DATATRIEVE–11
Guide to Writing Reports

Order No. AA-U051A-TK

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This document describes the DATATRIEVE–11 Report Writer.

OPERATING SYSTEMS:	RSX–11M RSX–11M-PLUS RSTS/E	
SOFTWARE VERSION:	DATATRIEVE–11	V3

digital equipment corporation, maynard, massachusetts

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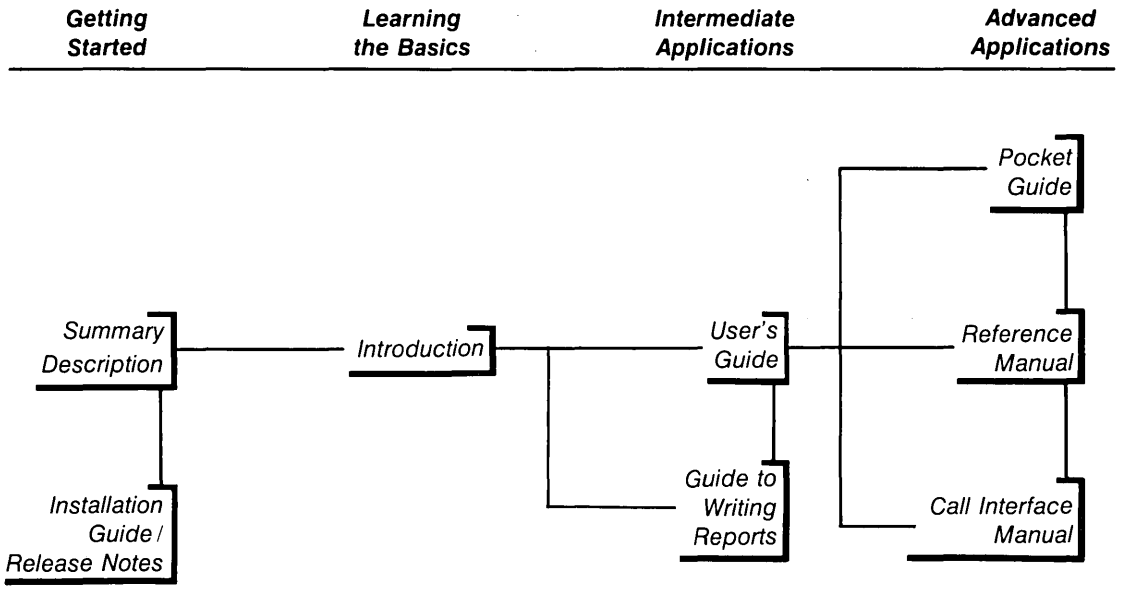
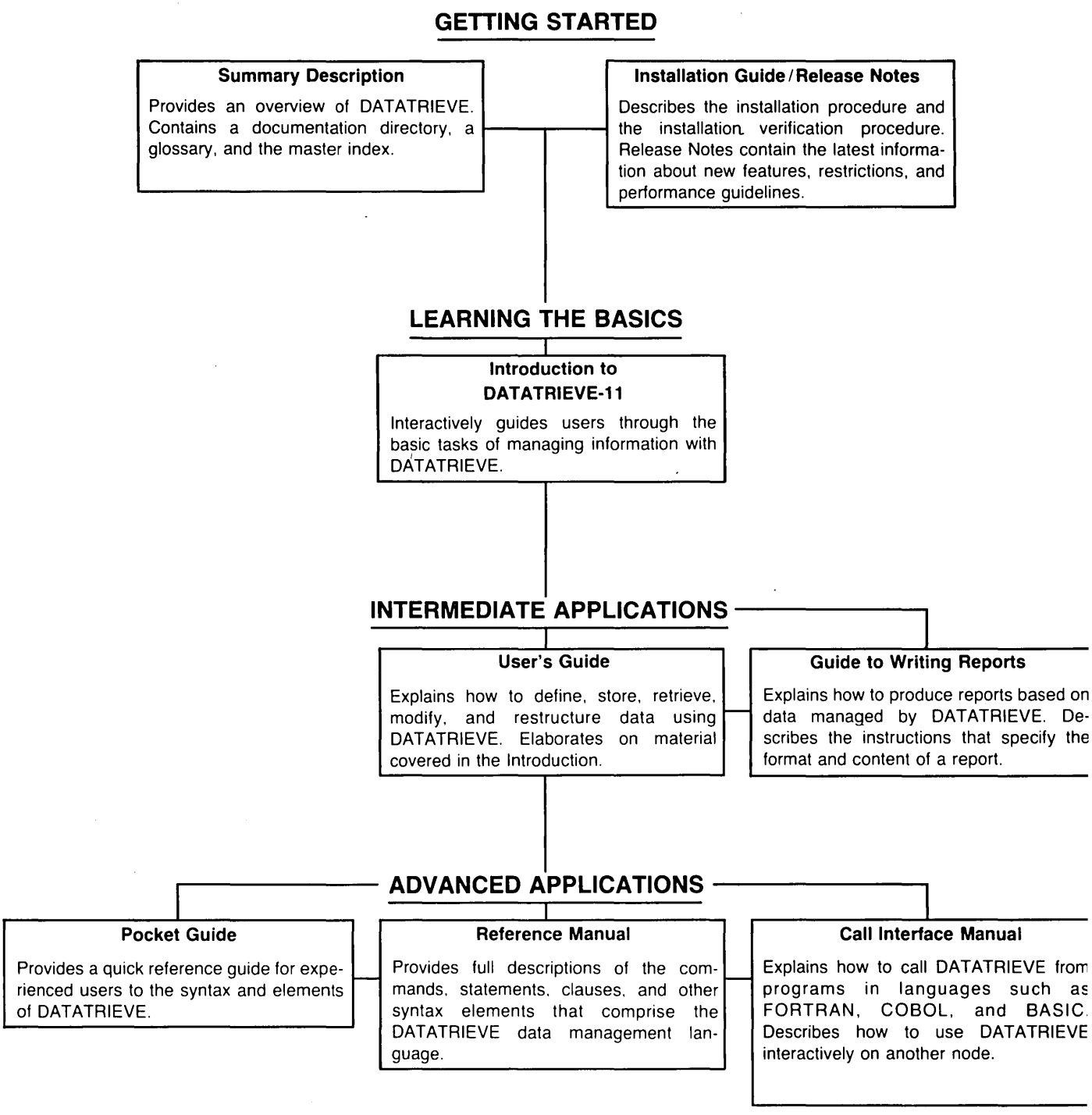
DATATRIEVE-11 DOCUMENTATION MAP



DATATRIEVE-11 DOCUMENTATION DESCRIPTION



Contents

How to Use This Manual

Manual Objectives

This manual describes how to write reports with DATATRIEVE–11. It illustrates the use of the DATATRIEVE–11 Report Writer.

Audience

You should use this manual if you want to produce reports using data managed by DATATRIEVE–11. The manual assumes that you have read or are familiar with the material covered in the *Introduction to DATATRIEVE–11*. For the more advanced topics in this manual (especially in Chapter 3), you should be familiar with the material in the *DATATRIEVE–11 User's Guide* about record definitions, record selection expressions, variables, procedures, and command files. In addition, you may need to refer to the section on the EDIT_STRING clause in Chapter 5 of the *DATATRIEVE–11 Reference Manual*.

Manual Structure

This manual has three chapters:

Chapter 1	Introduces the Report Writer and provides examples of simple reports.
Chapter 2	Describes how to develop a report specification, the instructions that control the content and format of a report. The chapter presents the Report Writer's default and optional settings.
Chapter 3	Discusses advanced techniques of report writing with DATATRIEVE–11. It covers such topics as reporting groups of sorted records and reporting data from several domains.
Appendix A	Contains the data files used in the examples in this book.

Conventions

The following list explains the special symbols used in this book:

RET	The symbol RET tells you to press the RETURN key on the keyboard of your terminal.
TAB	The symbol TAB tells you to press the TAB key on the keyboard of your terminal.
CTRL/X	The symbol CTRL/X tells you to press the CTRL (control) key and a letter key (usually Z or C) at the same time.
color	Text printed in red shows the lines you type while doing the examples.

Related Documents

You can find additional information in the following documents:

- *DATATRIEVE–11 User's Guide*
- *DATATRIEVE–11 Call Interface Manual*
- *DATATRIEVE–11 Reference Manual*

Getting Started 1

DATATRIEVE–11 allows you to organize and maintain data conveniently. A major reason for keeping this data is to make it available to the people who need it. DATATRIEVE's Report Writer helps you present this information in attractive and comprehensive reports.

Managers, secretaries, and many other people often need information immediately on a specific subject. To produce simple query reports, they need reliable techniques for presenting information. With a few simple statements and commands, you can quickly display and accurately summarize data managed by DATATRIEVE.

In addition to query reports, most organizations require detailed summary reports at regular intervals to compare current performance with past performance. These periodic reports are on subjects such as accounts receivable, inventory, and sales. The statistical functions within the Report Writer allow anyone to summarize the information needed for periodic reports.

Those who want the same report formats repeatedly can define DATATRIEVE procedures or use command files to save their report specifications. This manual teaches you by example how to generate many types of reports ranging from simple queries to complex summary reports.

The examples in this book use the sample domains YACHTS, PERSONNEL, and FAMILIES installed with your system. If the data in your files has changed since installation, your results may differ from those in the book. To check your data files with the ones these examples use, see Appendix A.

If your data file is different from that in Appendix A, you can either modify your data or see your system manager to obtain the original file.

1.1 What the Report Writer Can Do

The Report Writer can:

1. Center a report name at the top of the page
2. Print the current date at the upper right
3. Print page numbers at the upper right
4. Set up column headings
5. Print a data line with information about individual records (a detail line) for each record
6. Calculate and print a line of summary totals for:
   a. A group of data (such as yachts by the same builder)
   b. The entire report (such as yachts by several builders)

Each number corresponds to a feature listed in the following report produced by the Report Writer:


```
                                        LENGTH
                                         OVER
MANUFACTURER          MODEL       RIG    ALL     WEIGHT    BEAM    PRICE ——(4)

 ALBERG          37 MK II      KETCH     37      20,000     12    $36,951 ——(5)

        BOAT COUNT:  1                          AVERAGE PRICE:    $36,951

                  ****************************************

 ALBIN           79            SLOOP     26       4,200     10    $17,900
 ALBIN           VEGA          SLOOP     27       5,070     08    $18,600
 ALBIN           BALLAD        SLOOP     30       7,276     10    $27,500

        BOAT COUNT:  3                          AVERAGE PRICE:    $21,333 ——(6a)
                  ****************************************

 AMERICAN        26            SLOOP     26       4,000     08     $9,895
 AMERICAN        26-MS         MS        26       5,500     08    $18,895

        BOAT COUNT:  2                          AVERAGE PRICE:    $14,395

                  ****************************************

   TOTAL BOAT COUNT:  6                 OVERALL AVERAGE PRICE:    $21,140 ——(6b)
```

1.2 Writing Reports

With DATATRIEVE, you can produce reports both inside and outside of the Report Writer:

- With the PRINT statement to display data from one group of records
- With the SUM statement to generate summary totals from groups of records
- With the Report Writer, providing the most flexibility for designing the format and content of reports and providing the option of printing the report directly on a line printer

The following sections illustrate these three methods of report writing in DATATRIEVE. You can use the examples as models for creating similar reports with your own data.

1.2.1 The PRINT Statement

When you display records with the PRINT statement outside of the Report Writer, you create a simple report. To display the YACHTS built by ALBIN, type the following, being sure to use all uppercase letters for "ALBIN":

```
DTR> READY YACHTS
DTR> PRINT YACHTS WITH BUILDER = "ALBIN"

                                  LENGTH
                                   OVER
MANUFACTURER    MODEL      RIG     ALL    WEIGHT BEAM   PRICE

 ALBIN          79         SLOOP   26      4,200  10   $17,900
 ALBIN          BALLAD     SLOOP   30      7,276  10   $27,500
 ALBIN          VEGA       SLOOP   27      5,070  08   $18,600

DTR>
```

1.2.2 The SUM Statement

You may want to summarize information about selected groups within your report. The simplest way is with DATATRIEVE's SUM statement outside of the Report Writer. For example, assume that you have a collection of seven records from the YACHTS domain. Use the SUM statement to indicate the number of yachts and the total price for each builder.

The SUM statement in the following example means "Summarize the first seven yachts, telling the total number and total price of yachts for each builder and the total number and total price of all yachts in the collection."

