream copies the stored code.
- **USE *** parameter and a **WITH VALUES** clause assign values to the symbolic parameters.
- An **END** clause signals the end of the code affected by the USE parameter.

The Job Stream

```
USE RPT624
/*
```

The Stored Code

```
 col. 2
 ▼
USE *                  $Start of code sequence affected by changes
WITH VALUES (mmddyy,mmddyy,mmddyy,'MONTHLY REPORTS')
 IN 80
 REC ACCOUNT  1   5    'ACCOUNT'
   .
   .
   .
 END                     $End of code incorporating changes
```

Note: The code would specify actual dates in the format shown.

Modifying Code (USE Parameter)

What You Can Do

You can change report numbers and character strings, drop or keep parameters, and renumber type 7 and type 8 sequence numbers with the USE parameter.

How to Do It

- To modify code, use one or more **CHANGE** clauses for each USE parameter.

  Only one clause can specify a report number change.

- To eliminate or retain code, use one or more **DROP** or **KEEP** clauses.

  If both DROP and KEEP are coded, precedence is given to the DROP clause.

- To renumber type 7 and type 8 sequence numbers, use one or more **RENUMBER** clauses.

  The RENUMBER clause must be the last clause coded on the USE parameter.

Demonstration (1): Changing Report Numbers and Character Strings

Objective

This report is derived from stored code. The code is changed to provide updated branch office account activity information.

Procedure

- The report number is changed from 80 to 01.
- The title is changed from ACCOUNT ACTIVITY BY BRANCH to BRANCH ACCOUNTS.
- A type 5 parameter is changed to a type 4 to allow the branch number to print as a heading.

Complete Code

```
col. 2
▼
IN 80 F
USE *
    CHANGE RPTNO TO 01 AND                $Chained together with AND
         '51*010' 4/9 TO '410010' AND
         'ACCOUNT ACTIVITY BY BRANCH' TO 'BRANCH ACCOUNTS'
REC T-ACCOUNT     1     5          'ACCOUNT'
REC T-TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
REC T-TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
REC T-DATE       18     6  2       'DATE'
REC T-BRANCH     24     2
REC T-NAME       26    20          'NAME'
80OUT D                                        $Report number changed
80SORT T-BRANCH 1
803 ACCOUNT ACTIVITY BY BRANCH                 $Title changed
8051*010 T-BRANCH                              $Changed to a type 4 parameter
8051*020 T-ACCOUNT              HR
8051*030 T-NAME                 HR
8051*050 T-TRANS-AMT            HR
8051*060 T-TRANS-IND            HR
8051*070 T-DATE  FD             HR
END
```

Result

Sequential Parameter Listing

```
mm/dd/yy             SEQUENTIAL PARAMETER LISTING      volser Vnn.n  PAGE     1

00 ** SYSIN **                            IN 80 F
   C200138 INSTALLATION SECURITY OPTION IS NO

                                      USE *
                                          CHANGE RPTNO TO 01 AND                $Chained together with AND
                                               '51*010' 4/9 TO '410010' AND
                                               'ACCOUNT ACTIVITY BY BRANCH' TO 'BRANCH ACCOUNTS'
01 ** SYSIN **                        REC T-ACCOUNT     1     5         'ACCOUNT'
                                      REC T-TRANS-IND   6     1         'DEPOSIT/' 'WITHDRAWAL'
                                      REC T-TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
                                      REC T-DATE       18     6  2       'DATE'
                                      REC T-BRANCH     24     2
                                      REC T-NAME       26    20          'NAME'
                                      01OUT D                                       $Report number changed
                                      01SORT T-BRANCH 1
                                      013 BRANCH ACCOUNTS                   $Title changed
                                      01410010 T-BRANCH                             $Changed to a type 4 parameter
                                      0151*020 T-ACCOUNT              HR
                                      0151*030 T-NAME                 HR
                                      0151*050 T-TRANS-AMT            HR
                                      0151*060 T-TRANS-IND            HR
                                      0151*070 T-DATE  FD             HR
                                      END
```

Report

```
REPORT NO. 01                          BRANCH ACCOUNTS                        mm/dd/yy PAGE     1
         32
                                                                 AMOUNT OF             DEPOSIT/
           ACCOUNT                  NAME                       TRANSACTION           WITHDRAWAL             DATE

             15060          SHARON ARMSTRONG                       10,099.01              D               mm/dd/yy
             15060          SHARON ARMSTRONG                          990.11              W               mm/dd/yy
             15060          SHARON ARMSTRONG                      100,990.11              D               mm/dd/yy
             16070          ARTHUR LINK                             1,080.04              D               mm/dd/yy
             19235          GARY NOBLES                                80.04              W               mm/dd/yy
             21056          AMOS JOHNSON                                1.02              W               mm/dd/yy
REPORT NO. 01                          BRANCH ACCOUNTS                        mm/dd/yy PAGE     2
         35
                                                                 AMOUNT OF             DEPOSIT/
           ACCOUNT                  NAME                       TRANSACTION           WITHDRAWAL             DATE

             23055          JACK JACKSON                               500.00              W               mm/dd/yy
             23055          JACK JACKSON                            50,000.00              D               mm/dd/yy
             23055          JACK JACKSON                               30.00               D               mm/dd/yy
             29557          IRWIN TRIMBLE                         500,001.00               D               mm/dd/yy
```

Note: The report would show actual dates in the format shown.

Demonstration (2): Using a KEEP Clause

Objective

This example changes inline code to produce a report of individual account activity.

Procedure

A **KEEP** clause is used to retain the title and three type 5 fields (ACCOUNT, TRANS-AMT, and TRANS-IND). All other fields are dropped.

Complete Code

```
col. 2
▼
IN 80 F
USE *
    CHANGE RPTNO TO 01 AND
           'ACCOUNT ACTIVITY BY BRANCH' TO 'ACCOUNT ACTIVITY'
    KEEP  3 AND 'ACCOUNT' AND 'TRANS-AMT' AND 'TRANS-IND'
REC ACCOUNT     1     5          'ACCOUNT'
REC TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
REC TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
REC DATE       18     6  2       'DATE'
REC BRANCH     24     2
REC NAME       26    20          'NAME'
80OUT D                                 $Report number changed
80SORT NAME 0
803 ACCOUNT ACTIVITY BY BRANCH          $Title changed
8051*010 BRANCH
8051*020 ACCOUNT               HR       $Kept
8051*030 NAME                  HR
8051*050 TRANS-AMT             HR       $Kept
8051*060 TRANS-IND             HR       $Kept
8051*070 DATE  FD              HR
END
```

Sequential Parameter Listing

```
mm/dd/yy                SEQUENTIAL PARAMETER LISTING          volser  Vnn.n  PAGE     1

00 ** SYSIN **                           IN 80 F
   C200138 INSTALLATION SECURITY OPTION IS NO

                                      USE *
                                          CHANGE RPTNO TO 01 AND
                                                 'ACCOUNT ACTIVITY BY BRANCH' TO 'ACCOUNT ACTIVITY'
                                          KEEP  3 AND 'ACCOUNT' AND 'TRANS-AMT' AND 'TRANS-IND'
01 ** SYSIN **                        REC ACCOUNT     1     5          'ACCOUNT'
                                      REC TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
                                      REC TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
                                      013 ACCOUNT ACTIVITY          $Title changed
                                      0151*020 ACCOUNT               HR       $Kept
                                      0151*050 TRANS-AMT             HR       $Kept
                                      0151*060 TRANS-IND             HR       $Kept
```

Report

```
REPORT NO. 01                              ACCOUNT ACTIVITY                          mm/dd/yy PAGE     1
                                                                AMOUNT OF                    DEPOSIT/
                        ACCOUNT                                 TRANSACTION                  WITHDRAWAL

                         15060                                     10,099.01                    D
                         15060                                        990.11                    W
                         15060                                    100,990.11                    D
                         16070                                      1,080.04                    D
                         19235                                         80.04                    W
                         21056                                          1.02                    W
                         23055                                        500.00                    W
                         23055                                     50,000.00                    D
                         23055                                         30.00                    D
                         29557                                    500,001.00                    D
                         30115                                    500,001.00                    D
                         30115                                     50,001.00                    D
                         31113                                         36.00                    W
                         31113                                         36.00                    D
                         31275                                  5,000,000.00                    D
                         33470                                  7,590,001.30                    D
                         33470                                          1.30                    D
                         34440                                        195.01                    W
                         34440                                      2,000.01                    D
                         34440                                         95.01                    D
                         34440                                        100.00                    D
                         36682                                      4,000.78                    W
                         69876                                  9,009,901.15                    D
                         69876                                        637.55                    D
                         99083                                     50,001.30                    D
                         99083                                      6,468.52                    D

                                                                22,877,247.26
```

Demonstration (3): Using a DROP Clause

Objective

This example uses the DROP clause to produce the same report as that shown for the KEEP clause in Demonstration (2).

Procedure

A **DROP** clause is used to leave out DATE, BRANCH, and NAME. ACCOUNT, TRANS-IND, and TRANS-AMT are kept. ADD A LABEL HERE

```
col. 2
▼
IN 80 F
USE *
    CHANGE RPTNO TO 01 AND
           'ACCOUNT ACTIVITY BY BRANCH' TO 'ACCOUNT ACTIVITY'
    DROP  'DATE' AND 'BRANCH' AND 'NAME'
REC ACCOUNT     1     5          'ACCOUNT'
REC TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
REC TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
REC DATE       18     6  2       'DATE'
REC BRANCH     24     2
REC NAME       26    20          'NAME'
80OUT D
80SORT NAME 0                           $Dropped
803 ACCOUNT ACTIVITY BY BRANCH          $Title changed
8051*010 BRANCH                         $Dropped
8051*020 ACCOUNT               HR
8051*030 NAME                  HR       $Dropped
8051*050 TRANS-AMT             HR
8051*060 TRANS-IND             HR
8051*070 DATE  FD              HR       $Dropped
END
```

Demonstration (4): Using the RENUMBER Clause

Objective

This example renumbers type 7 sequence numbers in inline code to produce a current Account Activity Report.

Procedure

The **RENUMBER** clause is used to change type 7 sequence numbers from 010, 020, 040, and 050 to 100, 200, 300, and 400, respectively.

Complete Code

```
col. 2
▼
IN 80 F
USE *
    CHANGE 'ACCOUNT ACTIVITY BY BRANCH' TO 'ACCOUNT ACTIVITY'
    DROP  'BRANCH' AND 'NAME'
    RENUMBER 7 1/100 TO 100 BY 100
REC ACCOUNT     1     5          'ACCOUNT'
REC TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
REC TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
REC MMDDYY     18     6  2
REC BRANCH     24     2
REC NAME       26    20          'NAME'
01OUT D
01SORT NAME 0
010 MMDD
010 YY
010 YYMMDD
013 ACCOUNT ACTIVITY BY BRANCH                              $Changed
0151*010 BRANCH                                             $Dropped
0151*020 ACCOUNT               HR
0151*030 NAME                  HR                           $Dropped
0151*050 TRANS-AMT             HR
0151*060 TRANS-IND             HR
0151*070 YYMMDD  FD            HH 'DATE'
017010 IF TRANS-AMT LE 100  DROP                            $Renumbered
017020 COMPUTE TRUNC MMDDYY / 100  MMDD
017040 COMPUTE MMDDYY - (MMDD X 100) YY
017050 COMPUTE (YY X 10000) + MMDD YYMMDD
END
```

Result

Sequential Parameter Listing

```
mm/dd/yy                SEQUENTIAL PARAMETER LISTING                          volser  Vnn.n  PAGE     1

00 ** SYSIN **                           IN 80 F
   C200138 INSTALLATION SECURITY OPTION IS NO

                                      USE *
                                          CHANGE 'ACCOUNT ACTIVITY BY BRANCH' TO 'ACCOUNT ACTIVITY'
                                          DROP  'BRANCH' AND 'NAME'
                                          RENUMBER 7 1/100 TO 100 BY 100
01 ** SYSIN **                        REC ACCOUNT     1     5          'ACCOUNT'
                                      REC TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
                                      REC TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
                                      REC MMDDYY     18     6  2
                                      010UT D
                                      010 MMDD
                                      010 YY
                                      010 YYMMDD
                                      013 ACCOUNT ACTIVITY                              $Changed
                                      0151*020 ACCOUNT              HR
                                      0151*050 TRANS-AMT            HR
                                      0151*060 TRANS-IND            HR
                                      0151*070 YYMMDD  FD           HH 'DATE'
                                      017100 IF TRANS-AMT LE 100  DROP                            $Renumbered
                                      017200 COMPUTE TRUNC MMDDYY / 100  MMDD
                                      017300 COMPUTE MMDDYY - (MMDD X 100) YY
                                      017400 COMPUTE (YY X 10000) + MMDD YYMMDD
                                      END
```

Report

```
REPORT NO. 01                          ACCOUNT ACTIVITY                    $Ch       mm/dd/yy PAGE     1
                                           AMOUNT OF                     DEPOSIT/
                  ACCOUNT                TRANSACTION                   WITHDRAWAL                    DATE

                    15060                  10,099.01                       D                       yy/mm/dd
                    15060                     990.11                       W                       yy/mm/dd
                    15060                 100,990.11                       D                       yy/mm/dd
                    16070                   1,080.04                       D                       yy/mm/dd
                    23055                     500.00                       W                       yy/mm/dd
                    23055                  50,000.00                       D                       yy/mm/dd
                    29557                 500,001.00                       D                       yy/mm/dd
                    30115                 500,001.00                       D                       yy/mm/dd
                    30115                  50,001.00                       D                       yy/mm/dd
                    31275               5,000,000.00                       D                       yy/mm/dd
                    33470               7,590,001.30                       D                       yy/mm/dd
                    34440                     195.01                       W                       yy/mm/dd
                    34440                   2,000.01                       D                       yy/mm/dd
                    36682                   4,000.78                       W                       yy/mm/dd
                    69876               9,009,901.15                       D                       yy/mm/dd
                    69876                     637.55                       D                       yy/mm/dd
                    99083                  50,001.30                       D                       yy/mm/dd
                    99083                   6,468.52                       D                       yy/mm/dd
```

Note: The report would show actual dates in the format shown.

Copying and Modifying Code (=COPY Parameter)

What You Can Do

You can copy stored code, change report numbers, and suppress INPUT parameters with the =COPY parameter.

How to Do It

1. Code **=COPY** in the SYSIN file, beginning in column 1.
2. On the same line, include one or all of the following:
   - Source of the code to be used:
     - The name of the file
     - The name of the module
     - An asterisk (*) if inline code follows
   - A **RPTNO=** keyword followed by the 2-digit report number being assigned to this report

Demonstration

Objective

This example copies stored record descriptions and parameters.

Procedure

- An =COPY parameter is used to copy record descriptions from the file **RECS**.
- An =COPY parameter is used to copy parameters
- The report number of PARAMS is changed to 02 (**RPTNO=02**).

Complete Code

```
 col. 2
 ▼
=COPY RECS
=COPY PARAMS RPTN0=02
/*
```

Result

A plus sign (+), in the sequential parameter listing below, identifies copied lines:

Sequential Parameter Listing

```
mm/dd/yy                        SEQUENTIAL PARAMETER LISTING     volser  Vnn.n  PAGE     1

00 ** SYSIN **                          =COPY RECS
   C200138 INSTALLATION SECURITY OPTION IS NO


                                    +  IN 200
                                    +  REC EMPLOYEE        5   20
                                    +  REC FIRST-NAME      5   10
                                    +  REC LAST-NAME      15   10
                                    +  REC DEPARTMENT    115   25
                                    +  REC SALARY        160    5  3  DP=2
                                    +  REC TITLE         171   20

                                      =COPY PARAMS RPTNO=02
                                    +  02$"PARAMS"
                                    +  023 EMPLOYEE SALARY LISTING BY DEPARTMENT
                                    +  02SORT DEPARTMENT - SALARY D EMPLOYEE
                                    +  0251*010 DEPARTMENT      HH 'DEPARTMENT NAME'
                                    +  0251*020 LAST-NAME       HH '                    EMPLOYEE NAME'
                                    +  0251*025 FIRST-NAME
                                    +  0251*030 TITLE           HH 'JOB TITLE'
                                    +  0251*040 SALARY          HH '    ANNUAL SALARY'
```

Report

```
REPORT NO. 02           EMPLOYEE SALARY LISTING BY DEPARTMENT                mm/dd/yy PAGE     1
         DEPARTMENT NAME                          EMPLOYEE NAME                      JOB TITLE             ANNUAL SALARY

     ACCOUNTING AND PAYROLL                JENSON                  RUPERT       MGR ACCTNG/PAYROLL          82,000.00
     ACCOUNTING AND PAYROLL                KIMBALL                 MARIANNE     ACCOUNTANT                  45,000.00
     ACCOUNTING AND PAYROLL                HUTTON                  EDWARD       FINANCIAL ANALYST           44,000.00
     ACCOUNTING AND PAYROLL                BLOOMER                 JUNE         PAYROLL CLERK               15,000.00
     ACCOUNTING AND PAYROLL                KING                    DORIS        AR CLERK                    14,500.00
     ACCOUNTING AND PAYROLL                NICEMAN                 BRIAN        AP CLERK                    14,000.00

                                                                                                            214,500.00
     THERMOREGULATION                      WILCO                   ROGER        MGR THERMOREGULATION        80,000.00
     THERMOREGULATION                      FINN                    PHINEAS      KEEPER OF BALLOONS          45,000.00
     THERMOREGULATION                      CLOTH                   TERRY        HUMIDITY CONTROL CLK        38,000.00
     THERMOREGULATION                      TIME                    MARK         WINTERIZER                  33,000.00
     THERMOREGULATION                      KASPAR                  JOE          WINTERIZER                  31,000.00

                                                                                                            227,000.00

                                                                                                          2,522,500.00
```

Copying and Modifying Code (=MACRO Parameter)

What You Can Do

You can copy or modify code for a single CA Culprit run with the =MACRO parameter. Symbolic parameters can be used in copied or inline code as a substitute for arguments; parameters can be changed or suppressed.

How to Do It

- To code changes affecting copied code, enter **=MACRO** after the INPUT parameter.
- To code changes affecting inline code, enter **=MACRO *** at the beginning of the code to be changed.
- To modify code, enter the values for symbolic parameters, enclosed in parentheses, on the same line as the =MACRO (*) parameter.
- To eliminate or retain code, enter =DROP and =CHANGE on the line immediately following the =MACRO (*) parameter.
- Enter **=MEND** immediately after the =MACRO clauses.
- Code a second =MACRO */ =MEND sequence before inline code that is not to be changed.

Demonstration (1): Providing Symbolic Parameter Values

Objective

This report uses copied code that contains symbolic fields to list employees with salaries less than $60,000 in all departments except Brainstorming.

Procedure

The **=MACRO *** parameter provides the values for the symbolic parameters.

Complete Code

```
 col. 2
 ▼
 IN  200 F 400 PS(TAPE)
 REC EMP-NAME      5   25           'EMPLOYEE NAME'
 REC DEPARTMENT  115   45           'DEPARTMENT'
 REC SALARY      160    5  3  DP=2
 013 EMPLOYEE SALARY LISTING
 010 COUNT 1
=MACRO * (DEPARTMENT 'BRAIN STORMING     ' EMP-NAME SALARY 60000)
=MEND
 0151*000 COUNT
 0151*010 &.&3.                      $EMP-NAME
 0151*020 &.&4.        SZ=7 F2  HF   $SALARY
 0161*010 'TOTAL COUNT'
 0161*020 COUNT      SZ=8
 017010 IF &.&1. EQ &.&2. DROP     $If DEPARTMENT equal BRAINSTORMING
 017    IF &.&4. GE &.&5. DROP     $If SALARY greater than 60000
```

Result

In the sequential parameter listing, below:

- A plus sign (+) identifies the substitutions made.
- An asterisk (*) indicates a continuation line for parameters having more than one substitution.

Sequential Parameter Listing

```
mm/dd/yy                       SEQUENTIAL PARAMETER LISTING                 volser Vnn.n  PAGE     1

00 ** SYSIN **                           IN  200 F 400 PS(TAPE)
   C200138 INSTALLATION SECURITY OPTION IS NO

                                         REC EMP-NAME      5   25           'EMPLOYEE NAME'
                                         REC DEPARTMENT  115   45           'DEPARTMENT'
                                         REC SALARY      160    5  3  DP=2
                                         013 EMPLOYEE SALARY LISTING
                                         010 COUNT 1

                                        =MACRO * (DEPARTMENT 'BRAIN STORMING     ' EMP-NAME SALARY 60000)
                                      + =MEND
                                      +  0151*000 COUNT
                                      +  0151*010 &.&3.                      $EMP-NAME
                                      ++ 0151*010 EMP-NAME                 $EMP-NAME
                                      +  0151*020 &.&4.        SZ=7 F2  HF  $SALARY
                                      ++ 0151*020 SALARY     SZ=7 F2  HF  $SALARY
                                      +  0161*010 'TOTAL COUNT'
                                      +  0161*020 COUNT      SZ=8
                                      +  017010 IF &.&1. EQ &.&2. DROP     $If DEPARTMENT equal BRAINSTORMING
                                      ++ 017010 IF DEPARTMENT
                                      ++*EQ 'BRAIN STORMING     '
                                      ++*DROP     $If DEPARTMENT equal BRAINSTORMING
                                      +  017    IF &.&4. GE &.&5. DROP     $If SALARY greater than 60000
                                      ++ 017    IF SALARY
                                      ++*GE 60000
                                      ++*DROP     $If SALARY greater than 60000
```

Report

```
REPORT NO. 01                          EMPLOYEE SALARY LISTING              mm/dd/yy PAGE     1
                                                                                      SALARY

                              JUNE      BLOOMER                                      15,000.00
                              EDWARD    HUTTON                                       44,000.00
                              MARIANNE  KIMBALL                                      45,000.00
                              DORIS     KING                                         14,500.00
                              BRIAN     NICEMAN                                      14,000.00
                              JANE      FERNDALE                                     22,500.00
                              GEORGE    FONRAD                                       14,750.00
                              ROBIN     GARDNER                                      14,000.00
                              DOUGLAS   KAHALLY                                      20,000.00
                              TERENCE   KLWELLEN                                     43,000.00
                              SANDY     KRAAMER                                      14,000.00
JAMES     GALLWAY                                      33,000.00
                              PERCY     GRANGER                                      34,500.00
                              VLADIMIR  HEAROWITZ                                    33,000.00
                              JAMES     JACOBI                                       55,000.00
                              JULIE     JENSEN                                       37,000.00
                              LARRY     LITERATA                                     37,500.00
                              KATHERINE O'HEARN                                      42,500.00
                              RALPH     TYRO                                         20,000.00
                                     TOTAL COUNT                                           44
```

Demonstration (2): Modifying Parameters and the Report Number

Objective

This example modifies the report number and parameter of copied code to produce a report on employee salaries.

Procedure

- An **=DROP** clause is used to omit the INPUT and type 6 parameters.
- An **=CHANGE** clause is used to change the report number from 01 to 07.

Complete Code

```
 col. 2
 ▼
 IN  200
=MACRO RPT631A (DEPARTMENT 'BRAIN STORMING     ' EMP-NAME SALARY 60000)
=DROP INPUT  TYPE=6  $Drop INPUT and type 6 parameters
=CHANGE RPTNO=07     $Change the report number
=MEND
/*
```

Result

In the sequential parameter listing below:

- A plus sign (+) indicates copied parameters.
- A double plus sign (++) indicates a copied parameter and a value substitution.
- An asterisk (*) indicates a continuation line when more than one substitution occurs.