The command SET NO PROMPT, which is included in many of the following examples, stops DATATRIEVE's prompting for elements needed to complete

your current command or statement. If you omit SET NO PROMPT, prompts such as "Looking for next element in list" appear on your terminal. SET NO PROMPT does not affect your report in any way.

```
DTR> SET NO PROMPT↵
DTR> READY YACHTS; FIND FIRST 7 YACHTS↵
[7 records found]
DTR> SUM 1 ("NUMBER") USING 9,↵
CON> PRICE USING $$$$,$$$ BY BUILDER↵

MANUFACTURER NUMBER  PRICE    NUMBER  PRICE

 ALBERG         1     $36,951
 ALBIN          3     $64,000
 AMERICAN       2     $28,790
 BAYFIELD       1     $32,875
                              7     $162,616

DTR>
```

The report separates the seven records into four groups of builders. It summarizes data not only for each builder, but for all builders.

The SUM statement is the simplest way to create summary reports. See Chapter 3 for information on advanced summary reports.

1.2.3 The Report Writer

The PRINT and SUM statements give you some control over the display of your data, but the Report Writer helps you format the page more than the PRINT statement does. You can produce the simplest reports with only a few statements:

- A REPORT statement to invoke the Report Writer and to identify the data that you wish to report.
- One or more SET statements to name the report and control the format. (SET statements are optional. If you prefer, the Report Writer can do all the formatting for you.)
- A PRINT statement to indicate which fields from the records you want to display.
  - Note that the Report Writer PRINT statement is different from the regular PRINT statement in DATATRIEVE. In the Report Writer, you list the fields or value expressions that you want to display. You cannot say "PRINT CURRENT" or "PRINT YACHTS", because "CURRENT" and "YACHTS" are not field names or value expressions.
- An END_REPORT statement to tell DATATRIEVE to create and display the report.

To find out the names of fields you can specify in the PRINT statement, use a SHOW FIELDS command to display the field structure of the record:

```
DTR> SHOW FIELDS(RET)
YACHTS
    BOAT
        TYPE [Indexed field]
            MANUFACTURER (BUILDER)      [Character string, indexed key]
            MODEL       [Character string, indexed key]
        SPECIFICATIONS (SPECS)
            RIG [Character string]
            LENGTH_OVER_ALL (LOA)       [Character string]
            DISPLACEMENT (DISP) [Number]
            BEAM        [Number]
            PRICE       [Number]
DTR>
```

BOAT is the top-level field for the records in the YACHTS domain. BOAT includes all of the fields in YACHTS. If you want to report all the data on each yacht, specify BOAT in the PRINT statement.

Example: Report on all the yachts manufactured by Albin. Name the report "YACHTS BY ALBIN", and include a date and page number.

To produce the report, follow these steps:

1. Report each record in YACHTS for the builder ALBIN. The REPORT statement identifies the data and invokes the Report Writer. The RW> prompt shows that DATATRIEVE is ready to accept your Report Writer statements.
2. Name the report.
3. Print the top-level field BOAT for each record. By doing so, you display all the data on each yacht.
4. End with an END_REPORT statement.

The following DATATRIEVE session illustrates these steps. The number after each statement corresponds to one in the list above:

```
DTR> REPORT YACHTS WITH BUILDER = "ALBIN"(RET) ----------(1)
RW>  SET REPORT_NAME = "YACHTS BY ALBIN"(RET) ----------(2)
RW>  PRINT BOAT(RET) ----------(3)
RW>  END_REPORT(RET) ----------(4)

                                YACHTS BY ALBIN                    20-Aug-83
                                                                   Page 1

                                                    LENGTH
                                                     OVER
   MANUFACTURER        MODEL          RIG           ALL        WEIGHT     BEAM      PRICE

    ALBIN              79             SLOOP         26          4,200       10      $17,900
    ALBIN              BALLAD         SLOOP         30          7,276       10      $27,500
    ALBIN              VEGA           SLOOP         27          5,070       08      $18,600

DTR>
```

Note the way the Report Writer sets up the page format. The page has the date and page number in the upper right corner. In this example, the Report Writer automatically sets the page width at 80 columns per page, spacing the fields of each record for you.

1.3 Saving Report Statements

When you need to produce the same report periodically, you can save the Report Writer specification by putting the statements in a DATATRIEVE procedure or a command file.

1.3.1 Using Procedures

You define a procedure by:

1. Typing DEFINE PROCEDURE procedure-name at the DTR> prompt
2. Typing the report statements exactly as you would enter them outside a procedure
3. Typing END_PROCEDURE

By using one or more prompting value expressions within your procedure, you can let other people tailor the report. The prompting value expression consists of an asterisk (*) and a period, followed by an expression enclosed in quotation marks.

For example, you can include this statement:

```
REPORT YACHTS  WITH BUILDER = *."the builder"
```

When you invoke the procedure, the terminal displays the following prompt:

```
Enter the builder:
```

DATATRIEVE does not process the report until you enter the name of the builder.

Example: Define a procedure YACHT_PER_LB to produce a report with columns for these fields:

- MANUFACTURER
- MODEL
- DISP ("WEIGHT")
- PRICE

In addition, create a new column showing the price per pound of each yacht. The Report Writer calculates the price per pound by dividing the number in the PRICE field by the number in the DISP field.

Follow these steps:

1. Define a procedure YACHT_PER_LB.
2. Ready the domain YACHTS.
3. Identify the data you wish to report within the REPORT statement. Include a prompt so the user can select the builder's name.
4. Specify the items in each detail line with a PRINT statement. These items become the columns for the report. Create a column for price per pound by including PRICE/DISP as one of the items. The "/" indicates division. Use the edit string clause $$.99 to print the price per pound as a monetary value. (Chapter 2 discusses computed value expressions and edit strings in more detail.)
5. End the report specification with an END_REPORT statement.
6. End the procedure with an END_PROCEDURE statement.
7. Invoke the procedure by typing :YACHT_PER_LB.

The following DATATRIEVE statements produce the report. The number after each statement corresponds to one in the preceding list:

```
DTR> DEFINE PROCEDURE YACHT_PER_LB(RET) ------------------------------(1)
DFN> READY YACHTS(RET) ----------------------------------------------------(2)
DFN> REPORT YACHTS WITH BUILDER = *,"the builder"(RET) ---------------(3)
DFN> SET REPORT_NAME = "YACHT PRICES BY WEIGHT"(RET)
DFN> PRINT TYPE, DISP, PRICE,(RET) ----------------------------------------(4)
DFN> PRICE/DISP ("PRICE/LB") USING $$.99(RET)
DFN> END_REPORT(RET) ------------------------------------------------------(5)
DFN> END_PROCEDURE(RET) ---------------------------------------------------(6)
DTR> :YACHT_PER_LB(RET) ---------------------------------------------------(7)
Enter the builder: AMERICAN(RET)

                        YACHT PRICES BY WEIGHT          17-Apr-83
                                                        Page 1


 MANUFACTURER        MODEL       WEIGHT     PRICE     PRICE/LB

  AMERICAN           26           4,000     $9,895      $2.47
  AMERICAN           26-MS        5,500    $18,895      $3.43

DTR>
```

1.3.2 Using Command Files

You can also place report specifications in command files outside DATATRIEVE using a text editor.

For example, invoke a text editor, name the command file YACTWT.CMD, and enter the statements to create your report, just as you would enter them within DATATRIEVE:

```
READY YACHTS(RET)
REPORT YACHTS WITH BUILDER = *,"the builder"(RET)
SET REPORT_NAME = "YACHT PRICES BY WEIGHT"(RET)
PRINT TYPE, DISP, PRICE,(RET)
PRICE/DISP ("PRICE/LB") USING $$,99(RET)
END_REPORT(RET)
```

Exit from the text editor. Invoke DATATRIEVE and execute the command file, by typing the @ symbol and the command file name. The following statements produce the report:

```
DTR> @YACTWT.CMD(RET)
READY YACHTS
REPORT YACHTS WITH BUILDER = *,"the builder"
SET REPORT_NAME = "YACHT PRICES BY WEIGHT"
PRINT TYPE, DISP, PRICE,
PRICE/DISP ("PRICE/LB") USING $$,99
END_REPORT
Enter the builder: AMERICAN(RET)

                        YACHT PRICES BY WEIGHT        17-Apr-83
                                                      Page 1

 MANUFACTURER        MODEL       WEIGHT     PRICE      PRICE/LB

  AMERICAN           26           4,000     $9,895       $2.47
  AMERICAN           26-MS        5,500    $18,895       $3.43

DTR>
```

For each report you can decide whether to create the report specification interactively, to put it into a procedure, or to put it into a command file. In any case, the sequence of report statements and their syntax remain the same. For more information on procedures and command files, see the *DATATRIEVE–11 User's Guide.*

1.4 Printing Summary Statistics

If you want summary information on the data records in the report, use the Report Writer's statistical functions to compute values for a summary line. The functions are:

- COUNT
- AVERAGE
- TOTAL
- MAX (maximum value)
- MIN (minimum value)

Example: Report on yachts built by Albin. At the bottom of the report, indicate the total number of yachts and the average price of a yacht. Limit the page width to 70 columns. Follow these steps:

1. Identify the data you wish to report within the REPORT statement.
2. Name the report.
3. Set the page width.
4. Print the top-level field BOAT in each detail line.
5. Summarize the report with an AT BOTTOM OF REPORT statement. Use COUNT for the total number of boats. To suppress the header "COUNT", include a hyphen in parentheses after COUNT. Then apply AVERAGE to the field PRICE for the average price.
6. End with an END_REPORT statement.

The following group of statements produces the desired summary report:

```
DTR> SET NO PROMPT↵
DTR> REPORT YACHTS WITH BUILDER = "ALBIN"↵ ——————————————(1)
RW>  SET REPORT_NAME = "YACHTS BY ALBIN"↵ ——————————————(2)
RW>  SET COLUMNS_PAGE = 70↵ ——————————————(3)
RW>  PRINT BOAT↵ ——————————————(4)
RW>  AT BOTTOM OF REPORT PRINT SKIP, COL 10,↵
RW>     "BOAT COUNT:", SPACE, COUNT (-) USING Z9,↵
RW>     COL 45, "AVERAGE PRICE:", AVERAGE PRICE ↵ ——————————————(5)
RW>  END_REPORT↵ ——————————————(6)

                              YACHTS BY ALBIN                    10-Jan-83
                                                                 Page 1


                                                  LENGTH
                                                   OVER
  MANUFACTURER        MODEL          RIG          ALL       WEIGHT   BEAM    PRICE

    ALBIN             79             SLOOP        26         4,200    10    $17,900
    ALBIN             BALLAD         SLOOP        30         7,276    10    $27,500
    ALBIN             VEGA           SLOOP        27         5,070    08    $18,600

          BOAT COUNT:  3                                AVERAGE PRICE:      $21,333

DTR>
```

Note that the Report Writer has lined up the value for the average price in the PRICE column.

These sample reports demonstrate only a few applications of DATATRIEVE's Report Writer. The next two chapters discuss and illustrate other features to control the format and content of reports.

Designing a Report 2

You may be content to allow the Report Writer to supply the date, page number, page width, and other characteristics for your report. If you are, you need only concern yourself with what you want to put into the report, not how to design the report itself.

At times, though, you may want to supply your own formats. You are likely, for instance, to want to supply a name for your report. Unless you specify a name, the Report Writer generates a report without one.

Once you begin to specify titles, you may want to change page widths or provide your own column headers. This chapter tells what the Report Writer does for you and how to do those things for yourself if you wish.

You create a DATATRIEVE report with a series of Report Writer statements, called a report specification. A report specification controls the format and determines the content of a report. Some statements are required for a valid report specification, while others are optional.

These are required statements:

- A REPORT statement
- One PRINT statement or at least one AT statement
- An END_REPORT statement

These are optional statements:

- Statements to specify particular data you want for the report from all the available data
- Statements to specify the file or device to which DATATRIEVE writes the report

- A SET REPORT_NAME statement
- SET statements to control page format and assign headings
- AT statements if you wish to summarize data or print special headings

Each major section of this chapter discusses a part of the report specification. Each section discusses first the format built into the Report Writer (the default format) and then your options to change the default format.

You can incorporate one or more of the options into your report specification. If you are satisfied with the default format, skip the option section that immediately follows.

For example, the Report Writer automatically sets your page width at 80 columns per page. If you want to use that page width, you need not change it. But you can include an optional statement (SET COLUMNS_PAGE) to specify a different page width.

To start a report design, take a piece of paper to make a rough sketch of a report that you would like to produce. Indicate the information you would like the report to contain, and the basic format for each page. Then read each section of this chapter to develop a report specification that produces such a report, using the instructions and examples provided as aids.

2.1 Identifying the Data and Invoking the Report Writer

Reports usually highlight only a portion of the available information. To report specific data, you must identify it to DATATRIEVE and invoke the Report Writer. Follow these steps:

1. Ready the domain(s) containing the data you wish to report:

```
DTR> READY YACHTS(RET)
DTR>
```

2. Identify the data that you want to report within the domain, so you can limit the number of records in the report and sort the records if you desire. You can identify the data in one of two ways: in a FIND statement that precedes the report statement or with the REPORT statement itself.

   This example shows a FIND statement that forms a sorted collection from the YACHTS domain:

```
DTR> FIND YACHTS WITH LOA > 40 SORTED BY BEAM(RET)
[8 records found]
DTR>
```

3. Enter the REPORT statement to invoke the Report Writer. The format of the REPORT statement is:

REPORT [rse] [ON { file-spec / *.prompt }]

The following are valid REPORT statements:

- REPORT – When you omit the RSE (record selection expression) from the REPORT statement, the Report Writer reports on the records in the CURRENT collection:

```
DTR> REPORT↵
RW>
```

- REPORT ON file-spec – When you specify the output file and no RSE, the Report Writer reports on the CURRENT collection and writes the report to a file. For example, this statement writes the report to the file BIGYAT.LST:

```
DTR> REPORT ON BIGYAT↵
RW>
```

  If your REPORT statement includes an ON clause, the Report Writer advances the page after printing the report. That is, it places a trailing form feed on the report. If you do not include an ON clause, it does not add a form feed to the end of the report.

- REPORT rse - If you did not form a collection with a FIND statement, you must identify a record stream with the REPORT statement. For example:

```
DTR> REPORT YACHTS WITH DISP > 25000↵
RW>
```

2.2 Correcting Mistakes in the Report Writer

You can correct mistakes in a Report Writer specification by retyping the specification or by editing the procedure or command file that contains the report statements.

2.2.1 Returning to the DTR> Prompt

You invoke the Report Writer with a REPORT statement, and you exit with END_REPORT. However, if you make a mistake, you may want to exit before completing your report specification.

To force an exit from the Report Writer and return to DATATRIEVE command level, you can enter CTRL/Z as a response to an RW> prompt or in the middle of an input line:

```
DTR> READY YACHTS↵
DTR> REPORT YACHTS↵
RW>  CTRL/Z
DTR>
```

When you see the DTR> prompt, you can retype your Report Writer specification.

2.2.2 Using a Text Editor to Correct Mistakes

If you enter your report specification statements in a DATATRIEVE procedure or in a command file outside DATATRIEVE, you can correct errors easily and quickly.

To correct Report Writer statements contained in a DATATRIEVE procedure, follow these steps:

1. Use the EXTRACT command to copy the procedure to a file, using the statement:

   EXTRACT ON file-spec procedure-name

2. EXIT from DATATRIEVE.
3. Use a text editor to make corrections in the procedure.
4. Return to DATATRIEVE.
5. Invoke the command file just created.

   Notice the file begins with the commands DELETE procedure-name and DEFINE procedure-name. DATATRIEVE inserts these commands into the command file when you use the EXTRACT command. When you invoke the file, DATATRIEVE deletes the incorrect procedure and creates the corrected one.

6. Execute the procedure.

You also use the text editor to correct Report Writer statements in a command file created outside DATATRIEVE. When you execute a file containing errors in the report specification, DATATRIEVE sends you a message and returns you to the DTR> prompt. To correct the errors, exit from DATATRIEVE and edit the command file. Invoke DATATRIEVE again and execute the corrected command file by typing the @ symbol and the command file name.

2.2.3 Using the DATATRIEVE Editor to Correct Mistakes

You can use the DATATRIEVE Editor to correct report statements contained in a procedure. Type the command:

```
EDIT procedure-name
```

For a detailed explanation of the DATATRIEVE Editor, procedures and command files, see the *DATATRIEVE–11 User's Guide*.

2.3 Formatting the Report Page

One of the main advantages of the Report Writer is its ease of formatting. You can use the Report Writer's default format, or you can include SET statements to specify the number of columns and lines per page, and the maximum number of lines or pages in a report.

2.3.1 Default Page Width and Length

The default format is the setting the Report Writer uses unless you specify otherwise. For page width and length, these are the defaults:

- Page width = 80 columns
- Page length = 60 lines

2.3.2 Option 1: Setting the Page Width

If you do not want to use the default format of 80 columns per page, you can specify the number of columns by putting a SET COLUMNS_PAGE statement in your report specification. The statement has this form:

SET COLUMNS_PAGE = { n / *.prompt }

The value n is the number of columns per page. The maximum value for n is 255.

You can use this command at DTR command level or in the Report Writer to set the page width for reports. If you use the command in the Report Writer, it does not affect the page width when you return to the DTR> prompt.

If you make the width too small, the Report Writer breaks each detail line and moves the fields that do not fit to the next line of the display. In considering the setting for page width, take into account the number of columns used to display the same fields outside the Report Writer with the regular PRINT statement. If you request totals and other special value expressions on the detail line, you must add in the additional columns required for these print objects.

To set the page width at 60 columns, enter:

```
RW>  SET COLUMNS_PAGE = 60RET
```

If you use the prompt option, you can choose the page width when you process the report.

2.3.3 Option 2: Setting the Page Length

If you do not want to use the default format of 60 lines per page, you can include a SET LINES_PAGE statement within your report specification. The statement has the following form, where n is an integer representing the number of lines per page:

SET LINES_PAGE = { n / *.prompt }

To set the page length at 55 lines, enter:

```
RW>  SET LINES_PAGE = 55RET
```

If you use the prompt option, you can choose the page length at the time you process the report.

If your report contains a list, each item in the list counts as a separate detail line.

If you want a report without any page breaks, give n a value larger than the number of lines in the report.

To be sure that you have set up your page the way you would like it, you may have to experiment with two or three versions of the lines-per-page value.

2.3.4 Option 3: Limiting the Total Lines or Pages in a Report

The Report Writer limits the number of lines in a report to 32,767. It limits the number of pages to 32,767 also. Because the automatic limit is so large, you may want to use the SET MAX_LINES or SET MAX_PAGES statement to prevent a loop that would tie up your system's resources. These statements specify the maximum number of lines or pages your report can contain. For the statement SET MAX_LINES, DATATRIEVE counts header lines, blank lines, detail lines, and summary lines. The two formats are similar:

SET MAX_LINES = { n | *.prompt }

SET MAX_PAGES = { n | *.prompt }

The Report Writer counts all the lines or pages of the report. When it reaches the limit you have specified, it stops producing the report and prints one of the following error messages:

```
Maximum number of lines exceeded--report aborted
Execution failed


Maximum number of pages exceeded--report aborted
Execution failed
```

If you use the prompt option, you can select the maximum number of pages or lines at the time you process the report. For example:

```
DTR> READY YACHTS(RET)
DTR> REPORT YACHTS(RET)
RW>  PRINT BOAT(RET)
RW>  SET MAX_PAGES = *,"the maximum number of pages"(RET)
RW>  END_REPORT(RET)
Enter the maximum number of pages: 1(RET)
```

```
                                                          9-Mar-83
                                                          Page 1

                                        LENGTH
                                         OVER
MANUFACTURER        MODEL        RIG      ALL      WEIGHT     BEAM      PRICE

 ALBERG          37 MK II     KETCH      37       20,000       12      $36,951
 ALBIN           79           SLOOP      26        4,200       10      $17,900
 ALBIN           BALLAD       SLOOP      30        7,276       10      $27,500
 ALBIN           VEGA         SLOOP      27        5,070       08      $18,600
 AMERICAN        26           SLOOP      26        4,000       08       $9,895
                                  .
                                  .
                                  .
 GRAMPIAN        34           KETCH      33       12,000       10      $29,675
Maximum number of pages exceeded--report aborted
Execution failed
DTR>
```

2.4 Setting Up the Report Heading

The report heading consists of the report name, date, and page number. You can let the Report Writer use the default format or you can specify a report heading with SET statements.

2.4.1 Default Format

The default format for the report heading is:

- Report Name – The Report Writer prints no title, unless you include a SET REPORT_NAME statement.
- Date – The Report Writer prints the current system date in the upper right corner of the page. It uses the format DD-Mmm-YY (for example, 21-Jan-83).
- Page number – The Report Writer prints the page number of the report directly under the date. Regardless of the lengths of the date string and the page number, the Report Writer aligns the first character of the page number identification under the first character of the date. It uses the format Page n. For example:

```
                                                          21-Jan-83
                                                          Page 2
```

2.4.2 Option 1: Naming the Report

Use the SET REPORT_NAME statement to name your report. Be sure to enclose the name in quotation marks. The Report Writer centers this name on the first printed line at the top of the page. For example:

```
DTR> SET NO PROMPT(RET)
DTR> REPORT YACHTS(RET)
RW>  SET REPORT_NAME =(RET)
RW>  "ACCOUNTS PAYABLE FOR BOCK'S YACHTS"(RET)
RW>  END-REPORT(RET)
```

This statement produces the following title:

```
                    ACCOUNTS PAYABLE FOR BOCK'S YACHTS  21-Jan-83
                                                        Page 1
```

The SET REPORT_NAME statement has the following syntax:

For naming the report:

```
SET    REPORT_NAME =  { "string"[/...] }
                      { *.prompt       }
```

For specifying a date or string at the upper right of each page:

```
SET    DATE = "string"
```

For controlling the printing of a date or page number:

```
SET    { NO DATE   }
       { NUMBER    }  [,...]
       { NO NUMBER }
```

For specifying page width or length, or overall report length:

```
SET    { { COLUMNS_PAGE = }          { n        } }
       { { LINES_PAGE =   }          { *.prompt } }  [,...]
       { { MAX_LINES =    }                       }
       { { MAX_PAGES =    }                       }
```

You are not limited to report names of one line. To produce a report name of two or more lines, enclose each segment of the report name in quotation marks and separate each segment from the next with a slash (/):

```
DTR> REPORT YACHTS(RET)
RW>  SET REPORT_NAME =(RET)
RW>  "ACCOUNTS PAYABLE"/"FOR BOCK'S YACHTS"(RET)
RW>  END-REPORT(RET)
```

This statement produces the following report heading:

```
                          ACCOUNTS PAYABLE              18-Apr-83
                        FOR BOCK'S YACHTS               Page 1
```

You can also have the Report Writer prompt you for a name each time it processes a report. In response to the prompt, enclose each segment in quotation marks, and separate each segment from the next with a slash. For example:

```
DTR> READY PERSONNEL(RET)
DTR> REPORT FIRST 2 PERSONNEL(RET)
RW>  SET REPORT_NAME = _*,"report name"(RET)
RW>  PRINT PERSON(RET)
RW>  END_REPORT(RET)
Enter report name: "EMPLOYEE STATUS"/"FOR FIRST QUARTER"(RET)
```

This statement produces the following report:

```
                                EMPLOYEE STATUS                              17-Jan-83
                              FOR FIRST QUARTER                              Page 1


                        FIRST          LAST                  START                    SUP
  ID       STATUS       NAME           NAME        DEPT      DATE        SALARY       ID

  00012  EXPERIENCED  CHARLOTTE    SPIVA          TOP    12-Sep-72     $75,892   00012
  00891  EXPERIENCED  FRED         HOWL           F11    9-Apr-76      $59,594   00012

DTR>
```

If you include a one-line name for the report, the name prints on the same line as the page number.

To produce a report with no name, do not use the SET REPORT_NAME statement at all. There is no default report name.

2.4.3 Option 2: Assigning a Date

With the SET DATE statement, you can replace the default date in the top right corner of the page with another date or any other character string:

```
DTR> REPORT YACHTS(RET)
RW>  SET DATE = "22 MAR 1983"(RET)
RW>  END-REPORT(RET)
```

This statement produces:

```
                                                              22 MAR 1983
                                                              Page 1
```

You can use a variety of date formats. For example:

```
DTR> REPORT YACHTS(RET)
RW>  SET DATE = "TUESDAY, MARCH 14TH"(RET)
RW>  END-REPORT(RET)
```

This statement produces:

```
                                                    TUESDAY, MARCH 14TH
                                                    Page 1
```

You can specify wording that has no connection at all with dates. For example:

```
DTR> REPORT YACHTS(RET)
RW>  SET DATE = "COMPANY CONFIDENTIAL"(RET)
RW>  END-REPORT(RET)
```

This statement produces:

```
                                                    COMPANY CONFIDENTIAL
                                                    Page 1
```

2.4.4 Option 3: Suppressing a Date

If you do not want a date on your report, include the SET NO DATE statement as part of your report specification.

```
DTR> REPORT FIRST 3 YACHTS↵
RW>  SET NO DATE↵
RW>  SET REPORT_NAME = "FIRST BOATS"↵
RW>  PRINT BOAT↵
RW>  END_REPORT↵

                                FIRST BOATS                          Page 1


                                                LENGTH
                                                 OVER
   MANUFACTURER       MODEL          RIG         ALL       WEIGHT     BEAM      PRICE

    ALBERG          37 MK II       KETCH        37        20,000      12      $36,951
    ALBIN           79             SLOOP        26         4,200      10      $17,900
    ALBIN           BALLAD         SLOOP        30         7,276      10      $27,500

DTR>
```

2.4.5 Option 4: Suppressing the Page Number

If you do not want any page numbers on your report, include the SET NO NUMBER statement as part of your report specification.

```
DTR> REPORT FIRST 1 YACHTS↵
RW>  SET NO NUMBER↵
RW>  PRINT BOAT↵
RW>  END_REPORT↵

                                                                  13-Sep-82


                                                LENGTH
                                                 OVER
   MANUFACTURER       MODEL          RIG         ALL       WEIGHT     BEAM      PRICE

    ALBERG          37 MK II       KETCH        37        20,000      12      $36,951

DTR>
```

Unless you suppress the page number, the Report Writer automatically prints the page number in the upper right corner of the page.