Sequential Parameter Listing

```
mm/dd/yy                            SEQUENTIAL PARAMETER LISTING            volser  Vnn.n  PAGE     1

00 ** SYSIN **                          IN  200
   C200138 INSTALLATION SECURITY OPTION IS NO


                                        =MACRO RPT631A (DEPARTMENT 'BRAIN STORMING     ' EMP-NAME SALARY 60000)
                                        =DROP INPUT  TYPE=6
                                        =CHANGE RPTNO=07
                                        =MEND

                                       +  IN  200
 W C200052 INPUT CARD DROPPED
                                       +  REC EMP-NAME      5  25           'EMPLOYEE NAME'
                                       +  REC DEPARTMENT  115  45           'DEPARTMENT'
                                       +  REC SALARY      160   5  3  DP=2
                                       +  073 EMPLOYEE SALARY LISTING
                                       +  070 COUNT 1
                                       +  0751*010 &.&3.       HR
                                       ++ 0751*010 EMP-NAME  HR
                                       +  0751*020 &.&4.        SZ=7  F2   HF
                                       ++ 0751*020 SALARY     SZ=7  F2   HF
                                       +  0761*010 'TOTAL COUNT'
                                       +  0761*020 COUNT      SZ=8
                                       +  077010 IF &.&1. EQ &.&2. DROP
                                       ++ 077010 IF DEPARTMENT
                                       ++*EQ 'BRAIN STORMING     '
                                       ++*DROP
                                       +  077    IF &.&4. GE &.&5. DROP
                                       ++ 077    IF SALARY
                                       ++*GE 60000
                                       ++*DROP
```

Report

```
REPORT NO. 07              EMPLOYEE SALARY LISTING                        mm/dd/yy PAGE     1
                                    EMPLOYEE NAME                                    SALARY

                           JUNE       BLOOMER                                     15,000.00
                           EDWARD     HUTTON                                      44,000.00
                           MARIANNE   KIMBALL                                     45,000.00
                           DORIS      KING                                        14,500.00
                           BRIAN      NICEMAN                                     14,000.00
                           JANE       FERNDALE                                    22,500.00
                           GEORGE     FONRAD                                      14,750.00
                           ROBIN      GARDNER                                     14,000.00
                           DOUGLAS    KAHALLY                                     20,000.00
                           TERENCE    KLWELLEN                                    43,000.00
                           SANDY      KRAAMER                                     14,000.00
                           HERBERT    LIPSICH                                     18,500.00
                           NANCY      TERNER                                      13,000.00
                           BETH       CLOUD                                       52,750.00
                           TERRY      CLOTH                                       38,000.00
                           PHINEAS    FINN                                        45,000.00
                           JOE        KASPAR                                      31,000.00
                           MARK       TIME                                        33,000.00
                           JANE       DOUGH                                       33,000.00
                           JAMES      GALLWAY                                     33,000.00
                           PERCY      GRANGER                                     34,500.00
                           VLADIMIR   HEAROWITZ                                   33,000.00
                           JAMES      JACOBI                                      55,000.00
                           JULIE      JENSEN                                      37,000.00
                           LARRY      LITERATA                                    37,500.00
                           KATHERINE  O'HEARN                                     42,500.00
                           RALPH      TYRO                                        20,000.00

                                                                                  93,500.00
```

Listing the Contents of a Data File

What You Can Do

You can list the contents of a data file before CA Culprit reports are run against a file. Three to ten fields for a specified number of records can be printed in the order of appearance in the file.

You can also sort records, select records, and print total lines.

How to Do It

Code:

1. An **=MACRO** or **USE** parameter with:
   - **AMLIST** immediately followed by a number from 3 to 10, depending on how many fields are to be listed
   - The **WITH VALUES** clause if you code the **USE** parameter
   - An argument list enclosed in parentheses (the number of records to be listed, the subtitle, the field names in the order of listing)
2. The **=MEND** parameter, if **=MACRO** is used

Demonstration (1): Printing Fields with AMLIST3

Objective

This report prints three fields (EMP-NAME, TITLE, and SALARY) of the first ten records in the input file.

Procedure

- **=MACRO** is used to copy the input file.
- **AMLIST3** calls the AMLIST routine to print three fields (EMP-NAME, TITLE, and SALARY) from the first ten records in the input file.
- The heading of the report is COMPANY EMPLOYEES.
- Column headings are the field names.
- **=MEND** signals the end of the code affected by the =MACRO parameter.

Complete Code

```
 col. 2
 ▼
 IN  200
 REC EMP-NAME   5   25
 REC SALARY   160    5  3 DP=2
 REC TITLE    171   20
=MACRO AMLIST3 (10 'COMPANY EMPLOYEES' EMP-NAME TITLE SALARY)
=MEND
/*
```

Sequential Parameter Listing

```
mm/dd/yy                    SEQUENTIAL PARAMETER LISTING                       volser  Vnn.n  PAGE     1

00 ** SYSIN **                            IN  200
  C200138 INSTALLATION SECURITY OPTION IS NO
                                          REC EMP-NAME   5   25
                                          REC SALARY   160    5  3 DP=2
                                          REC TITLE    171   20
                                         =MACRO AMLIST3 (10 'COMPANY EMPLOYEES' EMP-NAME TITLE SALARY)
                                         =MEND
                                       +  03$00****CULPRIT ROUTINE-AMLIST3
                                       +  030 SEQUENCE ALL
                                       +  033DETAIL LIST
                                       +  034100010&.&2.
                                       ++ 034100010'COMPANY EMPLOYEES'
                                       +  03420001 ' '
                                       +  0351*010 &.&3.         HF
                                       ++ 0351*010 EMP-NAME      HF
                                       +  0351*020 &.&4.         HF
                                       ++ 0351*020 TITLE         HF
                                       +  0351*030 &.&5.         HF
                                       ++ 0351*030 SALARY        HF
                                       +  0368*001 ' '
                                       +  037110SEQUENCE A  1        SEQUENCE      $  COUNT RECORDS READ
                                       +  037            M  &.&1.    ALL           $  GET MAXIMUM
                                       ++ 037            M  10       ALL           $  GET MAXIMUM
                                       +  037   ALL      EQ 0        TAKE          $  TAKE ALL RECORDS
                                       +  037   SEQUENCE GT &.&1.    DROP          $  DROP IF OVER MAXIMUM
                                       ++ 037   SEQUENCE GT 10       DROP          $  DROP IF OVER MAXIMUM
```

Report

```
REPORT NO. 03                  DETAIL LIST                                mm/dd/yy PAGE     1

COMPANY EMPLOYEES

                                       EMP-NAME                        TITLE                      SALARY

                                JUNE       BLOOMER                    PAYROLL CLERK              15,000.00
                                EDWARD     HUTTON                     FINANCIAL ANALYST          44,000.00
                                RUPERT     JENSON                     MGR ACCTNG/PAYROLL         82,000.00
                                MARIANNE   KIMBALL                    ACCOUNTANT                 45,000.00
                                DORIS      KING                       AR CLERK                   14,500.00
                                BRIAN      NICEMAN                    AP CLERK                   14,000.00
                                HERBERT    CRANE                      MGR COMPUTER OPS           75,000.00
                                JANE       FERNDALE                   COMPUTER OPERATOR          22,500.00
                                GEORGE     FONRAD                     DATA ENTRY CLERK           14,750.00
                                ROBIN      GARDNER                    DATA ENTRY CLERK           14,000.00
```

Demonstration (2): Modifying Code Using WITH VALUES and CHANGE

Objective

This report is generated from the source code used for Demonstration (1). Three fields from the first ten records of the input file are listed.

Procedure

- The **USE** parameter is coded with the **AMLIST** routine.
- The **WITH VALUES** clause specifies a subtitle for the report by enclosing the literal that is to appear on the generated type 4 parameter ('COMPANY EMPLOYEES') in double quotation marks.
- The **CHANGE** clause changes the report number from 03 to 01.
- The **SORT** parameter sorts the data by employee title.
- A subtotal prints for every title.
- **Type 7** process code selects the first ten records in the file in which the salary amount is less than or equal to $25,000.

  Note: CA Culprit sorts process parameters in ascending order by sequence number. Therefore, be sure to code a sequence number that reflects the sequence in which record selection is to occur.

Complete Code

```
 col. 2
 ▼
 IN  200
 REC EMP-NAME   5   25
 REC SALARY   160    5  3 DP=2
 REC TITLE    171   20
USE AMLIST3
WITH VALUES (10 "'COMPANY EMPLOYEES'" EMP-NAME TITLE SALARY)
CHANGE RPTNO TO 01          $Change the report number
 01SORT TITLE -                    $Sort the data
 017010 SALARY GT 25000 DROP         $Select the salary amounts
 0161*030 SALARY                   $Total the salary amounts
```

Input Parameter Listing

```
mm/dd/yy                    INPUT PARAMETER LISTING                          volser  Vnn.n  PAGE     3

 ********
 PROCESS USER   INTERNAL
         LABEL  SEQUENCE     PROCESS STATEMENT
 ********
  01  7  010        1    SALARY    GT        25000     DROP      $Select the salary amounts
  01  7  110        2    SEQUENCE  +         1         SEQUENCE  $  COUNT RECORDS READ
  01  7             3    M         10        ALL       $  GET MAXIMUM
  01  7             4    ALL       EQ        0         TAKE      $  TAKE ALL RECORDS
  01  7             5    SEQUENCE  GT        10        DROP      $  DROP IF OVER MAXIMUM
```

Sequential Parameter Listing

```
mm/dd/yy              SEQUENTIAL PARAMETER LISTING                          volser  Vnn.n  PAGE     1

00 ** SYSIN **                            IN  200
  C200138 INSTALLATION SECURITY OPTION IS NO

                                          REC EMP-NAME   5   25
                                          REC SALARY   160    5  3 DP=2
                                          REC TITLE    171   20
                                         USE AMLIST3
                                         WITH VALUES (10 "'COMPANY EMPLOYEES'" EMP-NAME TITLE SALARY)
                                         CHANGE RPTNO TO 01          $Change the report number
01 AMLIST3                                01$00****CULPRIT ROUTINE-AMLIST3
                                          010 SEQUENCE ALL
                                          013DETAIL LIST
                                          014100010'COMPANY EMPLOYEES'
                                          01420001 ' '
                                          0151*010 EMP-NAME        HF
                                          0151*020 TITLE           HF
                                          0151*030 SALARY          HF
                                          0168*001 ' '
                                          017110SEQUENCE A  1       SEQUENCE      $  COUNT RECORDS READ
                                          017            M  10      ALL           $  GET MAXIMUM
                                          017   ALL      EQ 0       TAKE          $  TAKE ALL RECORDS
                                          017   SEQUENCE GT 10      DROP          $  DROP IF OVER MAXIMUM
00 ** SYSIN **                            01    SORT TITLE -                     $  Sort the data
                                          017   010 SALARY GT 25000 DROP         $  Select the salary amounts
                                          0161*030 SALARY                        $  Total the salary amounts
```

Report

```
REPORT NO. 01                                DETAIL LIST        mm/dd/yy PAGE     1

COMPANY EMPLOYEES

                                  EMP-NAME                        TITLE                      SALARY

                          BRIAN     NICEMAN                 AP CLERK                        14,000.00
                                                                                            14,000.00



                          DORIS     KING                    AR CLERK                        14,500.00
                                                                                            14,500.00



                          JANE      FERNDALE                COMPUTER OPERATOR               22,500.00
                          DOUGLAS   KAHALLY                COMPUTER OPERATOR               20,000.00
                          HERBERT   LIPSICH                 COMPUTER OPERATOR               18,500.00
                                                                                            61,000.00



                          GEORGE    FONRAD                  DATA ENTRY CLERK                14,750.00
                          ROBIN     GARDNER                 DATA ENTRY CLERK                14,000.00
                          SANDY     KRAAMER                 DATA ENTRY CLERK                14,000.00
                          NANCY     TERNER                  DATA ENTRY CLERK                13,000.00
                                                                                            55,750.00



                          JUNE      BLOOMER                 PAYROLL CLERK                   15,000.00
                                                                                            15,000.00

                                                                                           160,250.00
```

Chapter 13: Additional Standard File Facilities

This section contains the following topics:

Introduction

CA Culprit allows you to create and store nonprint reports and vary headings on printed reports. You can also access non-database files that are defined in the data dictionary.

Creating Nonprint Report Output

What You Can Do

You can write and store CA Culprit reports on conventional files on tape or disk.

These nonprint reports can be created from:

- Selected report information, including final report summary information
- Variable-length records
- Sequential files created from database information

The output from a CA Culprit run can be stored on tape or disk as:

- A sequential (PS) file
- An indexed sequential (IS) file
- A card (CARD) file
- A VSAM file
- A data table

How to Do It

Use:

- OUTPUT parameter options to set the output record size, block size, type of file, and the device to be used.

  If the device is TAPE, the label type is also specified on the OUT parameter.

- Special formatting codes on type 5 and 6 parameters:
  - **FB** to convert an integer field value to binary output.
  - **FU** to convert a numeric field value to a single precision floating point value. (SZ= and DP= cannot be used with the FU format code.)
  - **FW** to convert a numeric field value to a double precision floating point value. (SZ= and DP= cannot be used with the FW format code.)
  - **FP** to convert a numeric output field value into a signed packed decimal number.
  - **FZ** to convert a numeric output field value into a signed zoned decimal number.
- No titles or headings.
- A plus sign (+) for a break code if you want total records for the output.
- Absolute column placement.
- The JCL label SYS020 to define the output file.

Demonstration (1): Writing to a Sequential File

Objective

This example writes out selected data items listed on REC parameters to a 40-byte sequential file. A hexadecimal dump shows how the data is stored on the file.

Procedure

- An **OUTPUT** parameter defines a sequential file that will store detail information extracted from the type 5 detail lines:
  - Records are 40 bytes, fixed length.
  - DD=SYS020 specifies the name of the output file in execution JCL.

    In a z/VSE environment, the logical unit number of the device receiving the output file (DD=SYS020,20) must also be specified if the file type is not CARD.
- Type 5 lines specify **absolute column placement** for the data items written out.

  The column specifications become the byte positions of the items on the record.
- **Format codes** are used on numeric fields.

Complete Code

```
col. 2
▼
IN 150 F 1500 PS(TAPE)
REC CUST-NO       1     5  3
REC GROSS-AMT    10     9  2  DP=2
REC NET          19     9  2  DP=2
REC ITEM-NO      28     4  1
REC TYPE         38     3
01OUT 40 4000 D PS DD=SYS020
01SORT CUST-NO
0151 0001 CUST-NO    FN              $Outputs leading zeros
0151 0010 GROSS-AMT  FZ              $Formats as zoned decimals
0151 0019 NET        FZ
0151 0028 ITEM-NO    FM '9999999999'  $Requires ten digits
0151 0038 TYPE
017010   IF TYPE = ('E00' TO 'T99') DROP
```

The Hex Dump Output

```
RECORD BUFFER DUMP
            CHAR   00107661500024690 000222200 144523008A27
            ZONE   FFFFFFFFFFFFFFFFCFFFFFFFFCFFFFFFFFCFF
            DIGIT  00107661500024690000022220001445230081 27
                  01...5...10...5...20....5...30...5...40

            CHAR   00107661500005250 000047420 283356401B44
            ZONE   FFFFFFFFFFFFFFFFCFFFFFFFFCFFFFFFFFCFF
            DIGIT  00107661500005250000004742002833564012 44
                  01...5...10...5...20....5...30...5...40

            CHAR   00107661500015590 000132750 324836977B49
            ZONE   FFFFFFFFFFFFFFFFCFFFFFFFFCFFFFFFFFCFF
            DIGIT  00107661500015590000013275003248369772 49
                  01...5...10...5...20....5...30...5...40

            CHAR   00132696800239500 002195000 144523008A27
            ZONE   FFFFFFFFFFFFFFFFCFFFFFFFFCFFFFFFFFCFF
            DIGIT  00132696800239500000219500001445230081 27
                  01...5...10...5...20....5...30...5...40

            CHAR   00132696800009095 000081150 262973310B52
            ZONE   FFFFFFFFFFFFFFFFCFFFFFFFFCFFFFFFFFCFF
            DIGIT  00132696800009095000008115002629733102 52
                  01...5...10...5...20....5...30...5...40

            CHAR   00588568300000000 000002200 424304486X12
            ZONE   FFFFFFFFFFFFFFFFCFFFFFFFFCFFFFFFFFEFF
            DIGIT  00588568300000000000000220004243044867 12
                  01...5...10...5...20....5...30...5...40

            CHAR   00588568300010000 000085000 262973311B52
            ZONE   FFFFFFFFFFFFFFFFCFFFFFFFFCFFFFFFFFCFF
            DIGIT  00588568300010000000008500002629733112 52
                  01...5...10...5...20....5...30...5...40

            CHAR   00588568300044500 000400500 669011172C06
            ZONE   FFFFFFFFFFFFFFFFCFFFFFFFFCFFFFFFFFCFF
            DIGIT  00588568300044500000040050006690111723 06
                  01...5...10...5...20....5...30...5...40
```

Demonstration (2): Converting to Packed Decimal Format

Objective

This example writes the report in Demonstration (1) to a sequential file.

Procedure

- The record length is specified as 29 bytes to accommodate the signed packed decimal numeric fields.
- **FP** converts the numeric output into signed packed decimal format.

Complete Code

```
col. 2
▼
IN 80 F 400
REC CUST-NO       1     9  2
REC GROSS-AMT    10     9  2  DP=2
REC NET          19     9  2  DP=2
REC ITEM-NO      28    10  2
REC TYPE         38     3
010 DIFF DP=2
OUT 29 2900 D PS DD=SYS020  $Less space needed for packed decimal
01SORT CUST-NO
01510001 CUST-NO    FP      $Stored as packed decimal
01510006 GROSS-AMT  FP SZ=5
01510011 NET        FP SZ=5
01510016 ITEM-NO    FP SZ=6
01510022 TYPE
01510025 DIFF       FP SZ=5
017010   IF TYPE = ('E00' TO 'T99') DROP
017015   GROSS-AMT - NET  DIFF
```

The Hex Dump Output

```
RECORD BUFFER DUMP
            CHAR      /*                A27
            ZONE   017650049000220014208CFF00270
            DIGIT  0061C0260C0220C04530C1270040C
                  O1...5...10....5...20....5....

            CHAR      /*   &     *      B44    *
            ZONE   017650055000445023541CFF00005
            DIGIT  0061C0020C0072C08360C2440057C
                  O1...5...10....5...20....5....

            CHAR      /*               @B49
            ZONE   017650059000370034397CFF00210
            DIGIT  0061C0150C0125C02867C2490035C
                  O1...5...10....5...20....5....

            CHAR             &    &     & B27
            ZONE   012980035000350042851CFF00000
            DIGIT  0366C0080C0050C02230C2270030C
                  O1...5...10....5...20....5....

            CHAR                       A27
            ZONE   012980290002900014208CFF00000
            DIGIT  0366C0350C0150C04530C1270200C
                  O1...5...10....5...20....5....

            CHAR                       B52
            ZONE   012980099000810022730CFF00080
            DIGIT  0366C0005C0015C06931C2520090C
                  O1...5...10....5...20....5....

            CHAR                      %X12
            ZONE   058630000000020044046EFF00020
            DIGIT  0858C0000C0020C02348C7120020D
                  O1...5...10....5...20....5....

            CHAR                       B52
            ZONE   058630000000800022731CFF00100
            DIGIT  0858C0100C0050C06931C2520050C
                  O1...5...10....5...20....5....

            CHAR               &       C06   &
            ZONE   058630000000050069112CFF00450
            DIGIT  0858C0450C0400C06017C3060040C
                  O1...5...10....5...20....5....
```

Demonstration (3): Writing Complete Records

Objective

This example writes input records to a file by defining the entire input record on one REC parameter.

Procedure

- **ENTIRE-RECORD** defines the whole input record.
- CUST-NO is defined separately for use on the SORT parameter.
- TYPE is defined separately for use in type 7 logic.

Complete Code

```
col. 2
▼
IN 80 F 400
REC CUST-NO       1     9  2
REC TYPE         38     3
REC ENTIRE-RECORD 1     40 $Defines all input fields
01OUT 80 D
01SORT CUST-NO
01510001 ENTIRE-RECORD
017010   IF TYPE = ('E00' TO 'T99') DROP
```

Result

```
0010766150002469000002222000144523008A27
0010766150000525000000474250283356401B44
0010766150001559000001327500324836977B49
0013269680000385000000355000422283501B27
0013269680023950000021950000144523008A27
0013269680000909500000811500262973310B52
0058856830000000000000022000424304486X12
0058856830001000000000850000262973311B52
0058856830004450000004005000669011172C06
```

Demonstration (4): Writing Totals-only

Objective

This example writes a sorted totals-only report to a tape sequential file.

Procedure

A plus sign (+) inserted after CUST-NO indicates a control break, which prevents a blank record from being written each time the break occurs.

```
col. 2
▼
IN 80 F 400
REC CUST-NO       1     9  2
REC GROSS-AMT    10     9  2
REC NET          19     9  2
REC ITEM-NO      28    10  2
REC TYPE         38     3
010 DIFF
01OUT 40 4000 T PS(TAPE)
01SORT CUST-NO +    $Control break on CUST-NO
01510000 GROSS-AMT
01510000 NET
01510000 DIFF
017010   IF TYPE = ('E00' TO 'T99') DROP
017015   GROSS-AMT - NET  DIFF
01610001 CUST-NO     FN
01610010 GROSS-AMT   FZ
01610019 NET         FZ
01610028 DIFF        FZ SZ=11
018    IF LEVL EQ 2  DROP
```

Demonstration (5): Writing Variable-length Records

Objective

The following example reads in variable-length records and writes out variable-length records to a sequential file.

Procedure

- Input records are sorted by customer number and selectively written, depending to the value of TYPE.
- REC parameters define the complete input file in three segments, non of which exceeds 256 bytes:
  - The first four bytes of the record contain the RDW.

    A new RDW is not required in this example. User module CULLUS33 can be used if a new record descriptor word (RDW) must be generated.
  - The sort key CUST-NO and the type 7 field TYPE are the only individual fields defined.
- Variable length output files are created by coding:
  - A sequential output file type **OUT PS**
  - JCL output specifications of:
    - RECFM=V or VB (SYS020)
    - An increased LRECL size (a multiple of 4 but not larger than 4096 bytes or the block size) in SYS006 of the JCL to accommodate the SORT parameters

Complete Code

```
col. 2
▼
IN 640 V                        $Variable-length file
REC CUST-NO        5       5      3  $Used as a sort key
REC TYPE          70       3         $Used in type 7 logic
REC PART-ONE       1     250
REC PART-TWO     251     250
REC PART-THREE   501     140
01SORT  CUST-NO
01OUT  640  D  PS
01510001 PART-ONE
01510251 PART-TWO
01510501 PART-THREE
017010  IF TYPE EQ ('E00' TO 'T99')  DROP
```

Demonstration (6): Writing from the Database

Objective

This example creates a sequential data set, consisting of employee ID, employee name, and department name from data stored on the employee database.

Procedure

A conventional file is created from data that resides on the database by coding:

- The **DATABASE** parameter with the name of an alternate dictionary in a multiple dictionary environment.
- The **INPUT (IN) DB** parameter with the name of the subschema to be accessed.
- SYS020 in the JCL.
- Regular CA Culprit parameters.

See the chapter Generating Reports From Database Files for information on coding the database parameters and options.

Complete Code

```
col. 2
▼
DATABASE DICTNAME=DOCUDICT
IN DB SS=EMPSS01,EMPSCHM,100
PATHAA DEPARTMENT EMPLOYEE
01OUT 80 D PS DD=SYS020
01SORT DEPT-NAME-0410  EMP-NAME-0415
01510001 EMP-ID-0415  FZ
01510005 EMP-NAME-0415
01510030 DEPT-NAME-0410
```

Creating Variable Headings

What You Can Do

You can change the values that appear in report headings.

How to Do It

Code:

- The field to be used as a heading on a **SORT** parameter
- **Type 4** parameters to reference the sort key

  The current value will be obtained at each control break.

When a field to be used as a variable heading cannot be included on the SORT parameter, a BRANCH to HEAD instruction can be used (see the *CA Culprit for CA IDMS Reference Guide*).

Demonstration (1): Using the SORT Parameter

Objective

This report lists monthly account activity by branch. Each branch is listed on a separate page with the branch number as a subtitle.

Procedure

- A **SORT** parameter specifies:
  - BRANCH as a sort key
  - A control break (1), which starts a new report page
- A **type 4** parameter specifies
  - Absolute column placement
  - The word BRANCH to be printed
  - The value of BRANCH to be printed on the same line

Complete Code

```
col. 2
▼
IN 80 F 400
REC ACCOUNT     1     5          'ACCOUNT'
REC TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
REC TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
REC DATE       18     6  2       'DATE'
REC BRANCH     24     2
REC NAME       26    20          'NAME'
80OUT
80SORT BRANCH 1 ACCOUNT         $Control break on BRANCH
803 ACCOUNT ACTIVITY BY BRANCH
80410001 'BRANCH'               $Print BRANCH
80410009 BRANCH                $Prints the branch   number
8051*020 ACCOUNT               HR
8051*030 NAME                  HR
8051*050 TRANS-AMT             HR
8051*060 TRANS-IND             HR
8051*070 TRANS-DATE  FD        HR
```

Results

```
REPORT NO. 80      ACCOUNT ACTIVITY BY BRANCH     80     mm/dd/yy PAGE     1
BRANCH  32
                                                          AMOUNT OF              DEPOSIT/
           ACCOUNT                    NAME                TRANSACTION           WITHDRAWAL              DATE

             15060            SHARON ARMSTRONG                 10,099.01             D               mm/dd/yy
             15060            SHARON ARMSTRONG                    990.11             W               mm/dd/yy
             15060            SHARON ARMSTRONG                100,990.11             D               mm/dd/yy
             16070            ARTHUR LINK                       1,080.04             D               mm/dd/yy
             19235            GARY NOBLES                          80.04             W               mm/dd/yy
             21056            AMOS JOHNSON                          1.02             W               mm/dd/yy
                                                              113,240.33
REPORT NO. 80      ACCOUNT ACTIVITY BY BRANCH     80     mm/dd/yy PAGE     2
BRANCH  35
                                                          AMOUNT OF              DEPOSIT/
           ACCOUNT                    NAME                TRANSACTION           WITHDRAWAL              DATE

             23055            JACK JACKSON                        500.00             W               mm/dd/yy
             23055            JACK JACKSON                     50,000.00             D               mm/dd/yy
             23055            JACK JACKSON                        30.00              D               mm/dd/yy
             29557            IRWIN TRIMBLE                   500,001.00             D               mm/dd/yy
                                                              550,531.00
```

Note: The report would show actual dates in the format shown.