2.5 Printing Detail Lines and Column Headers

Detail lines contain information about individual records from a domain. The Report Writer arranges the information in columns, and the column headers from the DATATRIEVE domain tell what the information in each column represents.

The Report Writer PRINT statement produces a detail line in the report for every record in the CURRENT collection or in the specified record stream. A detail line can cover several lines on the report page, depending on the content and format you specify.

With the Report Writer PRINT statement, you can specify three characteristics of the detail lines:

- The content of the detail lines:
  - Values of fields from records identified either by a FIND or by a REPORT statement
  - Value Expressions
- The format of the print items in the detail lines:
  - Order of each print item
  - Column position of each print item
  - Edit string format for each print item
- Column headings for each print item

For further discussion of the Report Writer PRINT statement, see the *DATATRIEVE–11 Reference Manual.*

2.5.1 Content of the Detail Line

A detail line can have two kinds of print items. The first is the value of a field from the record. One example is the value of the PRICE field from YACHTS. The second is a value expression. You may derive value expressions from field values, as in PRICE/DISP (price per pound) or PRICE* 1.1 (10% markup on price). Value expressions may also be literals, variables, or prompt options.

2.5.1.1 Field Values — You determine the content of the detail line by indicating which fields from the record the Report Writer should print. You can specify either elementary fields or group fields. In the case of a group field, each of its elementary fields appears in a separate column.

Example: Print the TYPE and PRICE fields of the YACHTS domain in the default format. The report displays the group field TYPE as two columns, one for each elementary field (MANUFACTURER and MODEL) TYPE contains:

```
DTR> REPORT FIRST 2 YACHTS(RET)
RW> PRINT TYPE, PRICE(RET)
RW> SET COLUMNS_PAGE = 60(RET)
RW> END_REPORT(RET)
```

```
                                                    27-Aug-83
                                                    Page 1


        MANUFACTURER            MODEL               PRICE

         ALBERG                 37 MK II            $36,951
         ALBIN                  79                  $17,900

DTR>
```

2.5.1.2 Value Expressions — You can create additional detail line items computed from other field values with DATATRIEVE's arithmetic or statistical operators. In addition, you can include other value expressions such as literals, variables, or prompting value expressions.

Example: Display the model, current price, and a new price 10 percent higher than the current price for the first five records in the YACHTS domain.

```
DTR> SET NO PROMPT
DTR> REPORT FIRST 5 YACHTS
RW>  SET COLUMNS_PAGE = 60
RW>  SET REPORT_NAME = "BOCK'S YACHTS"/"PRICE LIST"
RW>  PRINT TYPE, PRICE, PRICE * 1.1 USING $$$,$$$
RW>  END_REPORT
```

```
                          BOCK'S YACHTS                 8-Mar-83
                            PRICE LIST                  Page 1


     MANUFACTURER          MODEL          PRICE

      ALBERG               37 MK II       $36,951      $40,646
      ALBIN                79             $17,900      $19,690
      ALBIN                BALLAD         $27,500      $30,250
      ALBIN                VEGA           $18,600      $20,460
      AMERICAN             26              $9,895      $10,884

DTR>
```

The edit string clause, USING $$$,$$$, specifies the output format for the PRICE *1.1 field. You need to use one more dollar sign than the maximum number of digits for the value expression. See Section 2.5.2.3 for more information on edit strings.

2.5.2 Format of Fields in the Detail Lines

The Report Writer determines a default format for each print item based on edit string or picture clauses in the record definition or variable declaration. You can, at your option, control the format within the PRINT statement.

2.5.2.1 Order of Print Items — The order of the field names in the PRINT statement determines the left to right printing order of the detail line items. The following example shows how you can control the order of field names for YACHTS:

```
DTR> REPORT YACHTS WITH BUILDER = "GRAMPIAN"RET
RW>  PRINT MODEL, PRICE, MANUFACTURER, LOARET
RW>  SET REPORT_NAME = "REPORT SHOWING PRINT ORDER"RET
RW>  END_REPORTRET

                          REPORT SHOWING PRINT ORDER                  13-Sep-82
                                                                       Page 1

                                                                      LENGTH
                                                                       OVER
        MODEL                  PRICE          MANUFACTURER           ALL

        2-34                $29,675           GRAMPIAN               34
        26                  $11,495           GRAMPIAN               26
        28                  $14,475           GRAMPIAN               28
        30                  $17,775           GRAMPIAN               30
        34                  $29,675           GRAMPIAN               33

DTR>
```

2.5.2.2 Column Position of Print Items — The Report Writer automatically sets up the column spacing based on field, header, and page widths. If you want to change the default spacing, you can specify the print position of any or all of the print items.

If you do not leave enough room for the column headers and data items, the Report Writer in some cases "wraps" the detail line. That is, it prints some items on a second line, including column headers. However, if a column header from the first line is so long that it wraps into the next header's space in the second line, the Report Writer suppresses the next header altogether. If you let the Report Writer wrap the headers, make certain that all your headers appear in the final copy.

If you choose to specify print positions, you can:

- Specify the column number where the Report Writer begins to print each item
- Require spacing between columns by including a SPACE [n] element in the PRINT statement

Here is an example of the first option:

Example: Display the same fields from YACHTS, but begin each field at 20 space intervals:

```
DTR> SET NO PROMPTRET
DTR> REPORT FIRST 2 YACHTSRET
RW>  SET REPORT_NAME = "REPORT SHOWING PRINT POSITIONS"RET
RW>  PRINT COL 1, MODEL, COL 21, PRICE,RET
RW>  COL 41, BUILDER, COL 61, LOARET
RW>  END_REPORTRET
```

```
                        REPORT SHOWING PRINT POSITIONS                  17-Jan-83
                                                                        Page 1

                                                                 LENGTH
                                                                  OVER
  MODEL                  PRICE                MANUFACTURER       ALL

37 MK II               $36,951                 ALBERG           37
79                     $17,900                 ALBIN            26

DTR>
```

Here is an example of spacing with the SPACE [n] element:

Example: Display the same fields, allowing five spaces between columns:

```
DTR> SET NO PROMPT(RET)
DTR> REPORT FIRST 2 YACHTS(RET)
RW>  SET REPORT_NAME = "REPORT USING THE SPACE ELEMENT"(RET)
RW>  PRINT MODEL, SPACE 5, PRICE, SPACE 5,(RET)
RW>  BUILDER, SPACE 5, LOA(RET)
RW>  END_REPORT(RET)

                        REPORT USING THE SPACE ELEMENT                  4-Oct-83
                                                                        Page 1

                                                                 LENGTH
                                                                  OVER
    MODEL                PRICE              MANUFACTURER       ALL

  37 MK II             $36,951               ALBERG           37
  79                   $17,900               ALBIN            26

DTR>
```

2.5.2.3 Edit String Format of Print Items — If you declare an edit string for a field in the record definition, the Report Writer uses that edit string to format the print item. If you are setting up print items derived from field values, the Report Writer supplies an edit string. You can replace either edit string for a print item by specifying an edit string in the PRINT statement.

The full range of edit strings for record definitions is available to you in Report Writer PRINT statements. With a USING clause, you can require that the Report Writer display the value of an alphabetic, numeric, or date field. The USING clause can contain commas, hyphens, percent signs, dollar signs, or decimal points.

Example: You want a numeric field to represent money. All values for the field are less than $10,000. You could choose the following edit string:

```
RW>  PRINT PRICE/DISP USING $$,$$$.99(RET)
```

Some values formatted with this edit string are:

- $9,016.97
- $995.38
- $.99

If a field contains a large amount of text, specify a T edit string. The format of a T edit string is T(n), where n is the column width. The T edit string instructs the Report Writer to print the text over several lines, with a maximum of n characters per line.

The Report Writer does not divide any words across lines.

If you put the T format value expression at the end of a line, the other print items all appear on the same line as the first line of text.

For full information on the edit strings available within DATATRIEVE, consult the *DATATRIEVE–11 Reference Manual.*

2.5.3 Column Headers for Print Items

DATATRIEVE displays column headers at the top of the report and at the top of each page. The Report Writer uses the field name or the query header from the record definition as the default.

2.5.3.1 Option 1: Suppressing a Column Header — If you do not want a column header for an individual field, follow the print list item with a hyphen in parentheses: (-). For example:

```
DTR> REPORT FIRST 1 YACHTS(RET)
RW>  SET COLUMNS_PAGE = 60(RET)
RW>  PRINT MANUFACTURER, MODEL (-), LOA, RIG, PRICE (-)(RET)
RW>  END_REPORT(RET)


                                                        9-Apr-83
                                                        Page 1


                                    LENGTH
                                     OVER
   MANUFACTURER                      ALL       RIG

   ALBERG          37 MK II          37        KETCH     $36,951

DTR>
```

2.5.3.2 Option 2: Specifying a Column Header — You can choose the column header by following a print list item with the column header enclosed in parentheses and quotation marks. For example, you could change the name of the first column header in the last example from "MANUFACTURER" to "VENDOR" by using this PRINT statement:

```
DTR> REPORT FIRST 1 YACHTS↵
RW>  PRINT MANUFACTURER ("VENDOR"), MODEL (-), LOA, RIG, PRICE (-)↵
RW>  END_REPORT↵
```

The report specification with this revised print statement produces the following report:

```
                                                    5-MAY-83
                                                    Page 1


                                    LENGTH
                                     OVER
    VENDOR                           ALL          RIG

  ALBERG          37 MK II           37         KETCH      $36,951

DTR>
```

To include a column header of two or more lines, use the slash (/) between quoted strings. For example:

```
DTR> REPORT FIRST 1 YACHTS↵
RW>  PRINT MANUFACTURER ("BOAT"/"BUILDER"), MODEL (-), LOA↵
RW>  END_REPORT↵
```

The report specification with this revised print statement produces:

```
                                                        17-Jan-83
                                                        Page 1


                                                    LENGTH
          BOAT                                       OVER
        BUILDER                                      ALL

        ALBERG                  37 MK II             37

DTR>
```

For fields with one or two character values, you can compress the headers. The following PRINT statement specifies a three-line header for the LOA field:

```
RW>  PRINT MANUFACTURER, LOA ("L"/"O"/"A"), RIG, PRICE↵
```

Here is a sample report using this print statement:

```
DTR> REPORT FIRST 1 YACHTS↵
RW>  SET COLUMNS_PAGE = 60↵
RW>  PRINT MANUFACTURER, LOA ("L"/"O"/"A"), RIG, PRICE↵
RW>  END_REPORT↵

                                                    17-Jan-83
                                                    Page 1

                          L
                          O
      MANUFACTURER        A          RIG           PRICE

       ALBERG             37         KETCH         $36,951

DTR>
```

2.6 Summarizing Data

You can instruct the Report Writer to calculate summary statistics for the report. Use the AT BOTTOM OF PAGE or the AT BOTTOM OF REPORT statements. (An AT BOTTOM OF field-name statement can generate summaries on groups within the report. See the next chapter for a discussion of dividing data records into groups.)

As a general rule, it is best not to use the AT TOP OF REPORT or AT TOP OF PAGE statements for summarizing data. Use these statements for printing special headings in the report.

2.6.1 COUNT, AVERAGE, and TOTAL

With the statistical operators COUNT, AVERAGE, and TOTAL you can display the number of records in the report, the average value of the value expressions in the record stream, and the total value of those expressions. You use these statistical operators within PRINT or AT TOP or AT BOTTOM statements.

Example: Bock's Yachts has a PERSONNEL domain that stores data about the members of its sales force. Report the ID, last name, department, and salary for each salesperson. At the bottom of the report, show the number of salespersons (COUNT), the total salary (TOTAL SALARY), and the average salary (AVERAGE SALARY).

Use a command file (.CMD) to create the report. The file AV.CMD and the report it generates follow:

```
DTR> @AV.CMD ↵
READY PERSONNEL
REPORT PERSONNEL
SET COLUMNS_PAGE = 60
SET REPORT_NAME = "BOCK'S YACHTS"/"SALARY REPORT"
PRINT ID, LAST_NAME, DEPT, SALARY
AT BOTTOM OF REPORT PRINT SKIP 2,
        COL 10, "WORK FORCE:", SPACE, COUNT (-) USING Z9,
        COL 37, "TOTAL:", TOTAL SALARY USING $$$$,$$$.99,
        COL 37, "AVERAGE:", AVERAGE SALARY USING $$$,$$$.99
END_REPORT
```

```
                    BOCK'S YACHTS                    28-Feb-83
                    SALARY REPORT                    Page 1


                      LAST
 ID                   NAME              DEPT          SALARY

00012              SPIVA                TOP           $75,892
00891              HOWL                 F11           $59,594
02943              TERRY                D98           $29,908
12643              TASHKENT             C82           $32,918
32432              SCHWEIK              F11           $26,723
34456              MORRISON             T32           $30,000
38462              SWAY                 T32           $54,000
38465              FREIBURG             E46           $23,908
39485              TERRICK              D98           $55,829
48475              CASSIDY              E46           $55,407
48573              KELLER               T32           $31,546
49001              ROBERTS              C82           $41,395
49843              HAMMER               D98           $26,392
78923              HARRISON             F11           $40,747
83764              MEADER               T32           $41,029
84375              NALEVO               D98           $56,847
87289              DEPALMA              G20           $57,598
87465              IACOBONE             C82           $58,462
87701              CHONTZ               F11           $24,502
88001              LITELLA              G20           $34,933
90342              DONCHIKOV            C82           $35,952
91023              WITTGEN              G20           $25,023
99029              PODERESIAN           C82           $33,738


   WORK FORCE: 23                    TOTAL:   $952,343.00
                                     AVERAGE: $41,406.21
```

2.6.2 Maximum Value and Minimum Value

To show the maximum and minimum values of specific fields, use the operators MAX and MIN on the field names. These operators cause the Report Writer to display the maximum or minimum value of all value expressions in the record stream or current collection.

Example: Expand the salary report to indicate the maximum salary and the minimum salary.

Use a command file (.CMD) to contain the statements to create the report.

Here is the file SALSTA.CMD, followed by the report that it generates:

```
DTR> @SALSTA RET
READY PERSONNEL
REPORT PERSONNEL
SET REPORT_NAME = "BOCK'S YACHTS"/"DETAILED SALES REPORT"
SET COLUMNS_PAGE = 60
PRINT ID, LAST_NAME, DEPT, SALARY
AT BOTTOM OF REPORT PRINT SKIP 2,
        COL 10, "WORK FORCE:", SPACE, COUNT (-) USING Z9,
        COL 37, "TOTAL:", TOTAL SALARY USING $$,,$$$,$$$.99,
        COL 37, "AVERAGE:", AVERAGE SALARY USING $$$,$$$.99,
        COL 37, "MAXIMUM:", MAX SALARY USING $$$,$$$.99,
        COL 37, "MINIMUM:", MIN SALARY USING $$$,$$$.99
END_REPORT
```

```
                    BOCK'S YACHTS                    8-Mar-83
                  DETAILED SALES REPORT              Page 1

                  LAST
ID                NAME              DEPT            SALARY

00012         SPIVA                 TOP             $75,892
00891         HOWL                  F11             $59,594
02943         TERRY                 D98             $29,908
12643         TASHKENT              C82             $32,918
32432         SCHWEIK               F11             $26,723
34456         MORRISON              T32             $30,000
38462         SWAY                  T32             $54,000
38465         FREIBURG              E46             $23,908
39485         TERRICK               D98             $55,829
48475         CASSIDY               E46             $55,407
48573         KELLER                T32             $31,546
49001         ROBERTS               C82             $41,395
49843         HAMMER                D98             $26,392
78923         HARRISON              F11             $40,747
83764         MEADER                T32             $41,029
84375         NALEVO                D98             $56,847
87289         DEPALMA               G20             $57,598
87465         IACOBONE              C82             $58,462
87701         CHONTZ                F11             $24,502
88001         LITELLA               G20             $34,933
90342         DONCHIKOV             C82             $35,952
91023         WITTGEN               G20             $25,023
99029         PODERESIAN            C82             $33,738


     WORK FORCE: 23                      TOTAL:    $952,343.00
                                         AVERAGE:   $41,406.21
                                         MAXIMUM:   $75,892.00
                                         MINIMUM:   $23,908.00
```

One other way to produce the report is to define a procedure within DATATRIEVE. Invoke the procedure at DATATRIEVE command level (indicated by the DTR> prompt) by typing a colon and the procedure name.

The last two examples use AT BOTTOM statements to produce overall page and report summaries. You can also use AT BOTTOM statements to divide your data records into groups. You can then compile statistics about groups of records, as well as about all the records.

2.7 Selecting the Output Device or File

With the REPORT statement you can select the device or file that is to receive the report. If you use the prompt option, you can choose the output device immediately before you produce the report.

2.7.1 Default: Output to Terminal

If you begin your report specification with a statement of the form "REPORT [rse]", the Report Writer displays the report on your terminal. Such a statement is equivalent to an explicit declaration of the form "REPORT [rse] ON TI:" except that the Report Writer does not start a new page after the report as it does when you use the ON clause.

2.7.2 Option 1: Output to a Line Printer

To get a copy of your report from a line printer, type the device name of the line printer at the end of the REPORT statement:

```
DTR> REPORT ON LP:RET
```

If the REPORT command contains an RSE, put the output specification after the RSE:

```
DTR> REPORT YACHTS WITH BUILDER = PEARSON ON LP:RET
```

2.7.3 Option 2: Output to a File

If you want to store your report in a file, end the REPORT statement with ON followed by a file specification. This example creates a file called REPORT.TXT in your default directory:

```
DTR> REPORT BIG_ONES ON REPORT.TXTRET
```

If you send your report to a file, you can use your operating system's commands to print a hard copy at your convenience.

For RSTS/E systems, if you specify an output file that already exists, the system sends you an error message and does not create the file.

2.7.4 Option 3: Prompt

If you want to choose the output medium at the time you process the report, use the prompt option. Then DATATRIEVE prompts you for the output medium when it processes the report:

```
DTR> READY PERSONNELRET
DTR> REPORT FIRST 4 PERSONNEL ON *,"OUTPUT DEVICE OR FILE"RET
RW>  SET REPORT_NAME = *,"THE NAME FOR THE REPORT"RET
RW>  PRINT ID, NAME, SALARYRET
RW>  END_REPORTRET
Enter THE NAME FOR THE REPORT: "TOP ACHIEVERS"RET
Enter OUTPUT DEVICE OR FILE: TIRET
```

```
                          TOP ACHIEVERS                          22-Apr-83
                                                                 Page 1

                  FIRST                LAST
 ID                NAME                NAME                SALARY

00012             CHARLOTTE           SPIVA               $75,892
00891             FRED                HOWL                $59,594
02943             CASS                TERRY               $29,908
12643             JEFF                TASHKENT            $32,918
```

In this case, the Report Writer displays the report on the terminal. You can specify only one output device in a REPORT command.

When you specify your output medium with an ON clause, the Report Writer advances to a new page after the report. If you do not use an ON statement, it does not advance to a new page after the report.

Mastering Report Writing Techniques 3

The Report Writer allows you to use a number of special techniques, such as these:

- Reporting on Groups of Records

  To report on groups of records, define your data file so your records are sorted automatically. Use an indexed file.

  If you want to sort the records differently for different reports, use the SORTED BY clause to tell the Report Writer how to sort the records.

- Reporting a Summary Only

  To produce a report made up of summary lines only, use the AT BOTTOM OF field-name statement.

- Printing a Title Page

  To print a complete title page before the body of the report, use the AT TOP OF REPORT statement.

- Printing Special Headings

  To produce special headings for successive pages of a report, use the AT TOP OF PAGE statement.

- Finding Totals within a Detail Line (Cross Tabulation)

  To add fields within a detail line, specify an additional print item that computes the total you want.

- Reporting List Fields

  To report list fields, form a collection with the FIND statement, and use an inner print list as an item in the PRINT statement.

This chapter describes these techniques and illustrates them with sample reports.

3.1 Dividing Data Records into Groups

You may often need to report on the groups of records within a body of data as well as on all the data. For example, you could report on employees sorted by department, with summary totals for each department as well as for all employees.

Groups of sorted records are **control groups**. A control group is a series of sorted data records that have the same value in one or more fields. The common field or fields "control" the forming of the group.

3.1.1 Defining Key Fields to Optimize Speed of Processing

Instead of requiring the Report Writer to sort the records (with the SORTED BY phrase), you can define your data file so the field you sort by most frequently is the primary key field. To define a data file for PERSONNEL with ID as the primary key, use this command:

```
DTR> DEFINE FILE FOR PERSONNEL, KEY = ID(RET)
```

Defining such primary key fields is an effective optimization technique. The examples in the next section show how to use the SORTED BY phrase for cases where you have not defined a key field or want to sort by a field other than the key field.

3.1.2 Developing Control Groups with a Sort Key

When you sort a group of records, you choose at least one field as the basis for the sort. That field is called the **sort key**. Sometimes every record in a record stream has a unique value for the sort key. For example, every employee's badge number is unique. When you sort employee records by the badge number, you create no control groups with two or more records because no two records have the same value in that field.

In other cases, the number of unique values for a sort key may be small compared to the number of sorted records. For example, a company of 500 employees may have only 10 departments. That is, there are only 10 unique values for DEPT in the collection of 500 employee records. When you sort the employee records by the department code (DEPT), you create 10 control groups. DEPT would be a meaningful sort key for the grouping "employee records."

The following report statement establishes DEPT as the sort key for the records in the domain PERSONNEL:

```
DTR> REPORT PERSONNEL SORTED BY DEPT(RET)
RW>
```

When you have completed the report specification, DATATRIEVE sorts the records according to the department code and processes the report:

```
DTR> REPORT PERSONNEL SORTED BY DEPT↵
RW>  SET COLUMNS_PAGE = 70↵
RW>  PRINT PERSON↵
RW>  END_REPORT↵
```

```
                                                    2-Mar-83
                                                    Page 1

                      FIRST        LAST                START                SUP
 ID      STATUS        NAME        NAME      DEPT      DATE      SALARY     ID

12643 TRAINEE      JEFF         TASHKENT    C82  4-Apr-81     $32,918 87465
49001 EXPERIENCED  DAN          ROBERTS     C82  7-Jul-79     $41,395 87465
87465 EXPERIENCED  ANTHONY      IACOBONE    C82  2-Jan-73     $58,462 00012
90342 EXPERIENCED  BRUNO        DONCHIKOV   C82  9-Aug-78     $35,952 87465
99029 EXPERIENCED  RANDY        PODERESIAN  C82  24-May-79    $33,738 87465
02943 EXPERIENCED  CASS         TERRY       D98  2-Jan-80     $29,908 39485
39485 EXPERIENCED  DEE          TERRICK     D98  2-May-77     $55,829 00012
49843 TRAINEE      BART         HAMMER      D98  4-Aug-81     $26,392 39485
84375 EXPERIENCED  MARY         NALEVO      D98  3-Jan-76     $56,847 39485
38465 EXPERIENCED  JOANNE       FREIBURG    E46  20-Feb-80    $23,908 48475
48475 EXPERIENCED  GAIL         CASSIDY     E46  2-May-78     $55,407 00012
00891 EXPERIENCED  FRED         HOWL        F11  9-Apr-76     $59,594 00012
32432 TRAINEE      THOMAS       SCHWEIK     F11  7-Nov-81     $26,723 00891
78923 EXPERIENCED  LYDIA        HARRISON    F11  19-Jun-79    $40,747 00891
87701 TRAINEE      NATHANIEL    CHONTZ      F11  28-Jan-82    $24,502 00891
87289 EXPERIENCED  LOUISE       DEPALMA     G20  28-Feb-79    $57,598 00012
88001 EXPERIENCED  DAVID        LITELLA     G20  11-Nov-80    $34,933 87289
91023 TRAINEE      STAN         WITTGEN     G20  23-Dec-81    $25,023 87289
34456 TRAINEE      HANK         MORRISON    T32  1-Mar-82     $30,000 87289
38462 EXPERIENCED  BILL         SWAY        T32  5-May-80     $54,000 00012
48573 TRAINEE      SY           KELLER      T32  2-Aug-81     $31,546 87289
83764 EXPERIENCED  JIM          MEADER      T32  4-Apr-80     $41,029 87289
00012 EXPERIENCED  CHARLOTTE    SPIVA       TOP  12-Sep-72    $75,892 00012

DTR>
```

Once you have sorted the records, you can use an AT TOP OF field-name or an AT BOTTOM OF field-name statement to emphasize the relationships among the sorted records. In the next example, an AT BOTTOM OF DEPT statement groups records according to department. Within the AT BOTTOM statement, you can use one or more statistical operators to summarize data about the employees in each control group.

Example: Bock's Yachts keeps salary records for employees in various departments using the PERSONNEL domain. Report on all employees for selected departments within the company. Display the total salary for each department.