Demonstration (2): Using the SORT/NOSORT Parameters

Objective

This is the same report as that shown in Demonstration (1). In this example, the input file is presorted and an actual sort is not needed.

Procedure

- A sort with the NOSORT option occurs on BRANCH:
  - **SORT BRANCH 1** creates the control break, which makes the current value of BRANCH available to the type 4 reference.
  - **NOSORT** prevents the resorting of the already sorted file.
- **Type 4** parameters:
  - Place the word BRANCH on the subtitle line.
  - Obtain and print the current value of BRANCH.

Complete Code

```
col. 2
▼
IN 80 F 400
REC ACCOUNT     1     5          'ACCOUNT'
REC TRANS-IND   6     1          'DEPOSIT/' 'WITHDRAWAL'
REC TRANS-AMT   7    11  2 DP=2  'AMOUNT OF' 'TRANSACTION'
REC DATE       18     6  2       'DATE'
REC BRANCH     24     2
REC NAME       26    20          'NAME'
80OUT
80SORT BRANCH 1 NOSORT           $Control break without a sort
803 ACCOUNT ACTIVITY BY BRANCH
80410001 'BRANCH'                    $Prints BRANCH
80410009  BRANCH                   $Prints the branch number
8051*020 ACCOUNT               HR
8051*030 NAME                  HR
8051*050 TRANS-AMT             HR
8051*060 TRANS-IND             HR
8051*070 TRANS-DATE  FD        HR
```

Results

```
REPORT NO. 80       ACCOUNT ACTIVITY BY BRANCH     80     mm/dd/yy PAGE     1
BRANCH  32

                                                    AMOUNT OF              DEPOSIT/
           ACCOUNT                   NAME           TRANSACTION            WITHDRAWAL            DATE

            15060            SHARON ARMSTRONG            10,099.01             D              mm/dd/yy
            15060            SHARON ARMSTRONG               990.11             W              mm/dd/yy
            15060            SHARON ARMSTRONG           100,990.11             D              mm/dd/yy
            16070            ARTHUR LINK                  1,080.04             D              mm/dd/yy
            19235            GARY NOBLES                     80.04             W              mm/dd/yy
            21056            AMOS JOHNSON                     1.02             W              mm/dd/yy
                                                        113,240.33
REPORT NO. 80        ACCOUNT ACTIVITY BY BRANCH     80     mm/dd/yy PAGE     2
BRANCH  35

                                                    AMOUNT OF              DEPOSIT/
           ACCOUNT                   NAME           TRANSACTION            WITHDRAWAL            DATE

            23055            JACK JACKSON                   500.00             W              mm/dd/yy
            23055            JACK JACKSON                50,000.00             D              mm/dd/yy
            23055            JACK JACKSON                   30.00              D              mm/dd/yy
            29557            IRWIN TRIMBLE              500,001.00             D              mm/dd/yy
                                                        550,531.00
```

Note: The report would show actual dates in the format shown.

Accessing Non-database Files Defined in the Data Dictionary

What You Can Do

When a file is defined in the data dictionary, the file attributes are automatically supplied to any CA Culprit program referencing the file. The file attributes include record size, record type, block size, file type, device type, user module name, and label type.

You can use standard files that are defined in the data dictionary and revise already existing data dictionary definitions.

How to Do It

To use the data dictionary definitions of a standard file, code:

- The **DATABASE** parameter with the DICTNAME= option if an alternate dictionary is used
- The **FN=** option on the INPUT parameter
- **REC** parameters if the fields in the file are to be renamed or redefined
- **HR** on edit parameters to print column headings stored in the data dictionary

To revise data dictionary definitions, code:

- A redefined **file definition** on the INPUT parameter:

  ```
  Data dictionary file definition: record size is 100.

  CA Culprit code redefinition: IN 80
  ```

- A redefined **field definition** on a REC parameter with a field name identical to that used in the data dictionary:

  ```
  Dictionary field definition: T-ACCOUNT with PIC X(5).

  CA Culprit code redefinition: REC T-ACCOUNT 1   10 'ACCOUNT'
  ```

Chapter 14: Additional CA IDMS/DB Facilities

This section contains the following topics:

Introduction

CA Culprit allows you to access the database, retrieve all record types, and write reports using standard CA Culprit code.

How to Prepare for Record Retrieval

Code:

1. The data dictionary name if using an alternate dictionary
2. The **INPUT (IN) DB** parameter specifying:
   - The subschema name
   - The size of the input buffer if more than 1000 bytes is needed

     The buffer must be large enough to hold:
     - Thirty-eight bytes of overhead
     - The sum of the length of each record type specified on the PATH parameter with the most records
     - Four additional bytes per record for the database key
3. The **path** or paths to navigate for retrieval of data

Retrieving Partial Paths

What You Can Do

You can retrieve a segment of a path (partial string) when the entire path cannot be completed.

How to Do It

Specify a shorter (alternate) path.

A special type of alternate path ID, the null path identifier, can be used to indicate that an occurrence of the entry record was either not found or not selected.

The null path identifier is discussed later in this chapter.

Code:

1. A **PATH** parameter with the path identifier and the records to be accessed
2. An **alternate path identifier** placed one record after the last record of the shorter path

```
PATH01 EMPLOYEE EXPERTISE (02) SKILL  $Shorter path is EMPLOYEE
```

Demonstration

Objective

This report:

- Lists all employees, their insurance coverage, and hospital claims each time the complete path is navigated
- Lists all employees and their insurance coverage each time the alternate path is navigated
- Prints the path navigated for each report line

Procedure

- PATHAA EMPLOYEE COVERAGE HOSPITAL-CLAIM is the **primary** path for retrieval of employees having hospital claims.
- PATHAA EMPLOYEE COVERAGE HOSPITAL-CLAIM (BB) is an **alternate path** (PATHBB) for retrieval of insurance coverage codes.
- The value of **PATH-ID** is tested in the type 7 procedure logic for selecting one or both detail lines for printing.

Complete Code

```
 col. 2
 ▼
 DATABASE DICTNAME=DOCUDICT
 IN DB SS=EMPSS01
 PATHAA EMPLOYEE COVERAGE HOSPITAL-CLAIM (BB)
 013 EMPLOYEE LISTING
 010 EMP-NAME '                          '
 010 INS-CODE '   '
 0151*005 PATH-ID               HH 'PATH' 'USED'
 0151*020 EMP-NAME-0415         HH 'EMPLOYEE' 'NAME'
 0151*030 INS-PLAN-CODE-0400    HH 'INSURANCE' 'PLAN CODE'
 0152*040+HOSPITAL-NAME-0430    HH 'HOSPITAL'
 017010 IF EMP-NAME-0415 EQ EMP-NAME AND INS-PLAN-CODE-0400 EQ
* INS-CODE  DROP                                  $Eliminate duplicate entries
 017020 MOVE EMP-NAME-0415 TO EMP-NAME
 017030 MOVE INS-PLAN-CODE-0400 TO INS-CODE
 017100   IF PATH-ID EQ 'AA' 300
 017200   TAKE 1
 017300   TAKE (1 2)
```

Result

```
REPORT NO. 01          EMPLOYEE LISTING              mm/dd/yy PAGE     1
              PATH                       EMPLOYEE                    INSURANCE
              USED                         NAME                      PLAN CODE
                                                                                    HOSPITAL

               BB             KATHERINE O'HEARN                      001
               BB             KATHERINE O'HEARN                      002
               BB             ROBBY     WILDER                       001
               BB             BURT      LANCHESTER                   004
               BB             BURT      LANCHESTER                   003
               AA             BURT      LANCHESTER                   002
+                                                                                   GENERAL HOSPITAL
               BB             BURT      LANCHESTER                   001
               BB             VLADIMIR  HEAROWITZ                    001
               BB             THEMIS    PAPAZEUS                     003
               BB             HERBERT   LIPSICH                      001
               BB             HENRIETTA HENDON                       004
               AA             HENRIETTA HENDON                       002
+                                                                                   ANGELS OF MERCY HOSPITAL
               BB             RUPERT    JENSON                       001
               BB             EDWARD    HUTTON                       003
               BB             RICHARD   MUNYON                       002
               BB             HARRY     ARM                          001
               BB             HARRY     ARM                          002
               BB             MICHAEL   ANGELO                       001
               BB             LAURA     PENMAN                       003
               BB             JAMES     JACOBI                       004
               BB             ROBIN     GARDNER                      002
               BB             HERBERT   CRANE                        004
               BB             HERBERT   CRANE                        003
               BB             HERBERT   CRANE                        001
               BB             PERCY     GRANGER                      003
               BB             JANE      DOUGH                        003
               BB             LARRY     LITERATA                     003
               BB             GEORGE    FONRAD                       004
               BB             DANIEL    MOON                         002
```

Retrieving Record Types by Name

What You Can Do

You can specify selection criteria for database records named on one or more PATH parameters.

How to Do It

Code **SELECT** or **BYPASS** parameters after the PATH parameters:

- The **IN PATH** clause specifies selection criteria for a specific path.
- The **BUFFER** specifies selection criteria for every path. (BUFFER is discussed further later in this chapter.)

Demonstration

Objective

This example creates two reports:

- Report 01 lists all employees for each department.
- Report 02 lists the skills of employees who work in departments 4000 and 3200.

Procedure

- Two paths are used to access data:

  for departments 4000 and 3200.

- A **SELECT** statement retrieves path BB when the department id is 4000 or 3200.
- **Type 7** procedure logic selects path AA for Report 01 and path BB for Report 02.

Complete Code

```
col. 2
▼
DATABASE DICTNAME=DOCUDICT
IN DB SS=EMPSS01
PATHAA DEPARTMENT EMPLOYEE
PATHBB DEPARTMENT EMPLOYEE EXPERTISE SKILL
SELECT DEPARTMENT IN PATH BB WHEN DEPT-ID-0410 EQ (4000 3200)
013 EMPLOYEES BY DEPARTMENT
0151*020 DEPT-NAME-0410    HH 'DEPARTMENT'
0151*030 EMP-NAME-0415     HH 'EMPLOYEE'
017010 IF PATH-ID NE 'AA' DROP
023 EMPLOYEE SKILL LEVELS FOR DEPTS 4000 AND 3200
0251*010 DEPT-ID-0410   FN HH 'DEPT ID'
0251*020 DEPT-NAME-0410    HH 'DEPARTMENT'
0251*030 EMP-NAME-0415     HH 'EMPLOYEE'
0251*040 START-YEAR-0415   HH 'START YEAR'
0251*050 SKILL-NAME-0455   HH 'SKILL'
027010 IF PATH-ID NE 'BB' DROP
```

Result

```
REPORT NO. 01          EMPLOYEES BY DEPARTMENT       mm/dd/yy  PAGE     1
                                 DEPARTMENT                                        EMPLOYEE

                    ACCOUNTING AND PAYROLL                                  JUNE      BLOOMER
                    ACCOUNTING AND PAYROLL                                  EDWARD    HUTTON
                    ACCOUNTING AND PAYROLL                                  RUPERT    JENSON
                    ACCOUNTING AND PAYROLL                                  MARIANNE  KIMBALL
                    ACCOUNTING AND PAYROLL                                  DORIS     KING
                    ACCOUNTING AND PAYROLL                                  BRIAN     NICEMAN
                    COMPUTER OPERATIONS                                     HERBERT   CRANE
                    COMPUTER OPERATIONS                                     JANE      FERNDALE
                    COMPUTER OPERATIONS                                     GEORGE    FONRAD
                    COMPUTER OPERATIONS                                     ROBIN     GARDNER
                    COMPUTER OPERATIONS                                     DOUGLAS   KAHALLY
                    COMPUTER OPERATIONS                                     TERENCE   KLWELLEN
                    COMPUTER OPERATIONS                                     SANDY     KRAAMER
                    COMPUTER OPERATIONS                                     HERBERT   LIPSICH
                    COMPUTER OPERATIONS                                     NANCY     TERNER
                    BLUE SKIES                                              BETH      CLOUD
                    BLUE SKIES                                              ALAN      DONOVAN
                    BLUE SKIES                                              DANIEL    MOON
                    BRAINSTORMING                                           ROY       ANDALE
                    BRAINSTORMING                                           HARRY     ARM
```

```
REPORT NO. 02          EMPLOYEE SKILL LEVELS FOR DEPTS 4000 AND 3200       mm/dd/yy  PAGE     1
      DEPT ID                       DEPARTMENT                                EMPLOYEE              START YEAR        SKILL

         3200      COMPUTER OPERATIONS                          HERBERT   CRANE                     77         IDMSDC
         3200      COMPUTER OPERATIONS                          HERBERT   CRANE                     77         IBM
         3200      COMPUTER OPERATIONS                          HERBERT   CRANE                     77         ASSEMBLER
         3200      COMPUTER OPERATIONS                          HERBERT   CRANE                     77         DEC
         3200      COMPUTER OPERATIONS                          HERBERT   CRANE                     77         RPGII
         3200      COMPUTER OPERATIONS                          JANE      FERNDALE                  79         IDMSDC
         3200      COMPUTER OPERATIONS                          JANE      FERNDALE                  79         IBM
         3200      COMPUTER OPERATIONS                          GEORGE    FONRAD                    80         DATA ENTRY
         3200      COMPUTER OPERATIONS                          GEORGE    FONRAD                    80         FILING
         3200      COMPUTER OPERATIONS                          ROBIN     GARDNER                   81         DATA ENTRY
         3200      COMPUTER OPERATIONS                          DOUGLAS   KAHALLY                   79         KEYPUNCH
         3200      COMPUTER OPERATIONS                          DOUGLAS   KAHALLY                   79         FILING
         3200      COMPUTER OPERATIONS                          DOUGLAS   KAHALLY                   79         TYPING
         3200      COMPUTER OPERATIONS                          DOUGLAS   KAHALLY                   79         PHONE
         3200      COMPUTER OPERATIONS                          TERENCE   KLWELLEN                  78         COBOL
         3200      COMPUTER OPERATIONS                          TERENCE   KLWELLEN                  78         ASSEMBLER
         3200      COMPUTER OPERATIONS                          SANDY     KRAAMER                   81         KEYPUNCH
         3200      COMPUTER OPERATIONS                          SANDY     KRAAMER                   81         TYPING
         3200      COMPUTER OPERATIONS                          HERBERT   LIPSICH                   81         IBM
         3200      COMPUTER OPERATIONS                          NANCY     TERNER                    82         FILING
         3200      COMPUTER OPERATIONS                          NANCY     TERNER                    82         PHONE
         3200      COMPUTER OPERATIONS                          NANCY     TERNER                    82         TYPING
         4000      PUBLIC RELATIONS                             MICHAEL   ANGELO                    79         RAINBOW
         4000      PUBLIC RELATIONS                             MICHAEL   ANGELO                    79         ART DESIGN
         4000      PUBLIC RELATIONS                             MICHAEL   ANGELO                    79         PASTEUP
         4000      PUBLIC RELATIONS                             MONTE     BANK                      78         PUB REL MGT
         4000      PUBLIC RELATIONS                             CHARLES   BOWER                     77         PHOTO COLOR
         4000      PUBLIC RELATIONS                             CHARLES   BOWER                     77         PHOTO B/W
         4000      PUBLIC RELATIONS                             CAROL     MCDOUGALL                 80         CUT/PASTE
         4000      PUBLIC RELATIONS                             CAROL     MCDOUGALL                 80         LAYOUT
```

Retrieving Record Types by Key

What You Can Do

You can retrieve the entry record on a PATH parameter directly by using a specific key value or a range of key values. Key values allow you to avoid sweeping a database area for a particular record.

The following types of key values can be specified:

- **CALC-key** values when entry records are stored in the CALC location mode
- **Index-key** values when entry records are indexed
- **Db-key** values for any location mode (VIA, CALC, or DIRECT) unless the entry records are indexed or are logical records
- Any **logical record fields** when entry records are logical records

How to Do It

Retrieve specific occurrences of the PATH entry record by using:

- **KEY** parameters to name key fields and key values

  To code a KEY parameter, supply the following information:

  1. The KEY keyword (beginning in column 2)
  2. The key field name
  3. A key value, a list of values, or a range of values

- A **KEYFILE** parameter to access a sequential file containing the key values

  To code a KEYFILE parameter, supply the following information:

  1. The KEYFILE keyword (beginning in column 2)
  2. The size, in bytes, of the key file record

3. The KF= keyword expression, followed by the starting position of the key field in the file and its length in bytes
4. Other options:
   - The **FN=** keyword expression to name a file defined to the data dictionary:

     ```
     PATH01 DEPT-EMP-LR WHERE EMP-NAME EQ EMP-KEY

     KEYFILE FN=EMPLOYEE-KEYS
     ```

   - The **LRFNAME=** keyword expression to name a logical record when the entry record is a logical record and you are supplying key information to the WHERE clause on the PATH parameter:

     ```
     PATH01 DEPT-EMP-LR WHERE EMP-LAST-NAME EQ KEY-VALUE

     KEYFILE CARD KF=10 15 LRFNAME=EMP-LAST-NAME
     ```

You can also use the KEYFILE parameter to:

- Define fields in a sequential key file that are not defined to the data dictionary:

  ```
  REC EMP-ID (KEYFILE) 20 4
  ```

- Define selection criteria applicable to key-file records:

  ```
  KEYFILE 80 KF=1 4
  SELECT DEPT-LOCATION EQ 'DEDHAMPLAC'
  ```

Demonstration (1): Accessing Records by Key

Objective

This example uses a KEY parameter to list the job ids, job titles, and job openings for three selected departments.

Procedure

- A **KEY** parameter is used to directly access DEPARTMENT records with ids of 0100, 3200, and 5100.
- The **key field** on the KEY parameter is DEPT-ID-0410 (the CALC-key value for the DEPARTMENT record).

Complete Code

```
col. 2
▼
DATABASE DICTNAME=DOCUDICT
IN DB SS=EMPSS01
PATH01 DEPARTMENT EMPLOYEE EMPOSITION JOB
KEY DEPT-ID-0410 (0100 3200 5100)
010UT D
013 JOB OPENINGS
0151*010 DEPT-ID-0410   FN      HH 'DEPARTMENT'
0151*020 JOB-ID-0440    FN      HH 'JOB ID'
0151*030 TITLE-0440             HH 'JOB TITLE'
0151*040 NUMBER-OPEN-0440       HH 'JOB' 'OPENINGS'
```

Result

```
REPORT NO. 01          JOB OPENINGS                mm/dd/yy  PAGE     1

                                                                                  JOB
               DEPARTMENT                JOB ID                  JOB TITLE     OPENINGS

                  0100                    9001                PRESIDENT
                  0100                    9007                DIR WEATHER
                  0100                    5001                MGR BRAINSTORMING
                  0100                    9003                DIR OPERATIONS
                  0100                    3001                MGR INTERNL SOFTWARE
                  0100                    9005                DIR CORP CONFUSION
                  3200                    3003                MGR COMPUTER OPS
                  3200                    3003                MGR COMPUTER OPS
                  3200                    3003                MGR COMPUTER OPS
                  3200                    3029                COMPUTER OPERATOR
                  3200                    3051                DATA ENTRY CLERK          1
                  3200                    3051                DATA ENTRY CLERK          1
                  3200                    3029                COMPUTER OPERATOR
                  3200                    3023                SYSTEMS PROGRAMMER
                  3200                    3051                DATA ENTRY CLERK          1
                  3200                    3029                COMPUTER OPERATOR
                  3200                    3051                DATA ENTRY CLERK          1
                  5100                    5025                SNOWBLOWER
                  5100                    5029                STURM/DRANG ADMIN
                  5100                    5027                KEEPER OF THE WINDS
                  5100                    5023                RAINDANCE CONSULTANT
                  5100                    5021                RAINMAKER
                  5100                    5021                RAINMAKER
                  5100                    5021                RAINMAKER
                  5100                    5001                MGR BRAINSTORMING
                  5100                    5001                MGR BRAINSTORMING
                  5100                    5025                SNOWBLOWER
                  5100                    5029                STURM/DRANG ADMIN
```

Demonstration (2): Accessing Records with a Key File

Objective

This report lists all employees associated with specific departments located at Dedham Place and University Avenue. Department IDs and building locations are stored in a key file.

Procedure

- A **KEYFILE** parameter defines a key file with records 80 bytes long. The key field is a CALC-key value that begins in position 1 and is four bytes long.
- A user-supplied **REC** parameter identifies DEPT-LOCATION as an alphanumeric field. DEPT-LOCATION starts in position 5 of the key file record for a length of ten bytes.
- A **SELECT** parameter uses DEPT-LOCATION to select only those records in the key file that specify Lost Brook or University Avenue.
- A **SORT** parameter sorts the output by building location. Building location appears as a heading on each page.

Complete Code

```
col. 2
▼
DATABASE DICTNAME=DOCUDICT
IN DB SS=EMPSS01
PATHAA DEPARTMENT EMPLOYEE
KEYFILE 80 KF=1 4
REC DEPT-LOCATION(KEYFILE) 5 10
SELECT DEPT-LOCATION EQ ('DEDHAMPLAC' 'UNIVERSITY')
01SORT DEPT-LOCATION,1
01410005 'BUILDING LOCATION'
01410025 DEPT-LOCATION
0151*001 DEPT-ID-0410   FM '9999' HH 'DEPT ID'
0151*003 EMP-ID-0415    FM '9999' HH 'EMPLOYEE' 'ID'
0151*005 EMP-NAME-0415            HH 'EMPLOYEE' 'NAME'
```

The standard file used to store the keys is specified in the JCL:

```
//SYS002   DD  DSN=user.keyfile,DISP=SHR
```

Result

```
BUILDING LOCATION   DEDHAMPLAC
                                        EMPLOYEE                        EMPLOYEE
                    DEPT ID               ID                              NAME

                      5200                0479                TERRY       CLOTH
                      5200                0329                PHINEAS     FINN
                      5200                0469                JOE         KASPAR
                      5200                0355                MARK        TIME
                      5200                0349                ROGER       WILCO
                      5300                0371                BETH        CLOUD
                      5300                0366                ALAN        DONOVAN
                      5300                0321                DANIEL      MOON
                      3100                0024                JANE        DOUGH
                      3100                0029                JAMES       GALLWAY
                      3100                0003                JENNIFER    GARFIELD
                      3100                0028                PERCY       GRANGER
                      3100                0027                VLADIMIR    HEAROWITZ
                      3100                0020                JAMES       JACOBI
                      3100                0019                JULIE       JENSEN
                      3100                0035                LARRY       LITERATA
                      3100                0023                KATHERINE   O'HEARN
                      3100                0021                RALPH       TYRO
BUILDING LOCATION   UNIVERSITY
                                        EMPLOYEE                        EMPLOYEE
                    DEPT ID               ID                              NAME

                      5100                0466                ROY         ANDALE
                      5100                0457                HARRY       ARM
                      5100                0467                C.          BREEZE
                      5100                0334                CAROLYN     CROW
                      5100                0301                BURT        LANCHESTER
                      5100                0015                RENE        MAKER
                      5100                0341                RICHARD     MUNYON
                      5100                0458                RICHARD     WAGNER
                      3200                0004                HERBERT     CRANE
                      3200                0032                JANE        FERNDALE
                      3200                0045                GEORGE      FONRAD
                      3200                0053                ROBIN       GARDNER
                      3200                0049                DOUGLAS     KAHALLY
                      3200                0016                TERENCE     KLWELLEN
                      3200                0074                SANDY       KRAAMER
                      3200                0031                HERBERT     LIPSICH
                      3200                0048                NANCY       TERNER
```

Retrieving Stand-alone Records

What You Can Do

You can retrieve record occurrences that do not participate in defined paths, as well as path-related records, by calling or branching to the DB-EXIT facility in type 7 logic.

How to Do It

To use the DB-EXIT facility, code:

1. **A dummy PATH parameter (PATH--)** with:
   - One or more database records
   - One or more logical records
2. A **STOP-RUN** command on a type 7 parameter if the only paths coded for the run are dummy paths.
3. A **CALL** or **BRANCH** to the DB-EXIT facility on a type 7 parameter

   A branch to DB-EXIT is preceded by a series of logic statements that move values to the DB-EXIT arguments.
4. **IDMS-STATUS** and **LR-STATUS** value checking in procedure logic statements after each DB-EXIT call.

Demonstration

Objective

This report lists the start date of five employees selected from the database EMPLOYEE record type. The selection occurs by means of the DB-exit facility.