Follow these steps:

1. Sort the records according to the sort key DEPT to produce a group of employees for each department.
2. Use an AT TOP OF DEPT statement to print the value for DEPT at the beginning of each DEPT control group.

3. Specify the values to be printed in each detail line. Use the concatenation expression (|| " " |) to put exactly one space between the values for the first and last names. The double vertical line (||) suppresses the trailing spaces after the entry for FIRST_NAME. The space in quotation marks puts one space after FIRST_NAME. The single vertical line (|) causes LAST_NAME to print immediately after the one space. Specify a header ("NAME").
4. Summarize salary information for each department with an AT BOTTOM OF DEPT statement. TOTAL SALARY gives the total salary for a department.

The following command file, SALRP1.CMD, incorporates these basic steps.

```
DTR> @SALRP1(RET)
READY PERSONNEL
REPORT PERSONNEL WITH DEPT = "D98", "E46", "T32" SORTED BY DEPT ----(1)
SET REPORT_NAME = "SALARY REPORT"
SET COLUMNS_PAGE = 60
AT TOP OF DEPT PRINT DEPT ----------------------------------------(2)
PRINT ID, FIRST_NAME!!" "!LAST_NAME ("NAME"), SALARY ----------(3)
AT BOTTOM OF DEPT PRINT SKIP,
        COL 34, DEPT!!" "!"TOTAL:",
        TOTAL SALARY USING $$$$,$$$ ----------------------------------(4)
END_REPORT


                        SALARY REPORT                   9-Mar-83
                                                        Page 1


    DEPT       ID                NAME                 SALARY

    D98
               02943      CASS TERRY                    $29,908
               39485      DEE TERRICK                   $55,829
               49843      BART HAMMER                   $26,392
               84375      MARY NALEVO                   $56,847

                                    D98 TOTAL:          $168,976
    E46
               38465      JOANNE FREIBURG               $23,908
               48475      GAIL CASSIDY                  $55,407

                                    E46 TOTAL:          $79,315
    T32
               34456      HANK MORRISON                 $30,000
               38462      BILL SWAY                     $54,000
               48573      SY KELLER                     $31,546
               83764      JIM MEADER                    $41,029

                                    T32 TOTAL:          $156,575

DTR>
```

3.1.3 Developing Levels of Control Groups Using Multiple Sort Keys

The last example used one sort key to establish control groups, with each member of the group having the same value for the key field. There may also be times when you wish to identify groups within these control groups. One control group can contain other control groups.

For example, you could sort a personnel file by department and type of employee.

Example: Two categories of employees work at Bock's Yachts, experienced workers and trainees. The STATUS field takes one of two values: "Experienced" or "Trainee ". Report salaries for each department, and for each type of employee within a given department.

Follow these steps:

1. Sort the records according to two sort keys, DEPT and STATUS.
2. Use AT TOP OF DEPT and AT TOP OF STATUS statements to set up special headings for the control groups.
3. Print the field values of the detail line. Use a concatenation expression (FIRST_NAME || " " | LAST_NAME) to allow exactly one space between FIRST_NAME and LAST_NAME. Specify a header for the full name ("NAME").
4. Use AT BOTTOM OF DEPT and AT BOTTOM OF STATUS statements to print summary lines for each control group.
5. Summarize the entire report with an AT BOTTOM OF REPORT statement.

The report specification follows these basic steps to produce a double-control-break report, that is, a report with two sort keys. It forms a new sort order each time there is a change for "DEPT" (the first control break), and for "STATUS" (the second). For brevity, this report shows only employees in departments D98 and T32.

The procedure SALARY_REPORT2 contains the following report specification:

```
DTR> SHOW SALARY_REPORT2(RET)
PROCEDURE SALARY_REPORT2
READY PERSONNEL
REPORT PERSONNEL WITH DEPT = "D98", "T32" SORTED BY DEPT, STATUS ---(1)
SET REPORT_NAME = "DETAILED SALARY REPORT"
SET COLUMNS_PAGE = 70
AT TOP OF DEPT PRINT DEPT ----+
AT TOP OF STATUS PRINT STATUS -+-------------------------------------(2)
PRINT ID, FIRST_NAME!!" "!LAST_NAME ("NAME"), SALARY ----------------(3)
AT BOTTOM OF STATUS PRINT SKIP, COL 38,---+
        STATUS!!" "!"TOTAL:", TOTAL SALARY USING |                    |
        $,$$$,$$$, SKIP                          |                    |---(4)
AT BOTTOM OF DEPT PRINT COL 36,                  |                    |
        "DEPARTMENT "!DEPT!!" TOTAL:",           |                    |
        TOTAL SALARY USING $,$$$,$$$,            |                    |
        COL 30, "----------------------", SKIP---+                    |
AT BOTTOM OF REPORT PRINT COL 15,---+                                  |
        "**************************************",  |                  |---(5)
        SKIP 2, COL 38, "GRAND TOTAL SALARY:",     |                  |
        TOTAL SALARY USING $,$$$,$$$ --------------+------------------+
END_REPORT
END_PROCEDURE
DTR> :SALARY_REPORT2(RET)
```

```
                          DETAILED SALARY REPORT                25-Jan-83
                                                                Page 1

DEPT      STATUS         ID              NAME                   SALARY

D98
          EXPERIENCED
                         02943     CASS TERRY                   $29,908
                         39485     DEE TERRICK                  $55,829
                         84375     MARY NALEVO                  $56,847

                                     EXPERIENCED TOTAL:         $142,584

          TRAINEE
                         49843     BART HAMMER                  $26,392

                                     TRAINEE TOTAL:             $26,392

                                   DEPARTMENT D98 TOTAL:        $168,976
                                 ----------------------

T32
          EXPERIENCED
                         38462     BILL SWAY                    $54,000
                         83764     JIM MEADER                   $41,029

                                     EXPERIENCED TOTAL:         $95,029

          TRAINEE
                         34456     HANK MORRISON                $30,000
                         48573     SY KELLER                    $31,546

                                     TRAINEE TOTAL:             $61,546

                                   DEPARTMENT T32 TOTAL:        $156,575
                                 ----------------------

                    ****************************************

                                   GRAND TOTAL SALARY:          $325,551

DTR>
```

The report looks like this if you change the order of the sort keys, putting STATUS before DEPT in your statement, but with the rest of the specification unchanged:

```
                        DETAILED SALARY REPORT                  17-Jan-83
                                                                Page 1

   STATUS        DEPT      ID              NAME                  SALARY

  EXPERIENCED
                 D98
                         02943     CASS TERRY                   $29,908
                         39485     DEE TERRICK                  $55,829
                         84375     MARY NALEVO                  $56,847
                                   DEPARTMENT D98 TOTAL:       $142,584
                           ----------------------

                 T32
                         38462     BILL SWAY                    $54,000
                         83764     JIM MEADER                   $41,029
                                   DEPARTMENT T32 TOTAL:        $95,029
                           ----------------------

                                     EXPERIENCED TOTAL:        $237,613

  TRAINEE
                 D98
                         49843     BART HAMMER                  $26,392
                                   DEPARTMENT D98 TOTAL:        $26,392
                           ----------------------

                 T32
                         34456     HANK MORRISON                $30,000
                         48573     SY KELLER                    $31,546
                                   DEPARTMENT T32 TOTAL:        $61,546
                           ----------------------

                                     TRAINEE     TOTAL:         $87,938

                ****************************************

                                     GRAND TOTAL SALARY:       $325,551

DTR>
```

The Report Writer sorts first by the sort key that you list first. Within each of the control groups formed by that key, it sorts by a second sort key, and so on. It creates a control break whenever there is a change in field value for the sort key.

If you are reporting on sorted records and do not call for explicit control breaks in the AT TOP or AT BOTTOM statements, the Report Writer does not supply breaks. If you want a field break when a value changes, you must include an explicit AT TOP OF field or AT BOTTOM OF field statement.

When it is printing the values for a given control group, the Report Writer continues printing until it reaches the end of the group, even if it must run over to a second page to do so.

3.1.4 Using Control Breaks on Unsorted Records

You may decide to use AT TOP and AT BOTTOM statements on records you have not sorted with DATATRIEVE. If you are reporting on:

- An indexed file, the Report Writer processes the records according to the ascending order of the primary key value
- A sequential file, the Report Writer processes records in the order they were stored

When you use AT statements with records you have not sorted using DATATRIEVE, the Report Writer produces the report, but it sends the following message:

```
Proceeding to report unsorted records
```

If you are using more than one AT TOP statement or AT BOTTOM statement, you should specify the control breaks in this order:

```
RW>  AT TOP OF field-1
RW>  AT TOP OF field-2
RW>  AT BOTTOM OF field-2
RW>  AT BOTTOM OF field-1
```

3.1.5 Reporting Group Summaries Only

Control groups allow you to separate groups of detail lines and to print group summaries. Sometimes you may want only the summary information for the groups. It is possible to produce a report with summary lines and no detail lines, using the Report Writer or the SUM statement.

You can produce a report consisting of only summary lines for control groups with the AT BOTTOM OF field-name statement.

Example: Report salary information for each department in Bock's Yachts. Include the number of employees in each department, the total salary, and the average salary. Finally, for the entire company, show the total number of employees, total salary, and average salary.

Follow these steps:

1. Specify a sort key for the REPORT statement.
2. Use AT BOTTOM OF DEPT to print each line of the body of the report. Each line summarizes a different department. Do not use the PRINT statement, because you are reporting on group totals, not on the individual members of the group. Use COUNT as a print item for the number of employees.
3. Use AT BOTTOM OF REPORT for the aggregate summaries. COUNT provides the total of all employees, because it represents the total of all records processed.

The report specification that follows is contained in the command file TOTALS.CMD:

```
DTR> @TOTALS↵
READY PERSONNEL
REPORT PERSONNEL SORTED BY DEPT ------------------------------------ (1)
SET COLUMNS_PAGE = *,"the columns per page" ------------------------- (2)
AT BOTTOM OF DEPT PRINT COL 10, DEPT,
        COL 20, COUNT ("NUMBER"/"EMPLOYEES"),
        COL 35, TOTAL SALARY ("TOTAL"/"SALARY") USING $,$$$,$$$,
        COL 50, AVERAGE SALARY ("AVERAGE"/"SALARY") USING $$$,$$$ ---- (2)
AT BOTTOM OF REPORT PRINT SKIP, COL 10, ----------------------------- (3)
        "*********************************************",
        SKIP 2, COL 10, "CORPORATE:", COL 22, COUNT,
        COL 34, TOTAL SALARY USING $$,$$$,$$$,
        COL 48, AVERAGE SALARY USING $,$$$,$$$ ---------------------- (3)
END_REPORT
Enter the columns per page: 60↵
```

```
                                                    9-Mar-83
                                                    Page 1


                    NUMBER          TOTAL           AVERAGE
DEPT            EMPLOYEES           SALARY          SALARY

C82                    5          $202,465        $40,493
D98                    4          $168,976        $42,244
E46                    2           $79,315        $39,657
F11                    4          $151,566        $37,891
G20                    3          $117,554        $39,184
T32                    4          $156,575        $39,143
TOP                    1           $75,892        $75,892

*********************************************

CORPORATE:            23          $952,343        $41,406

DTR>
```

3.2 Printing a Title Page and Other Special Headings

By using AT TOP OF REPORT and AT TOP OF PAGE statements, you can enhance your reports with title pages and headings.

3.2.1 Printing a Title Page

The AT TOP OF REPORT statement allows you to produce a title page before you produce any detail lines. When you use this statement, you suppress the default report heading on the first page of the report. You can then design the first page as a special title page without detail lines. The next page is "Page 1" and includes the report and column headers.

Example: Report the salaries of employees at Bock's Yachts. Produce a title page for the report. Include the company name, the warning "CONFIDENTIAL: FOR OFFICIAL EYES ONLY", and the company motto. Do not print the date or page number until the next page of the report. Separate each item in the print list with a comma. Include NEW_PAGE as the last item of your print list to ensure that the first detail lines do not appear until the next page.

The command file and title page look like this:

```
DTR> @TP(RET)
READY PERSONNEL
REPORT PERSONNEL WITH DEPT = "D98", "E46", "T32"
AT TOP OF REPORT PRINT SKIP 15, COL 20,
    "* * * * * * * * * * * * * * * * * * * * *",SKIP,
    COL 20, "*", COL 56, "*",SKIP,
    COL 20, "*", COL 56, "*",SKIP,
    COL 20, "*", COL 32, "SALARY REPORT", COL 56, "*",
    COL 20, "*", COL 56, "*", SKIP,
    COL 20, "*", COL 30, "FOR BOCK'S YACHTS", COL 56, "*",
    COL 20, "*", COL 56, "*", SKIP,
    COL 20, "*", COL 56, "*", SKIP, COL 20,
    "* * * * * * * * * * * * * * * * * * * *", SKIP 5,
    COL 32, "CONFIDENTIAL:", SKIP,
    COL 32, "FOR OFFICIAL", SKIP,
    COL 33, "EYES ONLY", SKIP 5,
    COL 20, "---------------------------------------",SKIP 3,
    COL 22, "OUR MOTTO:  A YACHT FOR EVERY WORKER", SKIP 3,
    COL 20, "---------------------------------------", NEW_PAGE
SET COLUMNS_PAGE = 70
PRINT ID, STATUS, FIRST_NAME!!" "!LAST_NAME ("NAME"),
      DEPT, SALARY
END_REPORT
```

Here is the title page. The body of the report is on the next page:

```
* * * * * * * * * * * * * * * * * * *
*                                     *
*                                     *
*            SALARY REPORT            *
*                                     *
*          FOR BOCK'S YACHTS          *
*                                     *
*                                     *
* * * * * * * * * * * * * * * * * * *

                CONFIDENTIAL:
                FOR OFFICIAL
                 EYES ONLY

---------------------------------------

  OUR MOTTO:  A YACHT FOR EVERY WORKER

---------------------------------------
```

```
                                                        18-Jan-83
                                                        Page 2

   ID        STATUS              NAME              DEPT    SALARY


02943    EXPERIENCED    CASS TERRY              D98     $29,908
34456    TRAINEE        HANK MORRISON           T32     $30,000
38462    EXPERIENCED    BILL SWAY               T32     $54,000
38465    EXPERIENCED    JOANNE FREIBURG         E46     $23,908
39485    EXPERIENCED    DEE TERRICK             D98     $55,829
48475    EXPERIENCED    GAIL CASSIDY            E46     $55,407
48573    TRAINEE        SY KELLER               T32     $31,546
49843    TRAINEE        BART HAMMER             D98     $26,392
83764    EXPERIENCED    JIM MEADER              T32     $41,029
84375    EXPERIENCED    MARY NALEVO             D98     $56,847

DTR>
```

3.2.2 Printing Special Page Headings

With the AT TOP OF PAGE statement you can print special headings for your report. When you use the AT TOP OF PAGE statement, you suppress the default report and column headings on every page. If you want either of these headings on the page, you must include REPORT_HEADER or COLUMN_HEADER as part of the print list for the AT TOP OF PAGE statement.

Example: Produce the salary report for Bock's yachts without a title page, but with the report heading: "SALARY REPORT FOR BOCK'S YACHTS", surrounded by asterisks. Include the date and page number, as well as the appropriate column headings:

```
DTR> @PGHEAD(RET)
READY PERSONNEL
REPORT PERSONNEL WITH DEPT = "D98", "E46", "T32"
SET COLUMNS_PAGE = 70
AT TOP OF PAGE PRINT REPORT_HEADER, SKIP 2,
    COL 20, "* * * * * * * * * * * * * * * * * * * * *",SKIP,
    COL 20, "*", COL 56, "*", SKIP,
    COL 20, "*", COL 56, "*", SKIP,
    COL 20, "*", COL 32, "SALARY REPORT", COL 56, "*",
    COL 20, "*", COL 56, "*", SKIP,
    COL 20, "*", COL 30, "FOR BOCK'S YACHTS",COL 56, "*",
    COL 20, "*", COL 56, "*", SKIP,
    COL 20, "*", COL 56, "*", SKIP, COL 20,
    "* * * * * * * * * * * * * * * * * * * *",
    SKIP 3, COLUMN_HEADER
PRINT ID, STATUS, FIRST_NAME!!" "!LAST_NAME ("NAME"),
    DEPT, SALARY
END_REPORT
```

```
                                                    29-Jul-83
                                                    Page 1

        * * * * * * * * * * * * * * * * * * * * *
        *                                       *
        *                                       *
        *              SALARY REPORT            *
        *                                       *
        *            FOR BOCK'S YACHTS          *
        *                                       *
        *                                       *
        * * * * * * * * * * * * * * * * * * * * *

  ID          STATUS              NAME                DEPT     SALARY

 02943     EXPERIENCED     CASS TERRY              D98      $29,908
 34456     TRAINEE         HANK MORRISON           T32      $30,000
 38462     EXPERIENCED     BILL SWAY               T32      $54,000
 38465     EXPERIENCED     JOANNE FREIBURG         E46      $23,908
 39485     EXPERIENCED     DEE TERRICK             D98      $55,829
 48475     EXPERIENCED     GAIL CASSIDY            E46      $55,407
 48573     TRAINEE         SY KELLER               T32      $31,546
 49843     TRAINEE         BART HAMMER             D98      $26,392
 83764     EXPERIENCED     JIM MEADER              T32      $41,029
 84375     EXPERIENCED     MARY NALEVO             D98      $56,847

DTR>
```

Note that the REPORT_HEADER print item produces both the date and page number. Then, after skipping three lines, the Report Writer prints the special heading as specified in the AT TOP OF PAGE statement. If the report had several pages, each successive page would have the special heading.

Using REPORT_HEADER along with the AT TOP OF PAGE statement, you could design a special billing form with the company heading, with labels for charges and charge descriptions. If the data for each bill was in a single record, you could include NEW_PAGE as the last print item in the PRINT statement. Then each page would contain one customer's bill.

You could also apply this technique to duplicate an existing standard form. Specify the appropriate character strings, column numbers, and field values as print list items. Finally, include NEW_PAGE as the last print list item.

3.3 Performing Cross Tabulations

Reports sometimes require totals of the fields within a detail line. For example, for the domain YACHTS, the field DISPLACEMENT is related to the field PRICE. You might want to design a report to print a detail line for each boat showing builder, model, and price. Perhaps a buyer wants to know the individual

prices for a number of boats, the combined price for all the boats, and the price for the boats after the next increase. To compute the scheduled new price, you need to apply a price increase formula to each detail line.

Specify an additional print item for the detail line by indicating the formula for the scheduled price increase. The Report Writer then produces a column of totals for each row.

The following example uses the domain YACHTS.

Example: Bock's Yachts maintains pricing records for its semiannual increases. Report on each boat's price, indicating the scheduled new price. Then, for the first fifteen boats, calculate the total price and the total new price. Use the equation (DISP/10) + PRICE to find the new price. Compute the totals of the field values with an AT BOTTOM OF REPORT statement.

Enter the steps for the report in a command file called PR.CMD. When you execute the command file, you get this report:

```
DTR> @PR(RET)
READY YACHTS
FIND FIRST 15 YACHTS WITH PRICE NE 0
[15 records found]
REPORT CURRENT
SET REPORT_NAME = "BOCK'S FAMOUS YACHTS"/
        "SEMIANNUAL PRICE CATALOGUE"
SET COLUMNS_PAGE = 70
PRINT BUILDER, MODEL, PRICE, COL 57,
(DISP/10) + PRICE ("NEW PRICE") USING $$$,$$$
AT BOTTOM OF REPORT PRINT SKIP 2, COL 1, "TOTAL:",
        TOTAL PRICE USING $$$,$$$,$$$, COL 54,
        TOTAL ((DISP/10) + PRICE) USING $$$,$$$,$$$
END_REPORT
```

```
                        BOCK'S FAMOUS YACHTS                    18-Jan-8
                    SEMIANNUAL PRICE CATALOGUE                  Page 1


      MANUFACTURER          MODEL                PRICE       NEW PRICE

       ALBERG               37 MK II           $36,951       $38,951
       ALBIN                79                 $17,900       $18,320
       ALBIN                BALLAD             $27,500       $28,227
       ALBIN                VEGA               $18,600       $19,107
       AMERICAN             26                  $9,895       $10,295
       AMERICAN             26-MS              $18,895       $19,445
       BAYFIELD             30/32              $32,875       $33,825
       BOMBAY               CLIPPER            $23,950       $24,890
       CAPE DORY            25                  $8,995        $9,395
       CAPE DORY            28                 $21,990       $22,890
       CAPE DORY            TYPHOON             $4,295        $4,485
       CARIBBEAN            35                 $37,850       $39,650
       CHALLENGER           32                 $31,835       $33,115
       CHALLENGER           35                 $39,215       $40,695
       CHALLENGER           41                 $51,228       $53,898


TOTAL:                                         $381,974      $397,188

DTR>
```

An alternate solution is to edit the record definition and add a new COMPUTED BY field, NEW_PRICE. Then include NEW_PRICE as one of the print items in the PRINT statement. The following is a sample field definition:

```
10 NEW_PRICE COMPUTED BY
   (DISP/10) + PRICE
               EDIT_STRING IS $$$,$$$.
```

Using a COMPUTED BY field saves typing if you need the value for the new price in several different reports. Then if the formula changes, you have to change it only in the record definition.

3.4 Reporting Hierarchical Records

A hierarchical record is a record that contains a list. The list field uses an OCCURS clause to specify the number of items in the list. Each list item is subordinate to the list field, on a lower logical level than the other fields of the record.

Figure 3–1 illustrates the structure of the hierarchical record FAMILY_REC.

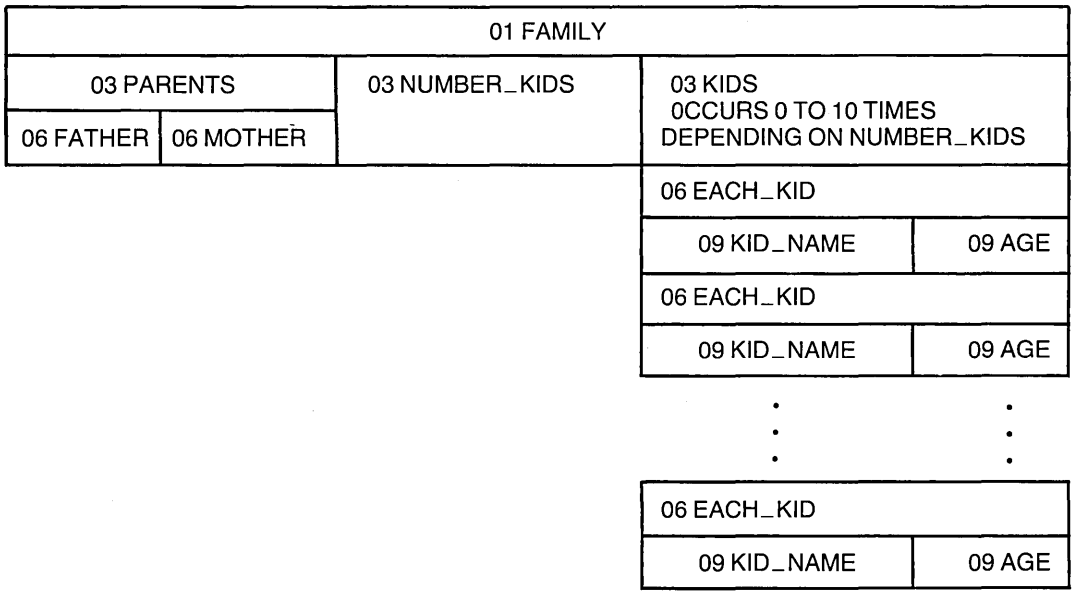


Figure 3–1: Field Structure of FAMILY_REC

The OCCURS clause of a hierarchical record designates either a fixed-length or a variable-length list. For variable-length lists, the list field's definition includes an OCCURS DEPENDING clause stating that the number of items in the list depends on the value of another field. For example, the length of the KIDS list in FAMILY_REC depends on the value stored in EACH_KID.

Here is the record definition for FAMILY_REC:

```
RECORD FAMILY_REC
 USING
01 FAMILY.
        03 PARENTS.
                06 FATHER PIC X(10).
                06 MOTHER PIC X(10).
        03 NUMBER_KIDS PIC 99 EDIT_STRING IS Z9.
        03 KIDS OCCURS 0 TO 10 TIMES DEPENDING ON NUMBER_KIDS.
                06 EACH_KID.
                        09 KID_NAME PIC X(10) QUERY_NAME IS KID.
                        09 AGE PIC 99 EDIT_STRING IS Z9.
;
```

If you have a domain with hierarchical records, you may want access to individual items from the list to compare their values or to find associated values on a table.

To provide DATATRIEVE with the proper context for each list item, you can use nested FOR statements outside of the Report Writer.