Procedure

The code for this report includes:

- A dummy path, **PATH--**, allocates space in the input buffer for the retrieved records.
- The work field **IDS.5** contains employee ID values.
- A call to the **DB-EXIT** facility has the following selection criteria arguments:
  - **Argument 1 ('CALC')** generates an OBTAIN CALC EMPLOYEE retrieval command.
  - **Argument 2 ('EMPLOYEE ')** specifies the EMPLOYEE record. The trailing blank is required (the record name is less than 16 characters).
  - **Argument 3 (EMP-ID-0415)** specifies the name of the CALC-key field for the EMPLOYEE record.
  - **Argument 4 ('IDS.INDEX')** specifies an occurrence of the work field IDS.5 that has the value of the EMP-ID-0415 field being selected.
  - **Argument 5** specifies the length of the EMP-ID-0415 field.
- **IDMS-STATUS NE '0000' 400** checks the IDMS Status for values that indicate error conditions or records not retrieved. If the condition is true, CA Culprit generates a buffer dump and stops the run.
- **STOP-RUN** terminates the run.

Complete Code

```
col. 2
▼
DATABASE DICTNAME=DOCUDICT
IN DB SS=EMPSS01 $RPT707
PATH--EMPLOYEE
010OUT 80 D
010 IDS.5 '0302' '0048' '0054' '0301' '0001'  $Employee ID values
010 INDEX 1
010 DUMP
010 MESSAGE 'EMPLOYEE NOT FOUND'
0151*005 IDMS-STATUS              HH 'IDMS-STATUS' 'FIELD'
0151*010 EMP-ID-0415    FM '9999' HH 'EMPLOYEE' 'ID'
0151*020 EMP-NAME-0415            HH 'EMPLOYEE' 'NAME'
0151*030 START-YEAR-0415           HH 'START' 'YEAR'
0152*005 IDMS-STATUS
0152*010 IDS.INDEX
0152*020 MESSAGE
017100   CALL DB-EXIT ('CALC' 'EMPLOYEE ' EMP-ID-0415 IDS.INDEX 4)
017      IF IDMS-STATUS EQ '0326'  200           $Employee not found
017      IDMS-STATUS NE '0000'  400
017      RELS 1
017      B 300
017200   MOVE 'EMPLOYEE NOT FOUND' TO MESSAGE
017      RELS 2
017300   INDEX + 1 INDEX
017      IF INDEX LE 5 100
017      STOP-RUN
017400   DUMP / DUMP DUMP                        $Forces a buffer dump
017      STOP-RUN
```

Result

```
IDMS-STATUS      EMPLOYEE            EMPLOYEE             START
  FIELD            ID                  NAME               YEAR

    0326          0302          EMPLOYEE NOT FOUND
    0000          0048       NANCY     TERNER               82
    0326          0054          EMPLOYEE NOT FOUND
    0000          0301       BURT      LANCHESTER           75
    0000          0001       JOHN      RUPEE                75
```

Retrieving All Record Occurrences

What You Can Do

You can retrieve all the occurrences of a database record type by navigating (walking) through each set of occurrences with the DB-EXIT facility.

How to Do It

Code the arguments of the DB-EXIT facility with:

- **ARG1**—A DB-EXIT argument that generates a CA IDMS/DB retrieval command
- **ARG2**— The field to be obtained
- **ARG3**— The area or set to be accessed

Demonstration

Objective

This example uses the DB-EXIT facility to retrieve all employees working in each office.

Procedure

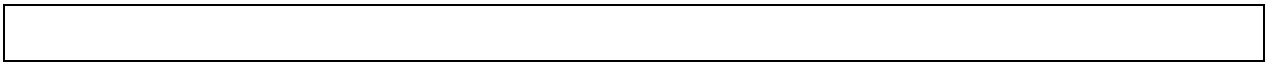
The DB-EXIT facility is used to walk the OFFICE-EMPLOYEE set until the end of the set is reached:

- **CALL DB-EXIT ('FIRST-AREA' 'OFFICE ' 'ORG-DEMO-REGION ')** retrieves the first OFFICE record in the ORG-DEMO-REGION area.
- **CALL DB-EXIT ('FIRST' 'EMPLOYEE ' 'OFFICE-EMPLOYEE ')** retrieves the first EMPLOYEE record in the OFFICE-EMPLOYEE set if the first office retrieval was successful.
- **CALL DB-EXIT ('NEXT' 'EMPLOYEE ' 'OFFICE-EMPLOYEE ')** retrieves the next EMPLOYEE record until the end of the set is reached.
- **CALL DB-EXIT ('NEXT-AREA' 'OFFICE ' 'ORG-DEMO-REGION ')** retrieves the next OFFICE record and, if successful, returns to retrieve the first EMPLOYEE record for that office.

Complete Code

```
col. 2
▼
DATABASE DICTNAME=DOCUDICT
IN DB SS=EMPSS01
PATH-- OFFICE EMPLOYEE
010 MSG  'ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEFGHIJKLMNOPQ'
010 JUNK
0151*005 IDMS-STATUS            HH 'IDMS-STATUS' 'FIELD'
0151*010 OFFICE-CODE-0450       HH 'OFFICE CODE'
0151*020 EMP-NAME-0415          HH 'EMPLOYEE' 'NAME'
0152*005 IDMS-STATUS
0152*010 MSG
010UT D
01SORT OFFICE-CODE-0450 0 EMP-NAME-0415
017      CALL DB-EXIT ('FIRST-AREA' 'OFFICE ' 'ORG-DEMO-REGION ')
017      IF IDMS-STATUS EQ '0000' 050
017      MOVE 'ERROR IN RETRIEVAL OF FIRST OFFICE' MSG
017      RELS 2
017      PERFORM 800
017050   CALL DB-EXIT ('FIRST' 'EMPLOYEE ' 'OFFICE-EMPLOYEE ')
017      B 150
017100   CALL DB-EXIT ('NEXT' 'EMPLOYEE ' 'OFFICE-EMPLOYEE ')
017150   IF IDMS-STATUS EQ '0000' 200                  $Test for record found
017      IF IDMS-STATUS EQ '0307' 300                  $Test for end of set
017      MOVE 'ERROR IN RETRIEVAL OF EMPLOYEE' MSG
017      RELS 2
017      PERFORM 800
017200   RELS 1
017      B 100
017300   CALL DB-EXIT ('NEXT-AREA' 'OFFICE ' 'ORG-DEMO-REGION ')
017      IF IDMS-STATUS EQ '0000' 050
017      IF IDMS-STATUS EQ '0307' STOP
017      MOVE 'ERROR IN RETRIEVAL OF NEXT OFFICE' MSG
017      RELS 2
017      PERFORM 800
017800   JUNK / 0  JUNK                            $Forces a buffer dump
017      STOP
```

Result



IDMS-STATUS FIELD	OFFICE CODE	EMPLOYEE NAME	
0000	001	BETSY	ZEDI
0000	001	HERBERT	CRANE
0000	001	HERBERT	LIPSICH
0000	001	JAMES	GALLWAY
0000	001	JAMES	JACOBI
0000	002	DOUGLAS	KAHALLY
0000	002	SANDY	KRAAMER
0000	002	TOM	FITZHUGH
0000	005	ALAN	DONOVAN
0000	005	BETH	CLOUD
0000	005	BURT	LANCHESTER
0000	005	CAROLYN	CROW
0000	005	DANIEL	MOON
0000	005	RENE	MAKER
0000	005	TERRY	CLOTH
0000	008	C.	BREEZE
0000	008	HARRY	ARM
0000	008	JOE	KASPAR
0000	008	MARK	TIME
0000	008	RICHARD	MUNYON
0000	008	RICHARD	WAGNER
0000	008	ROGER	WILCO
0000	008	ROY	ANDALE
0000	008	THEMIS	PAPAZEUS

Testing for Record Occurrences

What You Can Do

You can identify record occurrences that are not found in the database.

How to Do It

1. Create a **null path** by placing the path identifier immediately after the entry record.
2. Test the **current value of PATH-ID** in type 7 logic.

Demonstration

Objective

This report lists selected employees and their start year. If an employee record is not found, the message EMPLOYEE NOT FOUND is returned.

Procedure

- A primary path, **PATHOK**, returns the employee name, ID, and date of hire.
- A null path, **NO**, places NO in the input buffer if the employee ID is not found. selects one of two possible print lines.

Complete Code

```
col. 2
▼
DATABASE DICTNAME=DOCUDICT
IN DB SS=EMPSS01
REC  JOB-START(EMPOSITION) 1 6 2 'START' 'DATE'
PATHOK EMPLOYEE(NO) EMPOSITION JOB
KEY EMP-ID-0415 (0003 0023 0100 0301 3200 5100)
010UT 80 D
013 SELECTED EMPLOYEE DETAIL LIST
010 WK-ID
0151*0100EMP-NAME-0415          HH 'EMPLOYEE NAME'
0151*020 EMP-ID-0415  FM '9999'  HH 'EMPLOYEE' 'ID'
0151*030 JOB-START    FD         HR
0151*040 TITLE-0440              HH 'JOB' 'TITLE'
0152*010 'EMPLOYEE NOT FOUND       '
0152*020 EMP-ID-0415  FM '9999'
017005   IF PATH-ID EQ 'OK'  100
017010   IF PATH-ID NE 'NO'  DROP
017020   TAKE 2
017100   IF EMP-ID-0415 EQ WK-ID  DROP
017110   MOVE EMP-ID-0415 TO WK-ID
017120   TAKE 1
```

Result

```
REPORT NO. 01           SELECTED EMPLOYEE DETAIL LIST     mm/dd/yy  PAGE     1
                                  EMPLOYEE    START           JOB
          EMPLOYEE NAME             ID        DATE          TITLE


     JENNIFER  GARFIELD           0003     82/01/01   MGR INTERNL SOFTWARE

     KATHERINE O'HEARN            0023     79/05/05   PROGRAMMER/ANALYST

     EDWARD    HUTTON             0100     77/09/07   FINANCIAL ANALYST

     BURT      LANCHESTER         0301     80/02/03   RAINMAKER
     EMPLOYEE NOT FOUND           3200
     EMPLOYEE NOT FOUND           5100
```

Accessing Bill-of-Materials Structures

What You Can Do

You can access database information stored as a bill-of-materials data structure.

The bill-of-materials structure, which can be thought of as a series of nested set relationships, allows a path to be established between one record type and another of the same type. Different set relationships that exist between the record types are used.

How to Do It

Code:

1. **PATH** parameters using set names that define the level of information to be retrieved
2. **Field names** using level numbers to specify the level of information to be acted upon

Demonstration

Objective

This report lists:

- The managers of the company (first level)
- The supervisors reporting to each manager (second level)
- The workers reporting to each supervisor (third level)

Procedure

- **PATHAA** defines a three-level bill-of-materials relationship:
  1. EMPLOYEE STRUCTURE(MANAGES)
  2. EMPLOYEE(REPORTS-TO) STRUCTURE(MANAGES)
  3. EMPLOYEE(REPORTS-TO)
- **Type 5** and **type 7** parameters specify the level from which the names are extracted:
  - EMP-NAME-0415 (1) prints manager's names.
  - EMP-NAME-0415 (2) prints supervisor's names.
  - EMP-NAME-0415 (3) prints worker's names.

Complete Code

```
 col. 2
 ▼
 DATABASE DICTNAME=DOCUDICT
 IN DB SS=EMPSS01 $RPT708
 PATHAA EMPLOYEE STRUCTURE(MANAGES) EMPLOYEE(REPORTS-TO)
*STRUCTURE(MANAGES) EMPLOYEE(REPORTS-TO)
 01OUT 120
 010 MGR '                          '
 010 SUP '                          '
 010 EMP '                          '
 0141*010 'MANAGER'
 0141*020 'SUPERVISOR'
 0141*030 'WORKER'
 0142*001 ' '
 0151*010 EMP-NAME-0415 (1)
 0152*020 EMP-NAME-0415 (2)
 0153*030 EMP-NAME-0415 (3)
 017010   IF EMP-NAME-0415 (1) NE MGR  100
 017020   IF EMP-NAME-0415 (2) NE SUP  200
 017030   IF EMP-NAME-0415 (3) NE EMP  300
 017      DROP
 017100   RELS 1
```

```
017200   RELS 2
017300   RELS 3
017      MOVE EMP-NAME-0415 (1) TO MGR
017      MOVE EMP-NAME-0415 (2) TO SUP
017      MOVE EMP-NAME-0415 (3) TO EMP
```

Result

```
          MANAGER                SUPERVISOR                WORKER

ROBBY     WILDER
                       THEMIS     PAPAZEUS
                                                 ROGER      WILCO
                                                 DANIEL     MOON
                                                 RENE       MAKER
                       MONTE      BANK
                                                 BETSY      ZEDI
                                                 JOCK       JACKSON
                                                 LAURA      PENMAN
                                                 CAROL      MCDOUGALL
                                                 MICHAEL    ANGELO
                                                 CHARLES    BOWER
THEMIS    PAPAZEUS
                       ROGER      WILCO
                                                 TERRY      CLOTH
                                                 JOE        KASPAR
                                                 MARK       TIME
                                                 PHINEAS    FINN
                       DANIEL     MOON
                                                 BETH       CLOUD
                                                 ALAN       DONOVAN
                       RENE       MAKER
                                                 C.         BREEZE
                                                 ROY        ANDALE
                                                 RICHARD    WAGNER
                                                 HARRY      ARM
                                                 RICHARD    MUNYON
                                                 CAROLYN    CROW
                                                 BURT       LANCHESTER
HENRIETTA HENDON
                       ROGER      WILCO
                                                 TERRY      CLOTH
                                                 JOE        KASPAR
                                                 MARK       TIME
                                                 PHINEAS    FINN
                       DANIEL     MOON
                                                 BETH       CLOUD
                                                 ALAN       DONOVAN
                       ELEANOR    PEOPLES
                                                 MADELINE   ORGRATZI
                                                 TOM        FITZHUGH
                                                 CYNTHIA    JOHNSON
                       JENNIFER   GARFIELD
                                                 LARRY      LITERATA
                                                 JAMES      GALLWAY
                                                 PERCY      GRANGER
                                                 VLADIMIR   HEAROWITZ
                                                 JANE       DOUGH
                                                 KATHERINE  O'HEARN
                                                 RALPH      TYRO
                                                 JAMES      JACOBI
                                                 JULIE      JENSEN
```

Accessing Multiple-Member Sets

What You Can Do

You can access records in a set that has one owner record and two or more member records.

How to Do It

Code:

1. A PATH parameter placing the **ALL-MEMBERS** option after the name of the owner record
2. An optional SELECT/BYPASS BUFFER parameter *after the INPUT, KEYFILE, and PATH parameters* that includes the REC-NAME keyword

Demonstration

Objective

This report lists employee hospital and dental claims. The HOSPITAL-CLAIM and DENTAL-CLAIM records are owned by the COVERAGE record.

Procedure

- The **INPUT** parameter specifies an input buffer size of 4000 bytes to accommodate the five record types (EMPLOYEE, COVERAGE, HOSPITAL-CLAIM, NON-HOSP-CLAIM, and DENTAL-CLAIM), overhead, and DB-keys that are read into the buffer.

  The NON-HOSPITAL-CLAIM record, while not used for this report, must be included in the buffer size.
- The **ALL-MEMBERS** option on the PATH parameter specifies access to each occurrence of the records in the multiple-member set COVERAGE-CLAIMS.
- The **SELECT BUFFER** parameter with **REC-NAME** specifies access to two of the three records of the COVERAGE-CLAIMS set.
- **REC** parameters redefine the claim date fields as numeric to allow for automatic date formatting.

  Field redefinition is based upon the starting point in the record, as opposed to the position in the input buffer, by including the record type name immediately after the field name.

Complete Code

```
col. 2
▼
IN 4000 DB SS=EMPSS01
PATH01 EMPLOYEE COVERAGE ALL-MEMBERS (COVERAGE-CLAIMS)
SELECT BUFFER WHEN REC-NAME EQ ('HOSPITAL-CLAIM' 'DENTAL-CLAIM')
REC CLAIM-DATE-0430(HOSPITAL-CLAIM) 1  6  2
REC CLAIM-DATE-0405(DENTAL-CLAIM)   1  6  2
01OUT D
0141*010 'PATIENT'
0141*020 'HOSPITAL CLAIMS'
0141*030 'DENTAL CLAIMS'
0141*040 'EMPLOYEE'
0142*001 ' '
0151*010 PATIENT-NAME-0430
0151*020 CLAIM-DATE-0430  FD
0151*040 EMP-NAME-0415
0152*010 PATIENT-NAME-0405
0152*030 CLAIM-DATE-0405  FD
0152*040 EMP-NAME-0415
017010 IF REC-NAME EQ 'HOSPITAL-CLAIM' 300
017    TAKE 2
017300 TA
LANCHESTER
                  HELOISE   HENDON                                    77/05/23
HENRIETTA HENDON
                  HATFIELD HENDON           82/11/07                  HENRIETTA
HENDON
                  JESSICA   CRANE                                     80/10/04
HERBERT   CRANE
```

Chapter 15: Retrieving Data With SQL

This section contains the following topics:

Introduction

This chapter provides many useful procedures and CA Culprit coding techniques to help you write complex reports using SQL and CA Culprit.

Getting the Exact Column Names for an SQL Table

If you do not know the exact column names in the INV.STOCKS table, try running the following simple CA Culprit report.

```
col. 2
▼
PRO  EX=NO
IN  DB(Q)  DICTIONARY=TSTDICT   SCHEMA=INV
SQL SELECT * FROM STOCKS;
0151*001 ' '
```

The EX=NO tells CA Culprit to simply compile the report. No data extraction will be performed.

SQL SELECT * FROM STOCKS tells CA Culprit to describe all of the columns and null indicators for the STOCKS table. The generated REC cards will appear on the INPUT PARAMETER LISTING.

Generated REC Cards

```
********
REC       START    SIZE    TYPE   DP        FIELD-NAME
********
 REC      0100     00005     3    3   CLOSE_PRICE
 REC      0105     00004     1        CLOSE_PRICE_NULL_IND
 REC      0069     00005              COMPANY_ID
 REC      0074     00004     1        COMPANY_ID_NULL_IND
 REC      0049     00020              COMPANY_NAME
 REC      0078     00010              TRADING_DATE
 REC      0088     00004     1        TRADING_DATE_NULL_IND
 REC      0092     00004     1        VOLUME
 REC      0096     00004     1        VOLUME_NULL_IND
```

From this report, you can deduce that the STOCKS table was created using the following SQL command:

SQL Command

```
CREATE TABLE INV.STOCKS
(COMPANY_NAME  CHAR(20) NOT NULL,
 COMPANY_ID    CHAR(5),
 TRADING_DATE  DATE,
 VOLUME        INTEGER,
 CLOSE_PRICE   DECIMAL(9,3));
```

Using the AS Clause to Rename SQL Columns

Long SQL column names can present a problem to CA Culprit, since you can create a null indicator name by appending **_NULL_IND** to the end of the previously generated REC card name. You can avoid potential errors by using an AS clause to assign an alias to each SQL column.

AS Clause Example

```
 col. 2
 ▼
 INPUT  DB(Q)    DICTIONARY=TSTDICT    SCHEMA=INV
 SQL SELECT "EMP-ID-0415"           AS  "ID",
*           "EMP-FIRST-NAME-0415"   AS  "FNAME",
*           "EMP-LAST-NAME-0415"    AS  "LNAME"
*    FROM EMPLOYEE
*    WHERE "EMP-ID-0415" = 2000
*    ORDER BY ID;
 0151*001  ID
 0151*002  FNAME
 0151*003  LNAME
```

Please note that you may not use the alias names ID, FNAME, and LNAME on most clauses in the SQL statement (Aliases are allowed on the order by clause). However, the aliases will be used to generate REC parameters, and must be used on all subsequent CA Culprit statements.

Generated REC Cards

```
********
REC       START    SIZE    TYPE   DP        FIELD-NAME
********
 REC      0057     00015             FNAME
 REC      0072     00004     1       FNAME_NULL_IND
 REC      0049     00004     2       ID
 REC      0053     00004     1       ID_NULL_IND
 REC      0076     00020             LNAME
 REC      0096     00004     1       LNAME_NULL_IND
```

Retrieving Floating Point Data from SQL Columns

Although CA Culprit does not support **real** and **double precision** as REC parameter data types, there is a simple coding technique to work around the deficiency.

CA Culprit will treat real SQL columns as four byte alphanumeric fields. Double precision columns will be treated as eight byte alphanumeric fields. 16 byte packed decimal work fields can be defined, and CULLUS36 can be used to convert the floating point values to packed decimal. The CA Culprit program below illustrates the technique.

Converting to Packed Decimal

```
 col. 2
 ▼
 IN DB(Q)  DICTIONARY=TSTDICT   SCHEMA=INV
 SQL SELECT * FROM FLOAT_TABLE;
$  CA Culprit will generate  the REC cards shown below.
$REC  REAL_DATA     49  4                     $ GENERATED
$REC  DOUBLE_DATA   53  8                     $ GENERATED
$
 010  WK_REAL    0.000000
 010  WK_DOUBLE  0.000000000000
 010  RETCODE '    '
 0151*001   WK_REAL   HF
 0151*002   WK_DOUBLE HF
 017      CALL US36(REAL_DATA,  'S',  WK_REAL,    6, RETCODE)
 017      IF RETCODE NE '    '  200
 017      CALL US36(DOUBLE_DATA, 'D', WK_DOUBLE, 12, RETCODE)
 017      IF RETCODE NE '    '  200
 017      TAKE
 017200   CALL US48(' ERROR IN FLOATING POINT CONVERSION%%')
 017      DROP
```

The arguments for CULLUS36 are described below:

US36 Arguments(Error: Don't know what to do with column width of "20," (3).

ARG1 field-name

Name of input field containing the floating point value

ARG2 indicator

'S' = Single Precision:

'D' = Double Precision

ARG3 result-field

Name of 16 byte packed decimal work field

ARG4 decimal-pts

Integer indicating number of decimal places in result field

ARG5 return-code

Name of four byte alpha work field

Displaying an SQL Column with Data Type BINARY

The BINARY data type is a CA IDMS/DB extension to ANSI SQL. It is used to store hexadecimal literals up to 32,760 bytes in length.

During retrieval, CA Culprit treats columns with SQL data type BINARY as an alphanumeric field. To display the binary data on a report, use CULLUS31 to obtain a hexadecimal representation of the actual data.

In the example below, the SYSTEM.CONSTRAINT table has a column named REFCOLUMNS defined as BINARY(64). To print the data in hex on our report, displaying 10 bytes on each detail line.

Report Output

```
REPORT 01          CONSTRAINT TABLE REPORT       mm/dd/yy  PAGE   1

         CONSTRAINT                                 REFCOLUMNS
           NAME                                  01.....05.......10

     REFERENCED-TABLE          BYTES  1 - 10   0001000200000000000
                               BYTES 11 - 20   00000000000000000000
                               BYTES 21 - 30   00000000000000000000
                               BYTES 31 - 40   00000000000000000000
                               BYTES 41 - 50   00000000000000000000
                               BYTES 51 - 60   00000000000000000000
                               BYTES 61 - 64   00000000
```

Report Syntax

```
col. 2
▼
PRO  USER=MZC  PW=MZC
IN  300 DB(Q)   SCHEMA=SYSTEM  DICTIONARY=TSTDICT
REC HEX_REFCOL  150 128
REC HEX_REFCOL1 150 20
REC HEX_REFCOL2 170 20
REC HEX_REFCOL3 190 20
REC HEX_REFCOL4 210 20
REC HEX_REFCOL5 230 20
REC HEX_REFCOL6 250 20
REC HEX_REFCOL7 270 20
SQL  SELECT NAME, REFCOLUMNS FROM CONSTRAINT;
010UT  80 D
013  CONTRAINT TABLE REPORT
0151*001 NAME  HH 'CONSTRAINT' 'NAME'
0151*002 'BYTES  1 - 10'
0151*003 HEX_REFCOL1  HH 'REFCOLUMNS' '01......05........10'
0152*002 'BYTES 11 - 20'
0152*003 HEX_REFCOL2
0153*002 'BYTES 21 - 30'
0153*003 HEX_REFCOL3
0154*002 'BYTES 31 - 40'
0154*003 HEX_REFCOL4
0155*002 'BYTES 41 - 50'
0155*003 HEX_REFCOL5
0156*002 'BYTES 51 - 60'
0156*003 HEX_REFCOL6
0157*002 'BYTES 61 - 64'
0157*003 HEX_REFCOL7
017      CALL US31(REFCOLUMNS, 64, HEX_REFCOL)
```

The arguments for CULLUS31 are described below:

US31 Arguments(Error: Don't know what to do with column width of "20," (3).

ARG1 field-name

Name of input field containing the value to be converted

ARG2 length

Numeric literal or 8 byte work field containing the length of the input field. For release 12.0, this value must be in the range 1 through 127.

ARG3 result-field

Name of the output field. Result-field must be twice as long as the length of the input field.

How to Test and Display Null Values

The sales table below contains daily sales data for specific products.

Table Definition

```
CREATE TABLE INV.SALES
(PRODUCT       CHAR(20) NOT NULL,
 SALES_DATE    DATE     NOT NULL,
 UNITS_SOLD    INTEGER);
```

Notice that the UNITS_SOLD field may contain null values. A null value means "We don't know how many units we sold". That is much different than the value zero which means "We didn't sell any product on this date".

Here's how to create a detail report that displays null values on the detail line.

Detail Report

```
col. 2
▼
IN  DB(Q)  DICTIONARY=TSTDICT   SCHEMA=INV
SQL SELECT * FROM SALES;
01OUT 80  D
0151*001  PRODUCT      HF
0151*002  SALES_DATE   HF
0151*003  UNITS_SOLD   SZ=6   F-   HF
0152*001  PRODUCT
0152*002  SALES_DATE
0152*003  '---null---'
017       IF UNITS_SOLD_NULL_IND = -1    200
017100    TAKE 1
017200    TAKE 2
```

The UNITS_SOLD_NULL_IND will be set to minus one to indicate a null value. A zero value indicates that UNITS_SOLD is not null.

Report Output

```
      PRODUCT             SALES_DATE          UNITS_SOLD

WASHING MACHINES          yyyy-mm-dd              14
Washing Machines          yyyy-mm-dd          ---null---
WASHING MACHINES          yyyy-mm-dd               0
WASHING MACHINES          yyyy-mm-dd               3
WASHING MACHINES          yyyy-mm-dd              12
```

Handling Null Values at Total Time

You can enhance the previous example to produce weekly summary information for each product. You also want to print the average number of units sold per day. The final report should look like this:

Report Output

```
REPORT 01           WEEKLY SALES BY PRODUCT              PAGE 1

      PRODUCT              SALES_DATE          UNITS_SOLD

  Clothes Driers           yyyy-mm-dd                3
  Clothes Driers           yyyy-mm-dd             ---null---
  Clothes Driers           yyyy-mm-dd             ---null---
  Clothes Driers           yyyy-mm-dd                6
  Clothes Driers           yyyy-mm-dd                3
                                                  ----------
                           Total Weekly Sales        12
                           Average Daily Sales     4.00

  Stoves                   yyyy-mm-dd             ---null---
  Stoves                   yyyy-mm-dd             ---null---
  Stoves                   yyyy-mm-dd             ---null---
  Stoves                   yyyy-mm-dd             ---null---
  Stoves                   yyyy-mm-dd             ---null---
                                                  ----------
                           Total Weekly Sales     ---null---
                           Average Daily Sales    ---null---

  Washing Machines         yyyy-mm-dd                14
  Washing Machines         yyyy-mm-dd             ---null---
  Washing Machines         yyyy-mm-dd                 0
  Washing Machines         yyyy-mm-dd                 3
  Washing Machines         yyyy-mm-dd                12
                                                  ----------
                           Total Weekly Sales        29
                           Average Daily Sales     7.25
```

WHERE Clause

First, add a WHERE clause to select data for one week:

```
 col. 2
 ▼
 SQL SELECT * FROM SALES
*    WHERE SALES_DATE >= 'yyyy-mm-dd' AND
*          SALES_DATE <= 'yyyy-mm-dd';
```

Subtotals

Next, add a title parameter and a SORT parameter to request subtotals by product. A COUNT field has been initialized to one. It will be used to determine how many detail records have been processed for each group. You can automatically accumulate subtotals for COUNT and UNITS_SOLD_NULL_IND if they appear on detail lines. However, since you don't want the detail values to print, use print position zero:

```
col. 2
▼
01SORT  PRODUCT 0, SALES_DATE
010 COUNT  1
013 WEEKLY SALES BY PRODUCT
0151*000   COUNT
0151*000   UNITS_SOLD_NULL_IND
```

Based on the information in the report shown above, the total-time values for PRODUCT, COUNT, and UNITS_SOLD_NULL_IND are:

Subtotal Values(Error: Don't know what to do with column width of "20," (3).(Error: Don't know what to do with column width of "11," (3).

PRODUCT	COUNT	UNITS_SOLD_NULL_IND
Washing Machines	5	-1
Clothes Driers	5	-2
Stoves	5	-5

These values let you determine how many UNITS_SOLD for each product are not null. This in turn provides you with the divisor you need to compute the average daily sales for each product. The total-time logic is shown below:

Total-time Logic

```
col. 2
▼
010 NOT_NULL_COUNTER  0
010 AVERAGE           0.00
018     IF LEVL = 2 DROP
018     COMPUTE COUNT + UNITS_SOLD_NULL_IND  NOT_NULL_COUNTER
018     IF NOT_NULL_COUNTER = 0  400
018     COMPUTE UNITS_SOLD / NOT_NULL_COUNTER  AVERAGE
018     TAKE (1,2,3)
018400  TAKE (1,4,5)
0161*003   '-----------'
0162*002   'Total Weekly Sales'
0162*003   UNITS_SOLD    SZ=6  F-
0163*002   'Average Daily Sales'
0163*003   AVERAGE       SZ=6  F-
0164*002   'Total Weekly Sales'
0164*003   '---null---'
0165*002   'Average Daily Sales'
0165*003   '---null---'
```

Understanding CA Culprit Decimal Point Handling

In our STOCKS table example, the CLOSE_PRICE field is defined as having three implied decimal digits.

Table Definition

```
CREATE TABLE INV.STOCKS
(COMPANY_NAME  CHAR(20) NOT NULL,
 COMPANY_ID    CHAR(5),
 TRADING_DATE  DATE,
 VOLUME        INTEGER,
 CLOSE_PRICE   DECIMAL(9,3));
```

This allows you to represent 1/8 point fractions as a decimal value. However when formatting reports, you often want to print the value as a money field, dollars and cents. This means converting the number from DP=3 to DP=2.

To obtain the correctly rounded value, move the CLOSE_PRICE field to a work field, WK_CLOSE defined with two decimal points. Then, reference WK_CLOSE on the detail line. The report below shows why:

Report Syntax

```
col. 2
▼
IN  DB(Q)  DICTIONARY=TSTDICT   SCHEMA=INV
SQL SELECT * FROM STOCKS;
010UT 80  D
010  WK_CLOSE  0.00
0151*001  COMPANY_NAME      HF
0151*002  CLOSE_PRICE       HF
0151*003  CLOSE_PRICE       DP=2   HH 'DP=2 ON' '5  LINE'
0151*004  WK_CLOSE          HF
017       MOVE CLOSE_PRICE TO WK_CLOSE
```

Report Output

```
                                DP=2 ON
      COMPANY_NAME      CLOSE_PRICE      5  LINE       WK_CLOSE

   CA                          9.125        91.25           9.13
   Boston Edison              20.375       203.75          20.38
```

As you can see, coding **CLOSE_PRICE DP=2** on the edit parameter changes the location of the implied decimal point, and produces erroneous results. To insure correct rounding, move the value to a work variable that was defined with the correct number of decimal points.

Interpreting Common Error Messages in SQL Retrieval

For retrieval processing, SQL Prepare and Describe commands are issued during the pre-compile phase of CA Culprit. If any errors are detected, you will receive the following messages on your Sequential Parameter Listing.

```
mm/dd/yy             SEQUENTIAL PARAMETER LISTING           Vnn.n   PAGE 1

00 ** SYSIN **       PRO  USER=MZC  PW=MZC
  C200138 INSTALLATION SECURITY OPTION IS NO
                     IN  DB(Q)  SCHEMA=INV  DICTIONARY=TSTDICT
                     SQL SELECT * FROM  XYZ;
E C700054 ERROR FROM PREPARE SQL SELECT
  C700055   SQLCODE:  -0004          SQLCERC: 5138
  C700056   SQLCESER:  0000          SQLCNRP: 0000
  C700057    Table INV.XYZ not found in catalog
E C700052 SQL ERROR ENCOUNTERED
```

Messages 55, 56, and 57 print the error codes and text contained in the SQL Communications Area (SQLCA).

see the *CA IDMS SQL Reference Guide*, for more information about the SQLCA error code fields.

Any **E** or **F** level errors associated with the SQL statement will prevent CA Culprit from generating REC parameters to describe the SQL columns and null indicators. That means you will probably receive messages like "Field Not Defined" on the Input Parameter Listing. Ignore these extraneous errors for now. They will probably go away as soon as you correct the SQL statement.

During the extract phase of CA Culprit, you issue SQL commands to perform the bulk fetch operation. Any errors at this time appear under Run Time Messages. The SQL error codes and text are be formatted exactly as shown above.

Chapter 16: Creating New SQL Data Tables

This section contains the following topics:

Introduction

This chapter illustrates many CA Culprit coding techniques used to create new CA IDMS SQL tables.

Create Table Syntax Generated by CA Culprit

Information from the OUTPUT parameter and the EDIT parameters is used to generate SQL Create Table syntax during the compile phase of CA Culprit. To help illustrate this correspondence, a CA Culprit program fragment is included below along with the SQL commands that are generated:

CA Culprit Syntax

```
 col. 2
 ▼
 010 ZERO  0
 010UT     SQLTABLE=INVENTORY  TYPE=CREATE
*          DICTIONARY=TSTDICT  SCHEMA=INV
 0151*010  WAREHOUSE      SZ=10  NOT NULL
 0151*020  PRODUCT_CODE   SZ=10  NOT NULL
 0151*030  UNITS_ON_HAND  FP     SZ=4
 0151*031  ZERO           FB     SZ=4
```

Compile-phase SQL Syntax

```
CONNECT TO TSTDICT;
SET SESSION CURRENT SCHEMA "INV";
CREATE TABLE "INVENTORY"
        ("WAREHOUSE"     CHAR(0010)  NOT NULL,
         "PRODUCT_CODE"  CHAR(0010)  NOT NULL,
         "UNITS_ON_HAND" DECIMAL(0007,0000));
COMMIT RELEASE;
```

These SQL commands are generated and issued directly by CA Culprit; nothing is required of the user.

Converting ASF Tables to SQL Tables

The job of converting a ASF table to an SQL table is really quite simple using CA Culprit. Simply read the ASF table as input, and create an OUTPUT SQL table with TYPE=CREATE.

CA Culprit Syntax

```
 col. 2
 ▼
 PRO    USER=MZC  PW=
 INPUT  TABLE=INVENTRY  TYPE=COPY   CATALOG=ASFDICT
 010UT  SQLTABLE=INVENTORY  TYPE=CREATE
*       DICTIONARY=TSTDICT  SCHEMA=INV
*       BULKROWS=500
 010    UNITS_ON_HAND   0
 010    ZERO            0
 0151*010  WAREHOUSE      SZ=10  NOT NULL
 0151*020  PRODUCT_CODE   SZ=10  NOT NULL
 0151*030  UNITS_ON_HAND  FP     SZ=4
 0151*031  ZERO           FB     SZ=4
 017       MOVE ITEMS_IN_STOCK TO UNITS_ON_HAND
 017       TAKE
```

The technique of moving ITEMS_IN_STOCK to UNITS_ON_HAND lets the user create new SQL column names for the fields. Data values can be converted from one format within ASF to another SQL data type by simply coding a format code and SZ= on the edit card.

Parameter **0151*031** is the null indicator value for the UNITS_ON_HAND field. It must be present, and must have a data specification of **FB SZ=4**. Often a work field initialized to zero is used to represent a null indicator that may not have been present on the input data file.

Assigning Null Values to an SQL Column

The technique for assigning null values to an SQL column is quite simple: set the column null indicator to minus one (-1).

Consider the example of a phonelist. For the WORK_PHONE field, you could use blanks to mean "This person has no work phone" and null to mean "He may have a work phone, but we don't know the number".

On the sequential input file, null values are represented by a question mark (?) in the WORK_PHONE field. The example below reads the input file, converts question marks to null values, and creates a new SQL table containing the phonelist:

Code Example

```
 col. 2
 ▼
 IN 80
 REC  FIRST_NAME  1  12
 REC  LAST_NAME  13  15
 REC  IN_HOMEPH  28  12
 REC  IN_WORKPH  40  12
 010  HOME_PHONE '            '
 010  WORK_PHONE '            '
 010  SPACES     '            '
 010  HOME_PHONE_NULL_IND  0
 010  WORK_PHONE_NULL_IND  0
 01OUT SQLTABLE=PHONELIST  TYPE=CREATE
*      DICTIONARY=TSTDICT  SCHEMA=DEMO
 0151*010  FIRST_NAME      NOT NULL  WITH DEFAULT
 0151*020  LAST_NAME       NOT NULL  WITH DEFAULT
 0151*030  HOME_PHONE
 0151*031  HOME_PHONE_NULL_IND  FB SZ=4
 0151*040  WORK_PHONE
 0151*041  WORK_PHONE_NULL_IND  FB SZ=4
 017    IF IN_HOMEPH = '?'  100
 017    MOVE IN_HOMEPH TO HOME_PHONE         $ Not Null - Valid Number
 017    MOVE 0         TO HOME_PHONE_NULL_IND
 017    B  200
 017100 MOVE SPACES    TO HOME_PHONE         $ Assign Null Value
 017    MOVE -1        TO HOME_PHONE_NULL_IND
 017$
 017200 IF IN_WORKPH = '?'  300
 017    MOVE IN_WORKPH TO WORK_PHONE         $ Not Null - Valid Number
 017    MOVE 0         TO WORK_PHONE_NULL_IND
 017    B  400
 017300 MOVE SPACES    TO WORK_PHONE         $ Assign Null Value
 017    MOVE -1        TO WORK_PHONE_NULL_IND
 017400 TAKE
```

How CA Culprit Handles Data Insertion Errors

During the output phase of CA Culprit, it is possible to encounter errors during the SQL bulk insert. If this occurs, CA Culprit produces a diagnostic dump of the output data record and continue processing, as shown below:

Output Phase Diagnostic Error

```
E C760001 THE FOLLOWING ROWS WERE NOT STORED DUE TO INSERT ERRORS:

     OUTPUT                   R E C O R D    L A Y O U T
     RECORD   ERROR
     NUMBER   CODE

      0005    1023       CHAR            .............ABCDE....
                         ZONE   4444444444FFFF000130000CCCCC0000
                         DIGIT  0000000000FFFF0002C0000123450000
                                1...5...10....5...20....5...30..
```

In the above example, the **Output Record Number** indicates that the fifth row being written contained an error.

The **Record Layout** provides a complete vertical hex dump of the CA Culprit output buffer to assist in debugging. The **Error Code** 1023 indicates a constraint violation. This value was obtained from the SQLCERC field in the SQL Communications Area. A list of common error codes is given below:

SQLCERC Codes(Error: Don't know what to do with column width of "10," (3).

The following is a list of the error codes and their description

1008

No storage to load data

1010

Load of Table Deadlocked

1023

Constraint Violation

1025

Data Exception

1026

Data Conversion Error

1051

Cardinality Violation

1058

Duplicate Key Violation

1067

I/O Error While Loading Table

Chapter 17: Adding, Replacing, and Dropping Data on SQL Tables

This section contains the following topics:

Updating SQL Columns of Type DATE

SQL Tables that contain columns of type DATE may be updated using the ADD or REPLACE functions. Data to be loaded into a DATE column should be stored in a 10 byte alphanumeric variable or literal. The format of the date value should be **'YYYY-MM-DD'**. CA IDMS/DB is responsible for converting this date value into its own internal DATE format.

Existing Table Definition

```
CREATE TABLE STOCKS
((COMPANY_NAME    CHAR(20)  NOT NULL,
  COMPANY_ID      CHAR(5),
  TRADING_DATE    DATE,
  VOLUME          INTEGER,
  CLOSE_PRICE     DECIMAL(9,3));
```

Report Syntax

```
 col. 2
 ▼
 IN 80
 REC COMPANY_NAME  1 20
 REC COMPANY_ID   21  5
 REC VOLUME       26  8  2
 REC CLOSE_PRICE  34  9  2  DP=3
 010 TRADING_DATE 'yyyy-mm-dd'
 01OUT   SQLTABLE=STOCKS     TYPE=ADD
*        DICTIONARY=TSTDICT  SCHEMA=INV
```

```
010  ZERO  0
0151*010 COMPANY_NAME
0151*020 COMPANY_ID
0151*021 ZERO         FB   SZ=4
0151*030 TRADING_DATE
0151*031 ZERO         FB   SZ=4
0151*040 VOLUME       FB   SZ=4
0151*041 ZERO         FB   SZ=4
0151*050 CLOSE_PRICE  FP   SZ=5  DP=3
0151*051 ZERO         FB   SZ=4
```

Getting the Exact Syntax for Updating a SQL Table

In order to update an existing SQL table, it is necessary to know the exact order of the columns, the data types, and the existence of null indicators. Fortunately, there is an easy technique to get the exact CA Culprit syntax needed to update an SQL table. Here's how:

Code a small CA Culprit program using TYPE=ADD on the OUTPUT parameter. Deliberately make a mistake on the data type or size of an EDIT parameter. This produces **E** level errors during the compile phase of CA Culprit.

Report Syntax

```
col. 2
▼
IN 80
REC  ID  1 4 2
010UT  SQLTABLE=STOCKS      TYPE=ADD
*      DICTIONARY=TSTDICT   SCHEMA=INV
0151*001  ID   FW     $ Deliberate Error!
017       DROP
```

At the end of the compile phase, error messages are produced on the Input Parameter Listing. Message C700071 provides you with sample EDIT parameters to describe the output SQL table exactly. Use this as a template for coding your CA Culprit program.

Table Diagnostics

```
*********
EDIT      LINE CC COLUMN   VALUE OR FIELD-NAME AND EDIT OPTIONS
*********
 01   5     1       *001   ID       FW
E C300064 FORMAT CODE IS INVALID
E C300023 FIELD SIZE IS INVALID


I C700071 USE THE SAMPLE EDIT PARAMETERS BELOW TO CORRECT YOUR PROGRAM
          0151*010 COMPANY_NAME                     SZ=0020
          0151*020 COMPANY_ID                       SZ=0005
          0151*021 COMPANY_ID_NULL_IND         FB   SZ=0004
          0151*030 TRADING_DATE                     SZ=0010
          0151*031 TRADING_DATE_NULL_IND       FB   SZ=0004
          0151*040 VOLUME                      FB   SZ=0004
          0151*041 VOLUME_NULL_IND             FB   SZ=0004
          0151*050 CLOSE_PRICE                 FP   SZ=0005   DP=0003
          0151*061 CLOSE_PRICE_NULL_IND        FB   SZ=0004
```

Drop Table Example

The code needed to delete an SQL table definition using CA Culprit is given below:

CA Culprit Syntax

```
 col. 2
 ▼
 IN 80
 REC FIELDA  1 4
 010UTPUT  SQLTABLE=INVENTORY  TYPE=DROP
*          DICTIONARY=TSTDICT  SCHEMA=INV
 0151*001  ' '
 017       DROP
```

Report Output

```
SQL TABLE UPDATE STATISTICS

REPORT  FUNCTION    SCHEMA    TABLE NAME    TABLE DEFINITION   ROWS STORED
------  ________    ______    __________    ________________   ___________

  01      DEL     INV         INVENTORY          DELETED
```

Appendix A: The Personnel File Description

The Commonweather Corporation personnel file, which is used in examples in this manual, is described fully in the figure below:

The Commonweather Corporation Personnel File Description

```
RECORD SIZE    200 bytes
BLOCK SIZE     400 bytes
RECORD FORMAT  FIXED (F)
FILE TYPE      SEQUENTIAL (PS)
```

Data Field	Start Position	Length (bytes)	Data Type
EMPLOYEE-ID	1	4	Zoned decimal
EMPLOYEE-NAME	5	25	Alphanumeric
FIRST-NAME	5	10	Alphanumeric
LAST-NAME	15	15	Alphanumeric
STREET	30	20	Alphanumeric
CITY	50	15	Alphanumeric
STATE	65	2	Alphanumeric
ZIP-CODE	67	5	Alphanumeric
PHONE	72	10	Zoned decimal
STATUS	82	2	Alphanumeric
SS-NUMBER	84	9	Zoned decimal
START-MONTH	93	2	Zoned decimal
START-DAY	95	2	Zoned decimal
START YEAR	97	2	Zoned decimal
TERMINATION-MONTH	99	2	Zoned decimal
TERMINATION-DAY	101	2	Zoned decimal
TERMINATION-YEAR	103	2	Zoned decimal
BIRTH-MONTH	105	2	Zoned decimal
BIRTH-DAY	107	2	Zoned decimal
BIRTH-YEAR	109	2	Zoned decimal
DEPT-ID	111	4	Zoned decimal
DEPT-NAME	115	45	Alphanumeric
SALARY-AMOUNT	160	5	Packed Decimal
JOB-ID	167	4	Zoned decimal
TITLE	171	20	Alphanumeric

Appendix B: Debugging a CA Culprit Report

A CA Culprit report is debugged by using a combination of standard debugging techniques and the informational, warning, error, and statistical messages provided by CA Culprit. The following procedural sequence, recommended for finding errors in CA Culprit coding, uses standard and CA Culprit techniques:

1. Desk check the code.
2. Review CA Culprit listings, messages, and error codes, including buffer dumps.

   Refer to the *CA Culprit for CA IDMS Messages and Codes Guide*, for detailed information.
3. Use procedure module CULLUS48.
4. Print unsorted listings of data and walk through program logic with the data (play computer).
5. Print information beyond that required for the report.
6. Force buffer dumps.

This appendix presents a summary of CA Culprit capabilities that can be useful in debugging.

This section contains the following topics:

Reviewing CA Culprit Listings and Messages

CA Culprit generates a sequential parameter listing, an input parameter listing, and run-time messages in addition to printed reports. Through these listings, errors can be flagged from all of CA Culprit's processing phases.

Sequential Parameter Listing

Preliminary parameter syntax diagnostics (precompile phase) are printed in the sequential parameter listing. Diagnostics are printed immediately below an invalid parameter or at the end of the listing. Asterisks (*) may underline the field in error:

```
                                  REC SALARY      160
                                                  ***

        E  INCOMPLETE PARAMETER CARD
```

Input Parameter Listing

Warning and error messages produced during parameter validation (compile phase) are printed on the input parameter listing. Error messages relating to a particular input parameter appear below the invalid parameter. Errors relating to the entire report are listed at the end. The final message indicates if the extract phase was performed:

```
mm/dd/yy                      INPUT PARAMETER LISTING                            volser Vnn.n  PAGE     1
********
INPUT    RECORD TYPE BLOCK  FILE DESCRIPTION...
********
 INPUT   00200   F   00400  PS(TAPE)  LT=S
********
REC      START  SIZE  TYPE  DP    FIELD-NAME                 RECORD-NAME,LEVEL
********
 REC     00160  00007   3   2 SALARY                          'SALARY'       'TOTAL'
mm/dd/yy                      INPUT PARAMETER LISTING                            volser Vnn.n  PAGE     2
********
OUTPUT   RECORD BLOCK T/D  FILE DESCRIPTION...
********
 01 OUT               T
********
EDIT     LINE CC COLUMN  VALUE OR FIELD-NAME AND EDIT OPTIONS...
********
 01  5     1       *020   SALARY
********
EDIT     LINE CC COLUMN  VALUE OR FIELD-NAME AND EDIT OPTIONS...
********
 01  6     1       *010   'ALL DEPARTMENTS'   HH        'DEPARTMENT'
 01  6     1       *020   SALARY    SZ=0010   HH        'TOTAL SALARIES'
 C300106 EXTRACT WILL BE PERFORMED
 C300119 PROFILE OPTION IN EFFECT: RELEASE =  6
```

Runtime Messages

Processing errors resulting from input-file processing, buffer dumps, and end-of-file statistics are listed in run-time messages (extract phase):

- Processing errors include database access and file-matching operations.
- Buffer dumps show the contents of the input buffer in character and hexadecimal representation when an error occurs in input processing.

  If an error condition does not create a buffer dump, the dump can be forced by creating a zero-divide condition in the CA Culprit program:

  ```
  010 ZERO
      .
      .
      .
  017     ZERO / ZERO  ZERO
  ```

  The dump looks like this:

```
mm/dd/yy                    RUN TIME MESSAGES                                volser Vnn.n  PAGE     1

  C350023 INVALID NUMERIC DATA ENCOUNTERED IN REPORT 01
  (CONT) ERROR OCCURRED DURING PROCESSING DETAIL   LINE 1 FIELD   1
  (CONT) MOST RECENT SUBSCRIPT VALUE           0
  (CONT) INPUT BUFFER NUMBER           1
  (CONT) RECORD BUFFER DUMP
              CHAR   0069JUNE      BLOOMER        14 ZITHER TERR      LEXINGTON      MA01675          010395578188005050 0
              ZONE   FFFFDEDC444444CDDDDCD44444444FF4ECECCD4ECDD444444DCECDCEDD444444DCFFFFF4444444444FFFFFFFFFFFFFFFFF
              DIGIT  0069145500000023664590000000014099385903599000000357957365000000410167500000000000103955781880505000
                    01...5...10....5...20....5...30....5...40....5...50....5...60....5...70....5...80....5...90....5...00
              CHAR   0000    600425ACCOUNTING AND PAYROLL                                    PAYROLL CLERK
              ZONE   FFFF4444FFFFFFCCCDEDECDC4CDC4DCEDDDD444444444444444444444401000444444DCEDDDD4CDCDD4444444444444444444
              DIGIT  0000000060042513364539570154071896330000000000000000000000500C0000007189633033592000000000000000000
                   101...5...10....5...20....5...30....5...40....5...50....5...60....5...70....5...80....5...90....5...00
mm/dd/yy                RUN TIME MESSAGES                                volser Vnn.n  PAGE    25

  C350023 INVALID NUMERIC DATA ENCOUNTERED IN REPORT 01
  (CONT) ERROR OCCURRED DURING PROCESSING DETAIL   LINE 1 FIELD   1
  (CONT) MOST RECENT SUBSCRIPT VALUE           0
  (CONT) INPUT BUFFER NUMBER          25
  (CONT) RECORD BUFFER DUMP
              CHAR   0341RICHARD   MUNYON         17 BLACKHILL DR     WESTWOOD       MA02090          011110020818011140 0
              ZONE   FFFFDCCCCDC444DEDEDD444444444FF4CDCCDCDCDD4CD44444ECEEEDDC4444444DCFFFFF4444444444FFFFFFFFFFFFFFFFF
              DIGIT  0341993819400044586500000000017023132893304900000652366640000000410209000000000000111100208180111400
                    01...5...10....5...20....5...30....5...40....5...50....5...60....5...70....5...80....5...90....5...00
              CHAR   0000    501214BRAINSTORMING                                             SNOWBLOWER
              ZONE   FFFF4444FFFFFFCDCCDEEDDDCDC444444444444444444444444444444403000444444EDDECDDECD4444444444444444444
              DIGIT  0000000050121429195236949570000000000000000000000000000600C0000002566236659000000000000000000000
                   101...5...10....5...20....5...30....5...40....5...50....5...60....5...70....5...80....5...90....5...00
  ******************
  C350033 NUMBER OF EXTRACT DATA ERRORS HAS EXCEEDED     25
  C350037 MESSAGES SUPPRESSED UNTIL END OF FILE
  ******************
**********  END OF FILE  **************************************************
         56 INPUT RECORDS READ
       56 DATA ERRORS OCCURRED IN EXTRACT LOGIC
       56 ERRORS IN REPORT 01
                              DEPARTMENT                                  TOTAL SALARIES

                            ALL DEPARTMENTS
  C750009 RECORDS WRITTEN FOR REPORT 01 --          3
```

- End-of-file statistics are generated at the conclusion of extract file processing. The amount of information depends upon the type of run:

```
mm/dd/yy                    RUN TIME MESSAGES                                volser Vnn.n  PAGE     1
  C350023 INVALID NUMERIC DATA ENCOUNTERED IN REPORT 01 ◄------------ CAUSE OF DUMP
  (CONT) ERROR OCCURRED DURING PROCESSING DETAIL    LINE 1 FIELD   1 ◄┐                                  CHARACTER
  (CONT) MOST RECENT SUBSCRIPT VALUE            0                    ├── WHERE DUMP OCCURRED          ┌── REPRESENTATION
  (CONT) INPUT BUFFER NUMBER            1                            ◄┘                             │   OF INPUT BUFFER
  (CONT) RECORD BUFFER DUMP                                                                           ▼
              CHAR   0069JUNE      BLOOMER        14 ZITHER TERR      LEXINGTON      MA01675          0103955781880050500
              ZONE   FFFFDEDC444444CDDDDCD44444444FF4ECECCD4ECDD444444DCECDCEDD444444DCFFFFF4444444444FFFFFFFFFFFFFFFFF ◄┐
              DIGIT  00691455000000236645900000000140993859035990000003579573650000041016750000000000010395578188005050 ◄┐├─┐
                   01...5...10...5...20....5...30...5...40....5...50...5...60....5...70....5...80....5...90....5...00 ◄┘ │ │
                                                                                                                        │ │
                                                                                                                        │ │
                                                                                                HEX REPRESENTATION      └─┘
                                                                                                  OF INPUT BUFFER
```

The Report

Logic and format errors, generated in the output phase, can frequently be detected by reviewing the printed report. Error messages are printed where the processing problem occurs to the limit set in the OE= specification on the PROFILE parameter:

```
REPORT NO. 01          AVERAGE START AGE BY DEPARTMENT AND STATUS                    mm/dd/yy PAGE     1
                                        STATUS     START                                          BIRTH
          DEPARTMENT          EMPLOYEE NAME  CODE     YEAR                                          YEAR        AGE

   ACCOUNTING AND PAYROLL      BLOOMER       01         80                                           60          20
   ACCOUNTING AND PAYROLL      HUTTON        01         77                                           41          36
   ACCOUNTING AND PAYROLL      JENSON        01         80                                           48          32
   ACCOUNTING AND PAYROLL      KIMBALL       01         78                                           49          29
   ACCOUNTING AND PAYROLL      KING          01         80                                           60          20
   ACCOUNTING AND PAYROLL      NICEMAN       01         80                                           55          25
                                                                NUMBER OF EMPLOYEES BY STATUS CODE:                  6
                                                                    AVERAGE AGE                                      27
                                                                NUMBER OF EMPLOYEES BY DEPARTMENT:                   6
                                                                    AVERAGE AGE                                      27

   BLUE SKIES                  CLOUD         01         77                                           45          32
   BLUE SKIES                  DONOVAN       01         81                                           51          30
   BLUE SKIES                  MOON          01         78                                           44          34
                                                                NUMBER OF EMPLOYEES BY STATUS CODE:                  3
                                                                    AVERAGE AGE                                      32
                                                                NUMBER OF EMPLOYEES BY DEPARTMENT:                   3
                                                                    AVERAGE AGE                                      32

   BRAINSTORMING               BREEZE        01         79                                           34          45
   BRAINSTORMING               CROW          01         79                                           44          35
   BRAINSTORMING               LANCHESTER    01         75                                           32          43
   BRAINSTORMING               MAKER         01         78                                           45          33
   BRAINSTORMING               MUNYON        01         80                                           50          30
   BRAINSTORMING               WAGNER        01         78                                           34          44
                                                                NUMBER OF EMPLOYEES BY STATUS CODE:                  6
                                                                    AVERAGE AGE                                      38

   BRAINSTORMING               ANDALE        03         78                                           60          18
                                                                NUMBER OF EMPLOYEES BY STATUS CODE:                  1
                                                                    AVERAGE AGE
```

```
                              18
REPORT NO. 01           AVERAGE START AGE BY DEPARTMENT AND STATUS                    mm/dd/yy  PAGE     4
                                      STATUS     START                                                BIRTH
          DEPARTMENT        EMPLOYEE NAME   CODE      YEAR                                             YEAR        AGE

   PUBLIC RELATIONS            MCDOUGALL      01         80                                              59         21
   PUBLIC RELATIONS            PENMAN         01         77                                              44         33
                                                                 NUMBER OF EMPLOYEES BY STATUS CODE:                 6
                                                                      AVERAGE AGE                                    28

   PUBLIC RELATIONS            ZEDI           05         76                                              40         36
                                                                 NUMBER OF EMPLOYEES BY STATUS CODE:                 1
                                                                      AVERAGE AGE                                    36
                                                                 NUMBER OF EMPLOYEES BY DEPARTMENT:                  7
                                                                      AVERAGE AGE                                    29
   THERMOREGULATION            CLOTH          01         79                                              45         34
   THERMOREGULATION            FINN           01         79                                              38         41
   THERMOREGULATION            TIME           01         81                                              58         23
   THERMOREGULATION            WILCO          01         79                                              50         29
                                                                 NUMBER OF EMPLOYEES BY STATUS CODE:                 4
                                                                      AVERAGE AGE                                    32

   THERMOREGULATION            KASPAR         04         80                                              40         40
                                                                 NUMBER OF EMPLOYEES BY STATUS CODE:                 1
                                                                      AVERAGE AGE                                    40
                                                                 NUMBER OF EMPLOYEES BY DEPARTMENT:                  5
                                                                      AVERAGE AGE                                    33
                                                                 NUMBER OF EMPLOYEEES FOR THE COMPANY:              56
                                                                      AVERAGE AGE                                    31
  C750009 RECORDS WRITTEN FOR REPORT 01 --         139
```

Using CULLUS48

Status or diagnostic messages can be added to the run-time message chapter of a CA Culprit job by using the CULLUS48 user module. A message containing up to 132 characters can be executed in type 7 logic, as follows:

```
010 MESSAGE '0 THIS IS A MESSAGE  %%'
  .
  .
  .
927  CALL US48 (MESSAGE)
```

Note: The message, an alphanumeric string placed within single quotation marks, must start with a carriage control character and end with two percent signs.

More information about CULLUS48 can be found in *CA Culprit for CA IDMS User Modules Guide*.

Printing Additional Report Information

Debugging complex reports can be made easier by printing additional information in your report. You can:

- Print out sort key values in order to understand CA Culprit's sort sequence
- Print out detail lines for totals-only reports in order to determine the source of totals generated for the report
- Release values between complex calculations in order to track the processing sequence

Demonstration

Objective

This example lists values obtained while computing the volume of a sphere, in cubic centimeters, from diameters measured in inches. The program releases a detail line after every second arithmetic operation.

Procedure

The program issues several arithmetic instructions to compute the volume of the sphere. CA Culprit automatically *rounds* the result of a calculation. As the results below indicate, the code should specify truncation for the arithmetic operations in this example.

Code

```
 col. 2
 ▼
IN 80
REC TANK-DIA-IN  1  3
010 RADIUS-IN
010 RADIUS-CM
010 WORK-FLD
010 CUBIC-CM
013 CALCULATING THE CC VOLUME OF A SPHERE FROM A DIAMETER IN INCHES
0152*010 TANK-DIA-IN       HF
0152*020 RADIUS-IN         HF
0152*030 RADIUS-CM         HF
0152*040 WORK-FLD          HF
0152*050 CUBIC-CM          HF
 .
 .
```

```
 .
017    TANK-DIA / 2  RADIUS-IN
017    RADIUS-IN X 2.54  RADIUS-CM
017    RELS 2
017    COMPUTE (RADIUS-CM X RADIUS-CM X RADIUS-CM)  WORK-FLD
017    WORK-FLD X 3.1416  WORK-FLD
017    RELS 2
017    WORK-FLD X 4  WORK-FLD
017    WORK-FLD / 3  CUBIC-CM
017    RELS 2
 .
 .
 .
```

Result

The values released between calculations are:

TANK-DIA-IN	RADIUS-IN	RADIUS-CM	WORK-FLD	CUBIC-CM
15	8	20		
15	8	20	25,133	
15	8	20	100,532	33,511
45	24	60	125,665	33,511

The result should have been:

TANK-DIA-IN	RADIUS-IN	RADIUS-CM	WORK-FLD	CUBIC-CM
15	7.5	19.05		
15	7.5	19.05	21,718.8	
15	7.5	19.05	86,875.2	28,958.4
45	22.5	57.15	108,594.0	28,958.4

The released values show that rounding occurs in all calculations. Truncation should be indicated in the code for correct results.

Appendix C: Coding for Efficiency

Efficient coding prevents excessive use of system resources by minimizing overhead and input/output (I/O) processing wherever possible. Factors influencing coding choices include:

- The number of records processed
- The number of reports in a single run
- The number of times an instruction is executed

This chapter presents some of the most common coding alternatives that affect the efficiency of a CA Culprit program.

This section contains the following topics:

Eliminating Unnecessary Records

Eliminating the most frequently occurring record first is most efficient. For example:

Elimination of the Most Frequent Record

```
                    A occurs 2,000 times
                    B occurs 1,000 times
                    C occurs 50 times

017    COMPANY EQ 'A'  DROP       (Tests 3,050 records, drops 2,000)
017    COMPANY EQ 'B'  DROP       (Tests 1,050 records, drops 1,000)
017    COMPANY EQ 'C'  DROP       (Tests    50 records, drops    50)
           4,150 tests required to drop all records.

                             or
```

Eliminating records randomly is least efficient. For example:

Elimination of Random Records

```
                    A occurs 50 times
                    B occurs 1,000 times
                    C occurs 2,000 times

017    COMPANY EQ 'A'  DROP       (Tests 3,050 records, drops    50)
017    COMPANY EQ 'B'  DROP       (Tests 3,000 records, drops 1,000)
017    COMPANY EQ 'C'  DROP       (Tests 2,000 records, drops 2,000)
           8,050 tests required to drop all records.
```

When to Use SELECT and When to Use Type 7 Logic

Selection criteria can be applied to the entire run with the SELECT or BYPASS parameter or stated in the procedure logic for each report:

```
SELECT PRODUCT EQ 'CA-CULPRIT'
            vs.
017    PRODUCT EQ 'CA-CULPRIT'
027    PRODUCT EQ 'CA-CULPRIT'
037    PRODUCT EQ 'CA-CULPRIT'
```

Although it is quicker to write, the SELECT parameter uses more processing overhead than type 7 logic. SELECT only becomes efficient when six or more reports are batched together. Type 7 logic is more efficient than SELECT for a smaller number of reports.

Avoiding Unnecessary Logic

Obviously, streamlined code is more efficient than code that generates unnecessary processing.

In the example below, a call for the current date is executed for each record in the input file by processing user module US10:

```
017 CALL US10 ( 2 CURRENT-DATE )
```

The code below shows one method of calling the user module one time for the report, thereby avoiding unnecessary processing. The call executes only when the switch value is Y:

```
010 FIRST-TIME-SW 'Y'
 .
 .
 .
017     FIRST-TIME-SW EQ 'N' 010
017     MOVE 'N' FIRST-TIME-SW
017     CALL US10 ( 2 CURRENT-DATE) $Executes only on first record
017010      ...
```

Combining Tasks for Multiple Reports

Reports created from the same data source can often be grouped together to improve processing efficiency. The most common coding strategies are to:

- **Batch related reports together** to allow CA Culprit to read the data file once for all the reports. Code reports in ascending numerical sequence.
- **Use global work fields** to allow all the reports in the run access to work field contents. Calculation results can be shared between reports in this manner.
- **Use exact positioning** for edit parameters wherever possible; for example 01510045.
- **Keep relative column numbers low** (*0002, *0004, *0006) to allow for later insertions and still minimize the number of work areas (buckets) CA Culprit must set up. CA Culprit uses the highest relative column number to allocate storage for some internal tables:

```
*0002
*0004    Allocates a table with 6 entries
*0006

*0100
*0200    Allocates a table with 300 entries
*0300
```

Avoiding Unwanted Buffer Dumps

Buffer dumps should be used for debugging purposes only. Avoid unnecessary dumps by observing the following precautions:

- Test the value of any input field that could be zero (0) and used as a divisor. Code should include a branch around the division when the divisor equals zero (0). The result should be set to zero.
- Use a work field in place of an input field that could be nonnumeric and used in calculations. Move the work field as the program logic dictates.
- Sort match files in the same sequence. Match keys must be in ascending sequence.
- Use the BRANCH to HEAD instruction only when absolutely necessary to avoid the creation of additional records in the extract file.

Creating Subtotal Work Fields for Presorted Input Files

If your input file is presorted, it is more efficient to use type 7 logic to accumulate totals in a work field rather than allow CA Culprit to automatically total the fields each time a control break occurs on a SORT parameter.

Two different techniques for reporting total amounts by city are shown below:

1. This example uses type 7 logic to accumulate the total amount in a work field until the value of CONTROL-FLD changes. This method is extremely efficient, since NOSORT is required and only 7 extract records will be written to the extract file.

```
IN 200
REC CONTROL-FLD   1  4
REC INPUT-FLD     5  9  2
0151*002  SAVE-FLD    HH 'CONTROL'
0151*004  BUCKET      HH 'AMOUNT'
010 SAVE-FLD '    '
010 BUCKET 0
017     EOF = TAKE                    $Print last work field
017     CONTROL-FLD NE SAVE-FLD  100  $Control change?
017     INPUT-FLD + BUCKET  BUCKET    $Accumulate
017     DROP                          $Get next record
017100  RELS                          $Previous control-fld
017     MOVE CONTROL-FLD TO SAVE-FLD  $Save current information
017     MOVE INPUT-FLD TO BUCKET      $Save first amount
017     DROP                          $Get next
```

2. This example takes full advantage of CA Culprit's automatic subtotaling capabilities and does not require a presorted input file. However, it is less efficient because every record on the input file will be written to the extract file, which must then be sorted.

```
IN 200
REC CONTROL-FLD   1  4
REC INPUT-FLD     5  9  2
0261*002  CONTROL-FLD  HH 'CONTROL'
0261*004  INPUT-FLD    HH 'AMOUNT'
02SORT  CONTROL-FLD 0
02OUT T
027 TAKE
```

Output

```
CONTROL             AMOUNT
 BOSTON            136,409
 CLEV               17,500
 DENV              140,000
 NYC                17,170
 PHIL              267,000
 SF                 20,090
 TAMP                2,000
                   600,169
```

When you are coding a CA Culprit report, keep in mind these efficiency guidelines:

1. Always seek to limit I/O activity by reducing the size of the extract file. DROP records in type 7 logic whenever possible.
2. Avoid coding unnecessary SORT parameters. If your input file is presorted and you want control breaks, use the NOSORT option.
3. CPU activity is less expensive than I/O activity.

JCL Considerations

Defined record lengths, the amount of space allocated, and blocking factors affect CA Culprit's use of system resources. The following specifications are recommended:

- On **SYS005** (parameter file), the record length *must* be 320 bytes. A quarter or half track is recommended for the block size.
- On **SYS006** (extract file) and **SYS008** (NOSORT file), record length should be at least 256 bytes (larger for nonprint records). Block size should be equal to a half or full track, large enough to avoid overrides. Contiguous space is the most efficient, but not always possible.
- On **SYS007** (SORT parameters), the record length should be 80 bytes and block size should be a quarter track.

Miscellaneous Hints

The following suggestions may prove helpful:

- Document everything the code does. Use a dollar sign ($) for comments placed in the code.
- Use test files when developing routines that will run against large files.
- Use copied code syntax (USE, =COPY, =MACRO) to read INPUT and REC parameters into code.

Appendix D: Precoded CA Culprit User Modules

The following precoded CA Culprit user modules are provided on the CA Culprit installation media. These modules are compiled and link edited at installation time:

This section contains the following topics:

Input Modules

Input Modules

CULSPAN

Reads an input file containing spanned records in a z/VSE environment

CULLVSAM

Reads key or entry-sequenced VSAM files sequentially or directly

Procedure Modules

Procedure Modules

CULLUS00

Provides an interface between CA Culprit and user-written modules

CULLUS01

Retrieves records from a sequential file (z/OS and z/VM)

CULLUS10

Returns the system time and date to a user-defined field

CULLUS11

Converts a Julian date (YYDDD) to a Gregorian date (MMDDYY)

CULLUS12

Converts any century date to a user-specified format.

CULLUS14

Converts a Gregorian date (MMDDYY) to a Julian date (YYDDD)

CULLUS15

Converts a date in any format to a user-specified format

CULLUS22

Retrieves records from ISAM files and delivers them to a specified location

CULLUS25

Retrieves records from VSAM files and delivers them to a specified location

CULLUS29

Formats a vertical hexadecimal dump of all or part of a record, input field, or workfield

CULLUS31

Displays an input or work field in hexadecimal representation

CULLUS33

Converts a numeric field in packed signed decimal format to binary format

CULLUS34

Converts a packed signed numeric field to zoned decimal format

CULLUS35

Represents bit settings in display format

CULLUS36

Converts floating point values to decimal integers

CULLUS37

Converts a doubleword binary number to an eight-byte packed decimal number

CULLUS40

Enables z/VSE users to send messages to the console operator

CULLUS43

Moves data from a field known to CA Culprit to a position in another field

CULLUS45

Performs multiple MOVE operations on data

CULLUS46

Searches a string to locate a position of a specified character

CULLUS48

Adds a user-written message to the runtime messages section of a CA Culprit job

CULLUS50

Converts a binary string to a string of characters or workfields

CULLUS53

Concatenates a maximum of three fields to a single field

CULLUS62

Searches a CA Culprit table for specified fields

CULLUS64

Maintains a table of user-defined attributes for DDR (Data Dictionary Reporter) reports external to CA Culprit

CULLUS99

Causes a memory dump

Output Modules

The following is the list of output modules and the processing tasks.

CULEDUMP

Print an output line in vertical or horizontal dump format

CULELABL

Creates labels for output

CULEMLIN

Prints multiple output lines and multiple logical footer lines

CULEVSAM

Writes records to a user-defined VSAM file

CULEPOWR

Segments reports in a CA Culprit job through VSE/POWER

Appendix E: Employee Database Subschema

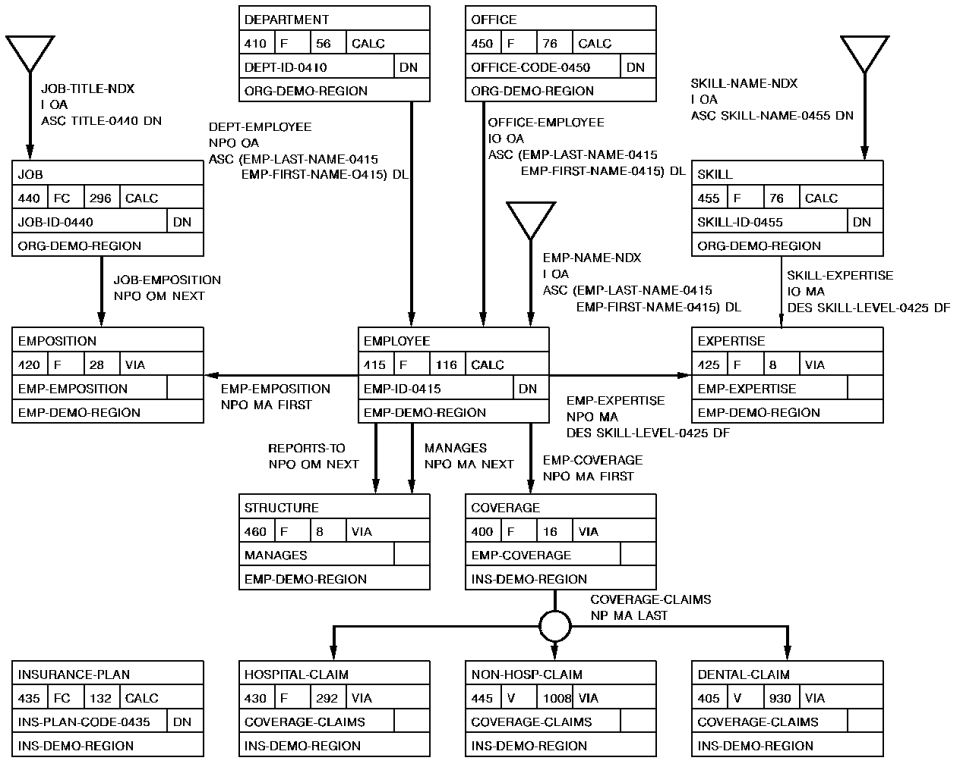
The employee database is the input for the examples and programs in this manual that reference database records or logical records.

The remainder of this appendix lists the fields defined for each record in the database.

This section contains the following topics:

Data Structure Diagram

The figure below shows the structure of the database.



Subschema Listing

Below is a listing of the Employee database:

```
                                SCHEMA=EMPSCHM VERSION=(100)
                                 SUBSCHEMA=(EMPSS01)


RECORD NAME........ COVERAGE                                    RLGTH=   36
RECORD VERSION..... 0100                                        DLGTH=   20
RECORD ID.......... 0400                                        KLGTH=   16
RECORD LENGTH...... FIXED                                       DSTRT=   16
LOCATION MODE...... VIA SET      EMP-COVERAGE        DISPLACEMENT 0000 PAGES
WITHIN............. INS-DEMO-REGION     OFFSET       5 PGS FOR        20 PGS
DBKEY POSITIONS.... SET............. TYPE........ NEXT  PRIOR OWNER
                    EMP-COVERAGE     MEMBER          1     2     3
                    COVERAGE-CLAIMS  OWNER           4
DATA ITEM.......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 SELECTION-DATE-0400           DISPLAY                          1     8
03 SELECTION-YEAR-0400           DISPLAY                 9(4)     1     4
03 SELECTION-MONTH-0400          DISPLAY                 9(2)     5     2
03 SELECTION-DAY-0400            DISPLAY                 9(2)     7     2
02 TERMINATION-DATE-0400         DISPLAY                          9     8
03 TERMINATION-YEAR-0400         DISPLAY                 9(4)     9     4
03 TERMINATION-MONTH-0400        DISPLAY                 9(2)    13     2
03 TERMINATION-DAY-0400          DISPLAY                 9(2)    15     2
02 TYPE-0400                     DISPLAY                 X       17     1
88 MASTER-0400                   COND         'M'                17
88 FAMILY-0400                   COND         'F'                17
88 DEPENDENT-0400                COND         'D'                17
02 INS-PLAN-CODE-0400            DISPLAY                 X(3)    18     3
88 GROUP-LIFE-0400               COND         '001'              18
88 HMO-0400                      COND         '002'              18
88 GROUP-HEALTH-0400             COND         '003'              18
88 GROUP-DENTAL-0400             COND         '004'              18


RECORD NAME........ DENTAL-CLAIM                                RLGTH=  944
RECORD VERSION..... 0100                                        DLGTH=  936
RECORD ID.......... 0405                                        KLGTH=    8
RECORD LENGTH...... VARIABLE                                    DSTRT=   12
MINIMUM ROOT.......   132  CHARACTERS
MINIMUM FRAGMENT...   932  CHARACTERS
LOCATION MODE...... VIA SET      COVERAGE-CLAIMS     DISPLACEMENT 0000 PAGES
WITHIN............. INS-DEMO-REGION     OFFSE        5 PGS FOR        20 PGS
DBKEY POSITIONS.... SET............. TYPE........ NEXT  PRIOR OWNER
                    COVERAGE-CLAIMS  MEMBER          1
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                    (FRAGMENT CHAIN) INTRNL          2

DATA ITEM.......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 CLAIM-DATE-0405               DISPLAY                          1     8
03 CLAIM-YEAR-0405               DISPLAY                9(4)      1     4
03 CLAIM-MONTH-0405              DISPLAY                9(2)      5     2
03 CLAIM-DAY-0405                DISPLAY                9(2)      7     2
02 PATIENT-NAME-0405             DISPLAY                          9    25
03 PATIENT-FIRST-NAME-0405       DISPLAY                X(10)     9    10
03 PATIENT-LAST-NAME-0405        DISPLAY                X(15)    19    15
02 PATIENT-BIRTH-DATE-0405       DISPLAY                          34     8
03 PATIENT-BIRTH-YEAR-0405       DISPLAY                9(4)      34     4
03 PATIENT-BIRTH-MONTH-0405      DISPLAY                9(2)      38     2
03 PATIENT-BIRTH-DAY-0405        DISPLAY                9(2)      40     2
02 PATIENT-SEX-0405              DISPLAY                X         42     1
02 RELATION-TO-EMPLOYEE-0405     DISPLAY                X(10)     43    10
02 DENTIST-NAME-0405             DISPLAY                          53    25
03 DENTIST-FIRST-NAME-0405       DISPLAY                X(10)     53    10
03 DENTIST-LAST-NAME-0405        DISPLAY                X(15)     63    15
02 DENTIST-ADDRESS-0405          DISPLAY                          78    46
03 DENTIST-STREET-0405           DISPLAY                X(20)     78    20
03 DENTIST-CITY-0405             DISPLAY                X(15)     98    15
03 DENTIST-STATE-0405            DISPLAY                X(2)     113     2
03 DENTIST-ZIP-0405              DISPLAY                         115     9
04 DENTIST-ZIP-FIRST-FIVE-0405   DISPLAY                X(5)     115     5
04 DENTIST-ZIP-LAST-FOUR-0405    DISPLAY                X(4)     120     4
02 DENTIST-LICENSE-NUMBER-0405   DISPLAY                9(6)     124     6
02 NUMBER-OF-PROCEDURES-0405     COMP                   9(2)     130     2
02 FILLER                        DISPLAY                X        132     1
02 DENTIST-CHARGES-0405          DISPLAY  OCCURS 0 TO 10         133   800
   DEPENDING ON --- NUMBER-OF-PROCEDURES-0405
03 TOOTH-NUMBER-0405             DISPLAY                9(2)      1     2
03 SERVICE-DATE-0405             DISPLAY                          3     8
04 SERVICE-YEAR-0405             DISPLAY                9(4)      3     4
04 SERVICE-MONTH-0405            DISPLAY                9(2)      7     2
04 SERVICE-DAY-0405              DISPLAY                9(2)      9     2
03 PROCEDURE-CODE-0405           DISPLAY                9(4)     11     4
03 DESCRIPTION-OF-SERVICE-0405   DISPLAY                X(60)    15    60
03 FEE-0405                      COMP-3                 S9(7)V99 75     5
03 FILLER                        DISPLAY                X        80     1


RECORD NAME........ DEPARTMENT                                  RLGTH=   72
RECORD VERSION..... 0100                                        DLGTH=   56
RECORD ID.......... 0410                                        KLGTH=   16
RECORD LENGTH...... FIXED                                       DSTRT=   16
LOCATION MODE...... CALC USING   DEPT-ID-0410         DUPLICATES NOT ALLOWED
WITHIN............. ORG-DEMO-REGION     OFFSET        5 PGS FOR       20 PGS
DBKEY POSITIONS.... SET............. TYPE........ NEXT  PRIOR OWNER
                    CALC            MEMBER          1     2
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                    DEPT-EMPLOYEE    INDEX OWNER     3     4

DATA ITEM......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 DEPT-ID-0410                 DISPLAY                  9(4)        1     4
02 DEPT-NAME-0410               DISPLAY                  X(45)       5    45
02 DEPT-HEAD-ID-0410            DISPLAY                  9(4)       50     4
02 FILLER                       DISPLAY                  XXX        54     3


RECORD NAME........ EMPLOYEE                                        RLGTH=  192
RECORD VERSION..... 0100                                            DLGTH=  120
RECORD ID.......... 0415                                            KLGTH=   72
RECORD LENGTH...... FIXED                                           DSTRT=   72
LOCATION MODE...... CALC USING   EMP-ID-0415          DUPLICATES NOT ALLOWED
WITHIN............. EMP-DEMO-REGION     OFFSET        5 PGS FOR       45 PGS
DBKEY POSITIONS.... SET............. TYPE........ NEXT  PRIOR OWNER
                    CALC             MEMBER          1     2
                    DEPT-EMPLOYEE    INDEX MEMBER    3           4
                    EMP-NAME-NDX     INDEX MEMBER    5
                    EMP-SSN-NDX      INDEX MEMBER    6
                    OFFICE-EMPLOYEE  INDEX MEMBER    7           8
                    EMP-COVERAGE     OWNER           9    10
                    EMP-EMPOSITION   OWNER          11    12
                    EMP-EXPERTISE    OWNER          13    14
                    MANAGES          OWNER          15    16
                    REPORTS-TO       OWNER          17    18
DATA ITEM......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 EMP-ID-0415                  DISPLAY                  9(4)        1     4
02 EMP-NAME-0415                DISPLAY                               5    25
03 EMP-FIRST-NAME-0415          DISPLAY                  X(10)       5    10
03 EMP-LAST-NAME-0415           DISPLAY                  X(15)      15    15
02 EMP-ADDRESS-0415             DISPLAY                              30    46
03 EMP-STREET-0415              DISPLAY                  X(20)      30    20
03 EMP-CITY-0415                DISPLAY                  X(15)      50    15
03 EMP-STATE-0415               DISPLAY                  X(2)       65     2
03 EMP-ZIP-0415                 DISPLAY                              67     9
04 EMP-ZIP-FIRST-FIVE-0415      DISPLAY                  X(5)       67     5
04 EMP-ZIP-LAST-FOUR-0415       DISPLAY                  X(4)       72     4
02 EMP-PHONE-0415               DISPLAY                  9(10)      76    10
02 STATUS-0415                  DISPLAY                  X(2)       86     2
88 ACTIVE-0415                  COND         '01'                    86
88 ST-DISABIL-0415              COND         '02'                    86
88 LT-DISABIL-0415              COND         '03'                    86
88 LEAVE-OF-ABSENCE-0415        COND         '04'                    86
88 TERMINATED-0415              COND         '05'                    86

02 SS-NUMBER-0415               DISPLAY                  9(9)       88     9
02 START-DATE-0415              DISPLAY                              97     8
03 START-YEAR-0415              DISPLAY                  9(4)       97     4
03 START-MONTH-0415             DISPLAY                  9(2)      101     2
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03 START-DAY-0415                DISPLAY                  9(2)       103     2
02 TERMINATION-DATE-0415         DISPLAY                             105     8
03 TERMINATION-YEAR-0415         DISPLAY                  9(4)       105     4
03 TERMINATION-MONTH-0415        DISPLAY                  9(2)       109     2
03 TERMINATION-DAY-0415          DISPLAY                  9(2)       111     2
02 BIRTH-DATE-0415               DISPLAY                             113     8
03 BIRTH-YEAR-0415               DISPLAY                  9(4)       113     4
03 BIRTH-MONTH-0415              DISPLAY                  9(2)       117     2
03 BIRTH-DAY-0415                DISPLAY                  9(2)       119     2


RECORD NAME........ EMPOSITION                                    RLGTH=   56
RECORD VERSION..... 0100                                          DLGTH=   32
RECORD ID.......... 0420                                          KLGTH=   24
RECORD LENGTH...... FIXED                                         DSTRT=   24
LOCATION MODE...... VIA SET      EMP-EMPOSITION     DISPLACEMENT 0000  PAGES
WITHIN............. EMP-DEMO-REGION     OFFSET      5 PGS FOR         45 PGS
DBKEY POSITIONS.... SET............. TYPE........ NEXT  PRIOR OWNER
                    EMP-EMPOSITION   MEMBER          1     2     3
                    JOB-EMPOSITION   MEMBER          4     5     6
DATA ITEM.......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 START-DATE-0420               DISPLAY                             1     8
03 START-YEAR-0420               DISPLAY                  9(4)       1     4
03 START-MONTH-0420              DISPLAY                  9(2)       5     2
03 START-DAY-0420                DISPLAY                  9(2)       7     2
02 FINISH-DATE-0420              DISPLAY                             9     8
03 FINISH-YEAR-0420              DISPLAY                  9(4)       9     4
03 FINISH-MONTH-0420             DISPLAY                  9(2)      13     2
03 FINISH-DAY-0420               DISPLAY                  9(2)      15     2
02 SALARY-GRADE-0420             DISPLAY                  9(2)      17     2
02 SALARY-AMOUNT-0420            COMP-3                   S9(7)V99  19     5
02 BONUS-PERCENT-0420            COMP-3                   SV999     24     2
02 COMMISSION-PERCENT-0420       COMP-3                   SV999     26     2
02 OVERTIME-RATE-0420            COMP-3                   S9V99     28     2
02 FILLER                        DISPLAY                  XXX       30     3


RECORD NAME........ EXPERTISE                                     RLGTH=   32
RECORD VERSION..... 0100                                          DLGTH=   12
RECORD ID.......... 0425                                          KLGTH=   20
RECORD LENGTH...... FIXED                                         DSTRT=   20
LOCATION MODE...... VIA SET      EMP-EXPERTIS       DISPLACEMENT 0000  PAGES
WITHIN............. EMP-DEMO-REGION     OFFSET      5 PGS FOR         45 PGS
DBKEY POSITIONS.... SET............. TYPE........ NEXT  PRIOR OWNER
                    EMP-EXPERTISE    MEMBER          1     2     3
                    SKILL-EXPERTISE  INDEX MEMBER    4           5
DATA ITEM.......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH

02 SKILL-LEVEL-0425              DISPLAY                  XX        1     2
88 EXPERT-0425                   COND         '04'                   1
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88 PROFICIENT-0425              COND         '03'                 1
88 COMPETENT-0425               COND         '02'                 1
88 ELEMENTARY-0425              COND         '01'                 1
02 EXPERTISE-DATE-0425          DISPLAY                           3     8
03 EXPERTISE-YEAR-0425          DISPLAY                9(4)       3     4
03 EXPERTISE-MONTH-0425         DISPLAY                9(2)       7     2
03 EXPERTISE-DAY-0425           DISPLAY                9(2)       9     2
02 FILLER                       DISPLAY                XX        11     2


RECORD NAME........ HOSPITAL-CLAIM                                RLGTH=  304
RECORD VERSION..... 0100                                          DLGTH=  300
RECORD ID.......... 0430                                          KLGTH=    4
RECORD LENGTH...... FIXED                                         DSTRT=    4
LOCATION MODE...... VIA SET      COVERAGE-CLAIMS    DISPLACEMENT 0000  PAGES
WITHIN............. INS-DEMO-REGION     OFFSET      5 PGS FOR         20 PGS
DBKEY POSITIONS.... SET.............. TYPE........ NEXT  PRIOR OWNER
                    COVERAGE-CLAIMS  MEMBER          1
DATA ITEM.......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 CLAIM-DATE-0430              DISPLAY                           1     8
03 CLAIM-YEAR-0430              DISPLAY                9(4)       1     4
03 CLAIM-MONTH-0430             DISPLAY                9(2)       5     2
03 CLAIM-DAY-0430               DISPLAY                9(2)       7     2
02 PATIENT-NAME-0430            DISPLAY                           9    25
03 PATIENT-FIRST-NAME-0430      DISPLAY                X(10)      9    10
03 PATIENT-LAST-NAME-0430       DISPLAY                X(15)     19    15
02 PATIENT-BIRTH-DATE-0430      DISPLAY                          34     8
03 PATIENT-BIRTH-YEAR-0430      DISPLAY                9(4)      34     4
03 PATIENT-BIRTH-MONTH-0430     DISPLAY                9(2)      38     2
03 PATIENT-BIRTH-DAY-0430       DISPLAY                9(2)      40     2
02 PATIENT-SEX-0430             DISPLAY                X         42     1
02 RELATION-TO-EMPLOYEE-0430    DISPLAY                X(10)     43    10
02 HOSPITAL-NAME-0430           DISPLAY                X(25)     53    25
02 HOSP-ADDRESS-0430            DISPLAY                          78    46
03 HOSP-STREET-0430             DISPLAY                X(20)     78    20
03 HOSP-CITY-0430               DISPLAY                X(15)     98    15
03 HOSP-STATE-0430              DISPLAY                X(2)     113     2
03 HOSP-ZIP-0430                DISPLAY                         115     9
04 HOSP-ZIP-FIRST-FIVE-0430     DISPLAY                X(5)     115     5

04 HOSP-ZIP-LAST-FOUR-0430      DISPLAY                X(4)     120     4
02 ADMIT-DATE-0430              DISPLAY                         124     8
03 ADMIT-YEAR-0430              DISPLAY                9(4)     124     4
03 ADMIT-MONTH-0430             DISPLAY                9(2)     128     2
03 ADMIT-DAY-0430               DISPLAY                9(2)     130     2
02 DISCHARGE-DATE-0430          DISPLAY                         132     8
03 DISCHARGE-YEAR-0430          DISPLAY                9(4)     132     4
03 DISCHARGE-MONTH-0430         DISPLAY                9(2)     136     2
03 DISCHARGE-DAY-0430           DISPLAY                9(2)     138     2
02 DIAGNOSIS-0430               DISPLAY  OCCURS 2      X(60)    140   120
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02 HOSPITAL-CHARGES-0430          DISPLAY                          260    41
03 ROOM-AND-BOARD-0430            DISPLAY                          260    26
04 WARD-0430                      DISPLAY                          260    13
05 WARD-DAYS-0430                 COMP-3                S9(5)      260     3
05 WARD-RATE-0430                 COMP-3                S9(7)V99   263     5
05 WARD-TOTAL-0430                COMP-3                S9(7)V99   268     5
04 SEMI-PRIVATE-0430              DISPLAY                          273    13
05 SEMI-DAYS-0430                 COMP-3                S9(5)      273     3
05 SEMI-RATE-0430                 COMP-3                S9(7)V99   276     5
05 SEMI-TOTAL-0430                COMP-3                S9(7)V99   281     5
03 OTHER-CHARGES-0430             DISPLAY                          286    15
04 DELIVERY-COST-0430             COMP-3                S9(7)V99   286     5
04 ANESTHESIA-COST-0430           COMP-3                S9(7)V99   291     5
04 LAB-COST-0430                  COMP-3                S9(7)V99   296     5


RECORD NAME........ INSURANCE-PLAN                                 RLGTH=  140
RECORD VERSION..... 0100                                           DLGTH=  132
RECORD ID.......... 0435                                           KLGTH=    8
RECORD LENGTH...... FIXED                                          DSTRT=    8
LOCATION MODE...... CALC USING   INS-PLAN-CODE-0435   DUPLICATES NOT ALLOWED
WITHIN............. INS-DEMO-REGION     OFFSET        1 PGS FOR        4 PGS
DBKEY POSITIONS.... SET............. TYPE........ NEXT  PRIOR OWNER
                    CALC             MEMBER          1     2
DATA ITEM.......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 INS-PLAN-CODE-0435             DISPLAY                X(3)        1     3

88 GROUP-LIFE-0435                COND         '001'                   1
88 HMO-0435                       COND         '002'                   1
88 GROUP-HEALTH-0435              COND         '003'                   1
88 GROUP-DENTAL-0435              COND         '004'                   1
02 INS-CO-NAME-0435               DISPLAY                X(45)       4    45
02 INS-CO-ADDRESS-0435            DISPLAY                            49    46
03 INS-CO-STREET-0435             DISPLAY                X(20)       49    20
03 INS-CO-CITY-0435               DISPLAY                X(15)       69    15
03 INS-CO-STATE-0435              DISPLAY                X(2)        84     2
03 INS-CO-ZIP-0435                DISPLAY                            86     9
04 INS-CO-ZIP-FIRST-FIVE-0435     DISPLAY                X(5)        86     5
04 INS-CO-ZIP-LAST-FOUR-0435      DISPLAY                X(4)        91     4
02 INS-CO-PHONE-0435              DISPLAY                9(10)       95    10
02 GROUP-NUMBER-0435              DISPLAY                9(6)       105     6
02 PLAN-DESCRIPTION-0435          DISPLAY                           111    20
03 DEDUCT-0435                    COMP-3                 S9(7)V99   111     5
03 MAXIMUM-LIFE-COST-0435         COMP-3                 S9(7)V99   116     5
03 FAMILY-COST-0435               COMP-3                 S9(7)V99   121     5
03 DEP-COST-0435                  COMP-3                 S9(7)V99   126     5
02 FILLER                         DISPLAY                XX         131     2


RECORD NAME........ JOB                                            RLGTH=  324
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RECORD VERSION..... 0100                                          DLGTH=  300
RECORD ID.......... 0440                                          KLGTH=   24
RECORD LENGTH...... FIXED  (INTERNALLY VARIABLE)                  DSTRT=   28
MINIMUM ROOT.......    24  CHARACTERS
MINIMUM FRAGMENT...   296  CHARACTERS
LOCATION MODE...... CALC USING   JOB-ID-0440          DUPLICATES NOT ALLOWED
WITHIN............. ORG-DEMO-REGION     OFFSET       5 PGS FOR       20 PGS
CALL PROCEDURES.... NAME.... WHEN.. FUNCTION
                    IDMSCOMP BEFORE STORE
                    IDMSCOMP BEFORE MODIFY
                    IDMSDCOM AFTER  GET
DBKEY POSITIONS.... SET............. TYPE........ NEXT  PRIOR OWNER
                    CALC            MEMBER          1     2
                    JOB-TITLE-NDX   INDEX MEMBER    3
                    JOB-EMPOSITION  OWNER           4     5
                    (FRAGMENT CHAIN) INTRNL         6
DATA ITEM.......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 JOB-ID-0440                  DISPLAY                 9(4)        1     4
02 TITLE-0440                   DISPLAY                 X(20)       5    20

02 DESCRIPTION-0440             DISPLAY                             25   120
03 DESCRIPTION-LINE-0440        DISPLAY  OCCURS 2       X(60)       25   120
02 REQUIREMENTS-0440            DISPLAY                            145   120
03 REQUIREMENT-LINE-0440        DISPLAY  OCCURS 2       X(60)      145   120
02 MINIMUM-SALARY-0440          DISPLAY                 S9(6)V99   265     8
02 MAXIMUM-SALARY-0440          DISPLAY                 S9(6)V99   273     8
02 SALARY-GRADES-0440           DISPLAY  OCCURS 4       9(2)       281     8
02 NUMBER-OF-POSITIONS-0440     DISPLAY                 9(3)       289     3
02 NUMBER-OPEN-0440             DISPLAY                 9(3)       292     3
02 FILLER                       DISPLAY                 XX         295     2


RECORD NAME........ NON-HOSP-CLAIM                                RLGTH= 1064
RECORD VERSION..... 0100                                          DLGTH= 1056
RECORD ID.......... 0445                                          KLGTH=    8
RECORD LENGTH...... VARIABLE                                      DSTRT=   12
MINIMUM ROOT.......   248  CHARACTERS
MINIMUM FRAGMENT...  1052  CHARACTERS
LOCATION MODE...... VIA SET      COVERAGE-CLAIMS    DISPLACEMENT 0000  PAGES
WITHIN............. INS-DEMO-REGION     OFFSET      5 PGS FOR         20 PGS
DBKEY POSITIONS.... SET............. TYPE........ NEXT  PRIOR OWNER
                    COVERAGE-CLAIMS  MEMBER          1
                    (FRAGMENT CHAIN) INTRNL          2
DATA ITEM.......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 CLAIM-DATE-0445              DISPLAY                             1     8
03 CLAIM-YEAR-0445              DISPLAY                 9(4)        1     4
03 CLAIM-MONTH-0445             DISPLAY                 9(2)        5     2
03 CLAIM-DAY-0445               DISPLAY                 9(2)        7     2
02 PATIENT-NAME-0445            DISPLAY                             9    25
03 PATIENT-FIRST-NAME-0445      DISPLAY                 X(10)       9    10
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03 PATIENT-LAST-NAME-0445        DISPLAY                 X(15)       19    15
02 PATIENT-BIRTH-DATE-0445       DISPLAY                             34     8
03 PATIENT-BIRTH-YEAR-0445       DISPLAY                 9(4)        34     4
03 PATIENT-BIRTH-MONTH-0445      DISPLAY                 9(2)        38     2
03 PATIENT-BIRTH-DAY-0445        DISPLAY                 9(2)        40     2
02 PATIENT-SEX-0445              DISPLAY                 X           42     1
02 RELATION-TO-EMPLOYEE-0445     DISPLAY                 X(10)       43    10
02 PHYSICIAN-NAME-0445           DISPLAY                             53    25

03 PHYSICIAN-FIRST-NAME-0445     DISPLAY                 X(10)       53    10
03 PHYSICIAN-LAST-NAME-0445      DISPLAY                 X(15)       63    15
02 PHYSICIAN-ADDRESS-0445        DISPLAY                             78    46
03 PHYSICIAN-STREET-0445         DISPLAY                 X(20)       78    20
03 PHYSICIAN-CITY-0445           DISPLAY                 X(15)       98    15
03 PHYSICIAN-STATE-0445          DISPLAY                 X(2)       113     2
03 PHYSICIAN-ZIP-0445            DISPLAY                            115     9
04 PHYSICIAN-ZIP-FIRST-FIVE-0445 DISPLAY                 X(5)       115     5
04 PHYSICIAN-ZIP-LAST-FOUR-0445  DISPLAY                 X(4)       120     4
02 PHYSICIAN-ID-0445             DISPLAY                 9(6)       124     6
02 DIAGNOSIS-0445                DISPLAY  OCCURS 2       X(60)      130   120
02 NUMBER-OF-PROCEDURES-0445     COMP                    9(2)       250     2
02 FILLER                        DISPLAY                 X          252     1
02 PHYSICIAN-CHARGES-0445        DISPLAY  OCCURS 0 TO 10             253   800
   DEPENDING ON -- NUMBER-OF-PROCEDURES-0445
03 SERVICE-DATE-0445             DISPLAY                             1     8
04 SERVICE-YEAR-0445             DISPLAY                 9(4)        1     4
04 SERVICE-MONTH-0445            DISPLAY                 9(2)        5     2
04 SERVICE-DAY-0445              DISPLAY                 9(2)        7     2
03 PROCEDURE-CODE-0445           DISPLAY                 9(4)        9     4
03 DESCRIPTION-OF-SERVICE-0445   DISPLAY                 X(60)      13    60
03 FEE-0445                      COMP-3                  S9(7)V99   73     5
03 FILLER                        DISPLAY                 XXX        78     3


RECORD NAME........ OFFICE                                      RLGTH=   92
RECORD VERSION..... 0100                                        DLGTH=   76
RECORD ID.......... 0450                                        KLGTH=   16
RECORD LENGTH...... FIXED                                       DSTRT=   16
LOCATION MODE...... CALC USING   OFFICE-CODE-0450     DUPLICATES NOT ALLOWED
WITHIN............. ORG-DEMO-REGION     OFFSET        5 PGS FOR       20 PGS
DBKEY POSITIONS.... SET.............. TYPE........ NEXT  PRIOR OWNER
                    CALC             MEMBER          1     2
                    OFFICE-EMPLOYEE  INDEX OWNER     3     4
DATA ITEM.......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 OFFICE-CODE-0450              DISPLAY                 X(3)        1     3
02 OFFICE-ADDRESS-0450           DISPLAY                             4    46
03 OFFICE-STREET-0450            DISPLAY                 X(20)       4    20
03 OFFICE-CITY-0450              DISPLAY                 X(15)      24    15
03 OFFICE-STATE-0450             DISPLAY                 X(2)       39     2
03 OFFICE-ZIP-0450               DISPLAY                            41     9
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04 OFFICE-ZIP-FIRST-FIVE-0450    DISPLAY                X(5)       41     5
04 OFFICE-ZIP-LAST-FOUR-0450     DISPLAY                X(4)       46     4
02 OFFICE-PHONE-0450             DISPLAY  OCCURS 3      9(7)       50    21
02 OFFICE-AREA-CODE-0450         DISPLAY                X(3)       71     3

02 SPEED-DIAL-0450               DISPLAY                X(3)       74     3

RECORD NAME........ SKILL                                          RLGTH=   96
RECORD VERSION..... 0100                                           DLGTH=   76
RECORD ID.......... 0455                                           KLGTH=   20
RECORD LENGTH...... FIXED                                          DSTRT=   20
LOCATION MODE...... CALC USING   SKILL-ID-0455       DUPLICATES NOT ALLOWED
WITHIN............. ORG-DEMO-REGION     OFFSET       5 PGS FOR      20 PGS
DBKEY POSITIONS.... SET.............. TYPE........ NEXT  PRIOR OWNER
                    CALC             MEMBER          1     2
                    SKILL-NAME-NDX   INDEX MEMBER    3
                    SKILL-EXPERTISE  INDEX OWNER     4     5
DATA ITEM.......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 SKILL-ID-0455                 DISPLAY                9(4)        1     4
02 SKILL-NAME-0455               DISPLAY                X(12)       5    12
02 SKILL-DESCRIPTION-0455        DISPLAY                X(60)      17    60


RECORD NAME........ STRUCTURE                                      RLGTH=   36
RECORD VERSION..... 0100                                           DLGTH=   12
RECORD ID.......... 0460                                           KLGTH=   24
RECORD LENGTH...... FIXED                                          DSTRT=   24
LOCATION MODE...... VIA SET      MANAGES           DISPLACEMENT 0000  PAGES
WITHIN............. EMP-DEMO-REGION     OFFSET      5 PGS FOR         45 PGS
DBKEY POSITIONS.... SET.............. TYPE........ NEXT  PRIOR OWNER
                    MANAGES          MEMBER          1     2     3
                    REPORTS-TO       MEMBER          4     5     6
DATA ITEM.......... REDEFINES... USAGE....... VALUE..... PICTURE. STRT  LGTH
02 STRUCTURE-CODE-0460           DISPLAY                X(2)        1     2
88 ADMIN-0460                    COND 'A'                           1
88 PROJECT-0460                  COND 'P1' THRU 'P9'                1
02 STRUCTURE-DATE-0460           DISPLAY                            3     8
03 STRUCTURE-YEAR-0460           DISPLAY                9(4)        3     4
03 STRUCTURE-MONTH-0460          DISPLAY                9(2)        7     2
03 STRUCTURE-DAY-0460            DISPLAY                9(2)        9     2
02 FILLER                        DISPLAY                XX         11     2
```

Appendix F: Summary of CA Culprit Parameters

This appendix presents tables that summarize the CA Culprit parameters presented in this manual.

This section contains the following topics:

The Basic CA Culprit Functions

The Basic CA Culprit Functions

Function	What CA Culprit needs	What to use
Create the basic report.		
	Record size and type	IN
	Fields being used	REC
	Size of the report	OUT
	Output organization	Type 5
Add a title.	Title details	Type 3
Generate subtitles.	Subtitle details	Type 4
Generate column headings.		
	Where to find the header information	HH HR HF
Adjust column widths.	Column size	SZ=

Function	What CA Culprit needs	What to use
Format numeric output.	A template	F$ FS FD Edit masks
Create multiple reports.	Report identifier	Report numbers
Sequence data.	The field(s) and their order	SORT
Process selected data.	Selection criteria	SELECT/BY PASS
Reference multiple detail lines.	Line identifier	Type 5 line numbers
Generate subtotals and page breaks.	Break codes	1 0 - +
Control the output of totals.	Identification of the field to be totaled	Type 6

Processing Operations

Processing Operations

Operation	Command	Action
Input processing	Type 7 parameter	Acts upon input data and writes it to the extract file
Output processing	Type 8 parameter	Acts upon data stored in the extract file for report output

Operation	Command	Action
Arithmetic		
	ADD (+)	Add
	MINUS (-)	Subtract
	TIMES (X)	Multiply
	DIVIDE (/)	Divide
	COMPUTE	Performs compound arithmetic operations
Conditional	IF	Performs a comparison or a test
Assignment	MOVE	Transfers a value to a field
Processing control	TAKE	Prints selected edit lines and stops processing
	DROP	Stops processing current record
	RELS	Prints selected edit lines without interrupting processing
	PERFORM	Sends the processing to a specified line or chapter of code
	RETURN	Returns processing to code immediately following the related PERFORM statement

Summary of Advanced Capabilities for Standard Files

Summary of Advanced Capabilities for Standard Files

Task	CA Culprit instruction
Print totals only.	OUT T Type 8 logic Type 6 edit line
Manipulate system-maintained totals.	Type 8 parameter
Define items to be totaled. Format total lines.	Type 6 parameter
Obtain current work field value.	Type 6 parameter Type 8 parameter Subscripted work fields on type 6 or type 8 parameters
Obtain a sort key value.	Control break Subscripted work fields on type 6 or type 8 parameters
Reference repeating groups.	Explicit, implied, or zero subscripts
Reference multiply-occurring input fields.	Subscripts using GROUP REC and ELMNT REC
Access file definitions stored in the data dictionary.	DATABASE DICTNAME= FN=

Task	CA Culprit instruction
Override parameters generated by the data dictionary.	IN REC GROUP REC/ELMNT REC
Match files.	IN parameter with MK=option
Insert the current value of a field into a heading.	Type 4 parameter Control breaks SORT/NOSORT B HEAD
Create nonprinted output.	OUT parameter with optional descriptors Format codes: FB, FU, FW, FP, or FZ DD=SYS020
Create standard files from the database.	DATABASE DICTNAME= IN DB SS= PATH DD=SYS020 (delete SYS010)
Copy the contents of a data file.	=MACRO AMLIST
Copy stored code.	USE =MACRO/=MEND =COPY

Task	CA Culprit instruction
Change inline or copied code.	USE WITH VALUES CHANGE DROP/KEEP RENUMBER =MACRO/=MEND =DROP =CHANGE =COPY RPTNO= INPUT=
Assign default values to symbolic parameters.	USE
Nest copied code.	USE */ END

Summary of Parameters for Using Database Data

Summary of Parameters for Using Database Data

Function	What CA Culprit needs	Use
Access the database.	Data dictionary name (if not primary dictionary) Data source Subschema used	DATABASE DICTNAME= IN DB SS=
Navigate the database.	Route through the database	PATH
Determine the database route used.	Keyword	PATH-ID
Use database information as a standard file.	Predefined logical records	PATH logical-record-name
Select logical records.	Conditional statements	WHERE

Function	What CA Culprit needs	Use
Search for defined values.	Comparison statements	CONTAINS MATCHES

Summary of Advanced Capabilities for Accessing the Database

Summary of Advanced Capabilities for Accessing the Database

TASK	CA Culprit instruction
Retrieve partial information.	Alternate path
Select record types by record name.	SELECT/BYPASS
Direct record retrieval by key value.	KEY
Use a key file to retrieve records.	KEYFILE
Test for record occurrences.	PATH-- DB-EXIT facility
Access more than one relationship between records.	PATH-- DB-EXIT facility
Retrieve all occurrences of a set.	PATH-- DB-EXIT facility
Access multiple-member sets.	PATH parameter ALL-MEMBERS option

Minimum Coding Requirements for Using Data Tables

Minimum Input and Output Coding Requirements for Using Data Tables

Task	CA Culprit parameter/keywords
Identify the source of conventional file input to create a table.	INPUT

Task	CA Culprit parameter/keywords
Define fields from non-IDMS files to CA Culprit.	REC
Define printed output.	OUTPUT
Define an output data table.	OUTPUT TABLE= TYPE=CREATE USER= PW= CATALOG=
Name the columns in a details-only table.	Type 5 (at least one)
Name the columns in a totals-only table.	Type 6
Retrieve a data table (copy a view).	INPUT TABLE= TYPE=COPY USER= PW= CATALOG=
Store additional rows in a previously defined data table.	OUTPUT TABLE= TYPE=ADD USER= PW= CATALOG=
Remove all rows and place new rows in a previously stored data table.	OUTPUT TABLE= TYPE=REPLACE USER= PW= CATALOG=

Task	CA Culprit parameter/keywords
Delete a previously stored data table and all associated data.	OUTPUT TABLE= TYPE=DELETE USER= PW= CATALOG=
Modify the table definition of an existing table.	OUTPUT TABLE= TYPE=GENERATE USER= PW= CATALOG=

Minimum Coding Requirements for Using SQL Tables

Minimum Input and Output Coding Requirements for Using SQL Tables

Task	CA Culprit parameter/keywords
Identify the source of conventional file input to create an SQL table.	INPUT
Define fields from non-IDMS files to CA Culprit.	REC
Define printed output.	OUTPUT
Identify the input source as an SQL table; specify table location.	IN DB(Q); DICTIONARY= SCHEMA=
Define the SQL query to CA Culprit.	SQL select-statement
Define an alias for an SQL column within the SQL query.	AS

Task	CA Culprit parameter/keywords
Define an output data table.	OUTPUT SQLTABLE= TYPE=CREATE DICTIONARY= SCHEMA=
Name the columns in a details-only table.	Type 5 (at least one)
Name the columns in a totals-only table.	Type 6
Indicate an SQL column cannot contain null values	NOT NULL
Define a NULL indicator for SQL columns that are allowed to be NULL.	FB SZ=4
Store additional rows in a previously defined SQL table.	OUTPUT SQLTABLE= TYPE=ADD DICTIONARY= SCHEMA=
Remove all rows and place new rows in a previously stored SQL table.	OUTPUT SQLTABLE= TYPE=REPLACE DICTIONARY= SCHEMA=
Delete a previously stored SQL table and all associated data.	OUTPUT SQLTABLE= TYPE=DROP DICTIONARY= SCHEMA=

Appendix G: How Totals Processing Works

CA Culprit processes data in two input/output phases:

1. The **extract phase (CULL)**:
   a. Executes type 7 logic against the input data.
   b. Outputs a temporary work file, called the **extract file.**.
2. The **output phase (CULE)**:
   a. Reads the extract file *after it has been sorted*.
   b. Outputs the report.

      When CA Culprit sends the detail report records to the printer, it looks for control breaks and executes type 8 logic.

Code for Sample Totals-Processing Report

This is a typical CA Culprit run where sorting and control breaks are processed by employee status within department. At each control break the average starting age for employees is calculated in type 8 logic.

The Code

```
IN 200
REC LAST-NAME      15   10
REC STATUS         82    2
REC START-YEAR     97    2  2
REC BIRTH-YEAR    109    2  2
REC DEPARTMENT    115   25
01SORT DEPARTMENT - STATUS 0       $Fields are written to the extract file
013 AVERAGE START AGE BY DEPARTMENT AND STATUS
010 TOTAL-MESSAGE '                                        '
010 EMPLOYEE-COUNT 1
010 AGE
010 AVERAGE-AGE
0151*000 EMPLOYEE-COUNT                          $Type 5 lines build the
0151*010 DEPARTMENT      HH 'DEPARTMENT'         $extract file with the
0151*020 LAST-NAME       HH 'EMPLOYEE NAME'      $current values of each
0151*030 STATUS          HH 'STATUS' 'CODE'      $field
0151*040 START-YEAR SZ=5 HH '   START' '   YEAR'
0151*050 BIRTH-YEAR SZ=5 HH '   BIRTH' '   YEAR'  $Type 5 lines also
0151*055 AGE SZ=2        HH 'AGE'                $format the print line
0161*045-TOTAL-MESSAGE
0161*050 EMPLOYEE-COUNT
0162*0450'AVERAGE AGE'
0162*055 AVERAGE-AGE SZ=2
017010 START-YEAR - BIRTH-YEAR  AGE   $Writes the value to the extract file
018010 IF LEVL EQ 1 100               $Type 8 logic executes when control
018020 IF LEVL EQ 2 200               $breaks are encountered
018030 IF LEVL EQ 3 300
018100 MOVE 'NUMBER OF EMPLOYEES BY STATUS CODE:'   TO TOTAL-MESSAGE
018110 B 400
018200 MOVE 'NUMBER OF EMPLOYEES BY DEPARTMENT:' TO TOTAL-MESSAGE
018210 B 400
018300 MOVE 'NUMBER OF EMPLOYEEES FOR THE COMPANY:' TO TOTAL-MESSAGE
018310 B 400
018400 COMPUTE AGE / EMPLOYEE-COUNT  AVERAGE-AGE   $Uses extract file data
018    TAKE
```

```
REPORT NO. 01                          AVERAGE START AGE BY DEPARTMENT AND STATUS                    mm/dd/yy PAGE     1

                                       STATUS     START                                              BIRTH
          DEPARTMENT        EMPLOYEE NAME  CODE      YEAR                                            YEAR        AGE

   ACCOUNTING AND PAYROLL      BLOOMER       01        80                                              60          20
   ACCOUNTING AND PAYROLL      HUTTON        01        77                                              41          36
   ACCOUNTING AND PAYROLL      JENSON        01        80                                              48          32
   ACCOUNTING AND PAYROLL      KIMBALL       01        78                                              49          29
   ACCOUNTING AND PAYROLL      KING          01        80                                              60          20
   ACCOUNTING AND PAYROLL      NICEMAN       01        80                                              55          25
                                                            NUMBER OF EMPLOYEES BY STATUS CODE:                  6
                                                                AVERAGE AGE                                      27
                                                            NUMBER OF EMPLOYEES BY DEPARTMENT:                   6
                                                                AVERAGE AGE                                      27

   BLUE SKIES                  CLOUD         01        77                                              45          32
   BLUE SKIES                  DONOVAN       01        81                                              51          30
   BLUE SKIES                  MOON          01        78                                              44          34
                                                            NUMBER OF EMPLOYEES BY STATUS CODE:                  3
                                                                AVERAGE AGE                                      32
                                                            NUMBER OF EMPLOYEES BY DEPARTMENT:                   3
                                                                AVERAGE AGE                                      32

   BRAINSTORMING               BREEZE        01        79                                              34          45
   BRAINSTORMING               CROW          01        79                                              44          35
   BRAINSTORMING               LANCHESTER    01        75                                              32          43
   BRAINSTORMING               MAKER         01        78                                              45          33
   BRAINSTORMING               MUNYON        01        80                                              50          30
   BRAINSTORMING               WAGNER        01        78                                              34          44
                                                            NUMBER OF EMPLOYEES BY STATUS CODE:                  6
                                                                AVERAGE AGE                                      38

   BRAINSTORMING               ANDALE        03        78                                              60          18
                                                            NUMBER OF EMPLOYEES BY STATUS CODE:                  1
                                                                AVERAGE AGE                                      18

   BRAINSTORMING               ARM           05        77                                              34          43
```

```
REPORT NO. 01                          AVERAGE START AGE BY DEPARTMENT AND STATUS                    mm/dd/yy  PAGE     2
                                       STATUS     START                                              BIRTH
          DEPARTMENT        EMPLOYEE NAME  CODE      YEAR                                            YEAR        AGE

                                                          NUMBER OF EMPLOYEES BY STATUS CODE:                 1
                                                              AVERAGE AGE                                    43
                                                          NUMBER OF EMPLOYEES BY DEPARTMENT:                  8
                                                              AVERAGE AGE                                    36

   COMPUTER OPERATIONS          CRANE          01         77                                              42         35
   COMPUTER OPERATIONS          FERNDALE       01         79                                              58         21
   COMPUTER OPERATIONS          FONRAD         01         80                                              50         30
   COMPUTER OPERATIONS          GARDNER        01         81                                              59         22
   COMPUTER OPERATIONS          KLWELLEN       01         78                                              55         23
   COMPUTER OPERATIONS          KRAAMER        01         81                                              54         27
   COMPUTER OPERATIONS          LIPSICH        01         81                                              53         28
                                                          NUMBER OF EMPLOYEES BY STATUS CODE:                 7
                                                              AVERAGE AGE                                    27

   COMPUTER OPERATIONS          TERNER         02         82                                              60         22
                                                          NUMBER OF EMPLOYEES BY STATUS CODE:                 1
                                                              AVERAGE AGE                                    22

   COMPUTER OPERATIONS          KAHALLY        05         79                                              52         27
                                                          NUMBER OF EMPLOYEES BY STATUS CODE:                 1
                                                              AVERAGE AGE                                    27
                                                          NUMBER OF EMPLOYEES BY DEPARTMENT:                  9
                                                              AVERAGE AGE                                    26

   EXECUTIVE ADMINISTRATION     HENDON         01         73                                              33         40
   EXECUTIVE ADMINISTRATION     PAPAZEUS       01         78                                              35         43
   EXECUTIVE ADMINISTRATION     RUPEE          01         75                                              33         42
   EXECUTIVE ADMINISTRATION     WILDER         01         79                                              55         24
                                                          NUMBER OF EMPLOYEES BY STATUS CODE:                 4
                                                              AVERAGE AGE                                    37
```

```
REPORT NO. 01                          AVERAGE START AGE BY DEPARTMENT AND STATUS                    mm/dd/yy  PAGE    3
                                       STATUS     START                                              BIRTH
          DEPARTMENT        EMPLOYEE NAME   CODE      YEAR                                           YEAR        AGE

                                                                NUMBER OF EMPLOYEES BY DEPARTMENT:                4
                                                                    AVERAGE AGE                                   37

   INTERNAL SOFTWARE          DOUGH          01        76                                             51         25
   INTERNAL SOFTWARE          GALLWAY        01        81                                             47         34
   INTERNAL SOFTWARE          GARFIELD       01        77                                             45         32
   INTERNAL SOFTWARE          GRANGER        01        80                                             58         22
   INTERNAL SOFTWARE          HEAROWITZ      01        81                                             56         25
   INTERNAL SOFTWARE          JACOBI         01        81                                             40         41
   INTERNAL SOFTWARE          JENSEN         01        82                                             48         34
   INTERNAL SOFTWARE          LITERATA       01        80                                             55         25
   INTERNAL SOFTWARE          O'HEARN        01        78                                             54         24
   INTERNAL SOFTWARE          TYRO           01        80                                             55         25
                                                                NUMBER OF EMPLOYEES BY STATUS CODE:              10
                                                                    AVERAGE AGE                                   29
                                                                NUMBER OF EMPLOYEES BY DEPARTMENT:               10
                                                                    AVERAGE AGE                                   29

   PERSONNEL                  FITZHUGH       01        81                                             56         25
   PERSONNEL                  ORGRATZI       01        80                                             51         29
   PERSONNEL                  PEOPLES        01        81                                             49         32
                                                                NUMBER OF EMPLOYEES BY STATUS CODE:               3
                                                                    AVERAGE AGE                                   29

   PERSONNEL                  JOHNSON        05        77                                             45         32
                                                                NUMBER OF EMPLOYEES BY STATUS CODE:               1
                                                                    AVERAGE AGE                                   32
                                                                NUMBER OF EMPLOYEES BY DEPARTMENT:                4
                                                                    AVERAGE AGE                                   30

   PUBLIC RELATIONS           ANGELO         01        79                                             57         22
   PUBLIC RELATIONS           BANK           01        78                                             50         28
   PUBLIC RELATIONS           BOWER          01        77                                             39         38
   PUBLIC RELATIONS           JACKSON        01        77                                             50         27
REPORT NO. 01                          AVERAGE START AGE BY DEPARTMENT AND STATUS                    mm/dd/yy  PAGE    4
                                       STATUS     START                                              BIRTH
          DEPARTMENT        EMPLOYEE NAME   CODE      YEAR                                           YEAR        AGE

   PUBLIC RELATIONS           MCDOUGALL      01        80                                             59         21
   PUBLIC RELATIONS           PENMAN         01        77                                             44         33
                                                                NUMBER OF EMPLOYEES BY STATUS CODE:               6
                                                                    AVERAGE AGE                                   28

   PUBLIC RELATIONS           ZEDI           05        76                                             40         36
                                                                NUMBER OF EMPLOYEES BY STATUS CODE:               1
                                                                    AVERAGE AGE                                   36
                                                                NUMBER OF EMPLOYEES BY DEPARTMENT:                7
                                                                    AVERAGE AGE                                   29

   THERMOREGULATION           CLOTH          01        79                                             45         34
   THERMOREGULATION           FINN           01        79                                             38         41
   THERMOREGULATION           TIME           01        81                                             58         23
   THERMOREGULATION           WILCO          01        79                                             50         29
                                                                NUMBER OF EMPLOYEES BY STATUS CODE:               4
                                                                    AVERAGE AGE                                   32

   THERMOREGULATION           KASPAR         04        80                                             40         40
                                                                NUMBER OF EMPLOYEES BY STATUS CODE:               1
                                                                    AVERAGE AGE                                   40
                                                                NUMBER OF EMPLOYEES BY DEPARTMENT:                5
                                                                    AVERAGE AGE                                   33
                                                                NUMBER OF EMPLOYEEES FOR THE COMPANY:            56
                                                                    AVERAGE AGE                                   31
```

It is easier to understand how subtotaling and control break processing works if we look at the role each parameter plays in the sample report.

This section contains the following topics:

The Extract Processing Phase (CULL)

- A single type 7 logic statement and an automatic TAKE combine to calculate an employee's age.

  When the implied TAKE is executed in type 7 logic, a record consisting of the two fields on the SORT parameter and the seven fields on the type 5 parameters is written to the extract file.

- Type 5 lines perform two functions, in this order:

  1. Build an extract record, which consists of all the fields on the type 5 parameters and all of the fields on the SORT parameter.
  2. Establish the format of a detail line on the report from the size and auto-header code included on the line.

Because there is no DROP or SELECTION logic, the processing of every record from the input file results in each record being written to the extract file. No sorting or totaling is done by CA Culprit during this input processing; only the instructions coded in type 7 logic are executed.

When CA Culprit is through processing the input file, the sort specified on the SORT parameter is executed by the installation's sort utility. The extract file is sorted in the order of the sort keys, which are part of each extract record. The extract file is then ready for output processing.

The Output Phase (CULE)

- The sorted extract file records provide the input for control breaks and printing the report.
- The only fields from the extract record used in the type 8 logic or on the type 6 lines are those that are coded on the SORT parameter or on the type 5 lines. Work fields that are not part of the extract record are also available for use.
- Type 8 logic is executed whenever a control break is encountered on STATUS or DEPARTMENT.
- The TAKE after sequence 400 sends the type 6 line to be printed.
- One subtotal accumulator (bucket) is set up for each field at each break level for numeric fields named on type 5 lines and referenced in type 8 logic or on type 6 parameters (AGE and EMPLOYEE-COUNT). No other fields are automatically subtotaled.
- There are three control break levels:

```
LEVL 1 - STATUS

LEVL 2 - DEPARTMENT

LEVL 3 - GRAND TOTAL
```

- AGE and EMPLOYEE-COUNT are defined as work fields, and used as such in type 7 logic., are not used In type 8 logic, AGE and EMPLOYEE-COUNT are not used as work fields because they are part of the extract file record in the output processing phase. (Note that AVERAGE-AGE could be used as a work field in both type 7 and type 8 logic because it is not part of the extract record.)

The Processing Steps when an Extract File Is Read

CA Culprit performs the following steps when an extract file is read:

1. Sends each detail extract record to the printer. Grand total break processing is performed at the end-of-file.
2. Updates all subtotal accumulators.

   In our example, the detail values for AGE and EMPLOYEE-COUNT are added to all three accumulators. Since none of the other numeric fields from the type 5 line are referenced in type 6 or type 8 code, no other automatic totaling is performed. EMPLOYEE-COUNT serves as a counter because it always has a value of 1 on the type 5 line. It is not printed on the detail line of the report because position *000 (0000 will work too) is specified on the type 5 line, but it is still subtotaled.
3. Looks ahead to the next detail extract record, searching its sort keys for a control break. If there is no control break, then it processes that next detail extract record (step 1 above).

   If there is a control break:

   - CA Culprit holds that next detail extract record aside and executes type 8 logic for the appropriate control break level.
   - TAKE in type 8 logic causes all of the type 6 lines to be sent to the printer.

   If a control break occurs on more than one level at the same time, CA Culprit executes type 8 logic once for each level starting with the lowest level number first.

   In our example, when DEPARTMENT breaks, STATUS always has to break because it is a LEVL 1. Type 8 logic is executed for STATUS first.
4. Executes control break spacing after exiting type 8 logic because of a TAKE or a DROP.

   If multiple control breaks occur, such as when DEPARTMENT and STATUS break together, the control break spacing is only performed for the highest level.
5. Moves 0 to the accumulator for each field being totaled at the control break level being processed.
6. Continues with step 1 (above) for the next record read from the extract file.
7. Looks again to the next detail record from the extract file.
8. Moves the values of any sort key fields on the record to an internal header control storage area if any of the sort key fields are coded on a type 4 parameter.

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