To print the names of the children from FAMILIES, for instance, you cannot simply say PRINT KID_NAME. You must provide a context. In the following example the first FOR statement, FOR FIRST 3 FAMILIES, instructs DATATRIEVE to process the first 3 records from FAMILIES one record at a time. The second FOR statement, FOR KIDS, tells it to process the KIDS list for each family record.

```
DTR> READY FAMILIES
DTR> SET NO PROMPT
DTR> FOR FIRST 3 FAMILIES
CON> FOR KIDS
CON> PRINT KID_NAME

   KID
   NAME

URSULA
RALPH
ANNE
JIM
ELLEN
DAVID
ROBERT
ANN
JEAN

DTR>
```

For more information on context in DATATRIEVE, see the *DATATRIEVE–11 User's Guide.*

To list items from within the Report Writer, first form a collection of the records you will use. In the PRINT statement, precede items from the list with ALL and follow them with OF and an RSE specifying the source of the items:

```
DTR> READY FAMILIES↵
DTR> FIND FAMILIES↵
[14 records found]
DTR> REPORT↵
RW>  PRINT MOTHER, FATHER, ALL KID_NAME OF KIDS↵
RW>  SET REPORT_NAME = "ANNUAL PICNIC ROSTER"↵
RW>  END_REPORT↵
```

```
                              ANNUAL PICNIC ROSTER                    9-Mar-83
                                                                      Page 1


                                                          KID
        MOTHER                      FATHER                NAME

        ANN                         JIM                   URSULA
                                                          RALPH
        LOUISE                      JIM                   ANNE
                                                          JIM
                                                          ELLEN
                                                          DAVID
                                                          ROBERT
        JULIE                       JOHN                  ANN
                                                          JEAN
        ELLEN                       JOHN                  CHRISTOPHR
        ANNE                        ARNIE                 SCOTT
                                                          BRIAN
        SARAH                       SHEARMAN              DAVID
        ANNE                        TOM                   PATRICK
                                                          SUZIE
        MERIDETH                    BASIL                 BEAU
                                                          BROOKS
                                                          ROBIN
                                                          JAY
                                                          WREN
                                                          JILL
        DIDI                        ROB
        RUTH                        JEROME                ERIC
                                                          CISSY
                                                          NANCY
                                                          MICHAEL
        BETTY                       TOM                   MARTHA
                                                          TOM
        LOIS                        GEORGE                JEFF
                                                          FRED
                                                          LAURA
        SARAH                       HAROLD                CHARLIE
                                                          HAROLD
                                                          SARAH
        TRINITA                     EDWIN                 ERIC
                                                          SCOTT


DTR>
```

If you were planning the games for the picnic, you might want a report of just the kids between five and twenty years old. You could specify the report like this:

```
DTR> READY FAMILIES↵
DTR> FIND FAMILIES WITH ANY KIDS WITH AGE BT 5 AND 20↵
[6 records found]
DTR> REPORT CURRENT↵
RW>  PRINT ALL KID_NAME, AGE OF KIDS WITH AGE BT 5 AND 20↵
RW>  SET REPORT_NAME = "SACK RACE CANDIDATES"↵
RW>  END_REPORT↵

                              SACK RACE CANDIDATES                    5-May-83
                                                                      Page 1


                                 KID
                                 NAME                          AGE

                           URSULA                               7
                           ROBERT                              16
                           SUZIE                                6
                           WREN                                17
                           JILL                                20
                           MICHAEL                             20
                           ERIC                                16
                           SCOTT                               11

DTR>
```

Dividing data into groups, printing title pages, performing cross tabulations, and reporting hierarchical records are some of the advanced Report Writer techniques you may want to use. If you wish to develop additional techniques of your own, refer to the *DATATRIEVE–11 Reference Manual* for a summary of the syntax for Report Writer statements.

Data Files Supplied with DATATRIEVE–11 A

This appendix contains copies of the original data for the YACHTS, FAMILIES, and PERSONNEL domains. If the files you have in your directory do not match these in any way, you may get different results from those shown in the examples in this book. To display the data you have in your files, just ready the domain and use the PRINT statement:

```
DTR> READY YACHTS RET
DTR> PRINT YACHTS RET
```

A.1 YACHTS Domain Data

MANUFACTURER	MODEL	RIG	LENGTH OVER ALL	WEIGHT	BEAM	PRICE
ALBERG	37 MK II	KETCH	37	20,000	12	$36,951
ALBIN	79	SLOOP	26	4,200	10	$17,900
ALBIN	BALLAD	SLOOP	30	7,276	10	$27,500
ALBIN	VEGA	SLOOP	27	5,070	08	$18,600
AMERICAN	26	SLOOP	26	4,000	08	$9,895
AMERICAN	26-MS	MS	26	5,500	08	$18,895
BAYFIELD	30/32	SLOOP	32	9,500	10	$32,875
BLOCK I.	40	SLOOP	39	18,500	12	
BOMBAY	CLIPPER	SLOOP	31	9,400	11	$23,950
BUCCANEER	270	SLOOP	27	5,000	08	
BUCCANEER	320	SLOOP	32	12,500	10	
C&C	CORVETTE	SLOOP	31	8,650	09	
CABOT	36	SLOOP	36	15,000	12	
CAL	2-27	SLOOP	27	6,700	09	
CAL	2-34	SLOOP	33	9,500	10	
CAL	29	SLOOP	29	8,000	09	
CAL	3-30	SLOOP	30	10,500	10	
CAL	35	SLOOP	35	15,000	11	
CAPE DORY	25	SLOOP	25	4,000	07	$8,995
CAPE DORY	28	SLOOP	28	9,000	09	$21,990
CAPE DORY	TYPHOON	SLOOP	19	1,900	06	$4,295
CAPITAL	NEWPORT	SLOOP	28	7,000	09	

MANUFACTURER	MODEL	RIG	LENGTH OVER ALL	WEIGHT	BEAM	PRICE
CARIBBEAN	35	SLOOP	35	18,000	11	$37,850
CHALLENGER	32	SLOOP	32	12,800	11	$31,835
CHALLENGER	35	SLOOP	35	14,800	12	$39,215
CHALLENGER	41	KETCH	41	26,700	13	$51,228
CHRIS-CRAF	CARIBBEAN	SLOOP	35	18,000	11	$37,850
COLUMBIA	35	SLOOP	35	11,350	10	
COLUMBIA	41	SLOOP	41	20,700	11	$48,490
COLUMBIA	PAYNE 9.6	SLOOP	32	10,200	10	
DOUGLAS	32	SLOOP	32	10,500	09	
DOWN EAST	32	SLOOP	32	15,000	11	
DOWN EAST	38	SLOOP	38	19,500	12	
DUFOUR	25	SLOOP	25	2,700	08	
EASTWARD	HO	MS	24	7,000	09	$15,900
ENCHILADA	20	SLOOP	20	2,300	07	
ENDEAVOUR	32	SLOOP	32	11,700	10	
ERICSON	23/ SPECIA	SLOOP	23	3,100	08	
ERICSON	CRUISING/3	SLOOP	36	16,000	12	
FISHER	30	KETCH	30	14,500	09	
FISHER	37	KETCH	37	30,000	12	
FJORD	MS 33	MS	33	14,000	11	
GRAMPIAN	2-34	SLOOP	34	11,800	10	$29,675
GRAMPIAN	26	SLOOP	26	5,600	08	$11,495
GRAMPIAN	28	SLOOP	28	6,900	10	$14,475
GRAMPIAN	30	SLOOP	30	8,600	09	$17,775
GRAMPIAN	34	KETCH	33	12,000	10	$29,675
GULFSTAR	41	KETCH	41	22,000	12	$41,350
HUNTER	27	SLOOP	27	6,500	09	$14,999
HUNTER	30	SLOOP	30	9,500	10	$21,500
I. TRADER	37	KETCH	36	18,600	12	$39,500
IRWIN	25	SLOOP	25	5,400	12	$10,950
IRWIN	30	SLOOP	30	10,000	10	$19,950
IRWIN	37 MARK II	KETCH	37	20,000	11	$36,950
IRWIN	HALF TON	SLOOP	30	7,300	10	
ISLANDER	28	SLOOP	28	5,994	10	$15,908
ISLANDER	30	SLOOP	30	8,600	10	$20,990
ISLANDER	36	SLOOP	36	13,450	11	$31,730
ISLANDER	BAHAMA	SLOOP	24	4,200	08	$6,500
ISLANDER	FREEPORT	KETCH	41	22,000	13	$54,970
LINDSEY	39	MS	39	14,500	12	$35,900
MARIEHOLD	32	SLOOP	31	8,000	10	
METALMAST	GALAXY	SLOOP	32	9,500	00	
MOODY	33	SLOOP	33	10,525	11	
NAUTOR	SWAN 41	SLOOP	41	17,750	12	
NEWPORT	27S	SLOOP	27	6,000	09	
NEWPORT	30 II	SLOOP	30	8,000	10	
NEWPORT	41 S	SLOOP	41	18,000	11	
NICHOLSON	33	SLOOP	32	10,046	10	
NORTHERN	29	SLOOP	29	7,250	09	$20,975
NORTHERN	37	KETCH	37	14,000	11	$50,000
O'DAY	27	SLOOP	27	5,900	09	
O'DAY	32	SLOOP	32	11,000	00	$29,500
OLYMPIC	ADVENTURE	KETCH	42	24,250	13	$80,500
ONTARIO	32	SLOOP	32	9,500	11	
ONTARIO	VIKING	SLOOP	34	8,807	10	
PACESHIP	PY26	SLOOP	26	6,000	10	
PEARSON	10M	SLOOP	33	12,441	11	
PEARSON	26	SLOOP	26	5,400	08	
PEARSON	26W	SLOOP	26	5,200	09	
PEARSON	28	SLOOP	28	7,850	09	
PEARSON	30	SLOOP	30	8,320	09	
PEARSON	35	SLOOP	35	13,000	10	

MANUFACTURER	MODEL	RIG	LENGTH OVER ALL	WEIGHT	BEAM	PRICE
PEARSON	36	SLOOP	37	13,500	11	
PEARSON	365	KETCH	36	17,700	11	
PEARSON	39	SLOOP	39	17,000	12	
PEARSON	419	KETCH	42	21,000	13	
RANGER	26	SLOOP	26	5,860	09	
RANGER	28	SLOOP	28	5,108	10	
RANGER	29	SLOOP	29	6,700	09	
RANGER	33	SLOOP	33	10,500	10	
RHODES	SWIFTSURE	SLOOP	33	14,000	10	
ROBERTS	29	SLOOP	29	9,664	10	
ROBERTS	36	SLOOP	37	14,750	11	
ROGGER FD	M/S	MS	35	17,600	11	
RYDER	S. CROSS	SLOOP	31	13,600	00	$32,500
S2	8M AFT	SLOOP	26	4,600	08	
S2	8M MID	SLOOP	26	5,200	08	
SABRE	28	SLOOP	28	7,400	09	$22,000
SALT	19	SLOOP	25	2,600	07	$6,590
SAN JUAN	21	SLOOP	21	1,250	07	
SAN JUAN	26	SLOOP	26	4,400	08	
SCAMPI	30	SLOOP	30	6,600	10	
SOLNA CORP	SCAMPI	SLOOP	30	6,600	10	
TA CHIAO	FANTASIA	SLOOP	35	23,200	00	
TANZER	26	SLOOP	26	4,350	09	$11,750
TANZER	28	SLOOP	28	6,800	10	$17,500
VENTURE	21	SLOOP	21	1,500	07	$2,823
VENTURE	222	SLOOP	22	2,000	07	$3,564
WESTERLY	CENTAUR	SLOOP	26	6,700	08	$15,245
WESTSAIL	32	SLOOP	32	19,500	11	
WINDPOWER	IMPULSE	SLOOP	16	650	07	$3,500
WRIGHT	SEAWIND II	SLOOP	32	14,900	00	$34,480

A.2 FAMILIES Domain Data

FATHER	MOTHER	NUMBER KIDS	KID NAME	AGE
JIM	ANN	2	URSULA	7
			RALPH	3
JIM	LOUISE	5	ANNE	31
			JIM	29
			ELLEN	26
			DAVID	24
			ROBERT	16
JOHN	JULIE	2	ANN	29
			JEAN	26
JOHN	ELLEN	1	CHRISTOPHR	0
ARNIE	ANNE	2	SCOTT	2
			BRIAN	0
SHEARMAN	SARAH	1	DAVID	0
TOM	ANNE	2	PATRICK	4
			SUZIE	6
BASIL	MERIDETH	6	BEAU	28
			BROOKS	26
			ROBIN	24
			JAY	22
			WREN	17
			JILL	20
ROB	DIDI	0		

FATHER	MOTHER	NUMBER KIDS	KID NAME	AGE
JEROME	RUTH	4	ERIC	32
			CISSY	24
			NANCY	22
			MICHAEL	20
TOM	BETTY	2	MARTHA	30
			TOM	27
GEORGE	LOIS	3	JEFF	23
			FRED	26
			LAURA	21
HAROLD	SARAH	3	CHARLIE	31
			HAROLD	35
			SARAH	27
EDWIN	TRINITA	2	ERIC	16
			SCOTT	11

A.3 PERSONNEL Domain Data

ID	STATUS	FIRST NAME	LAST NAME	DEPT	START DATE	SALARY	SUP ID
00012	EXPERIENCED	CHARLOTTE	SPIVA	TOP	12-Sep-72	$75,892	00012
00891	EXPERIENCED	FRED	HOWL	F11	9-Apr-76	$59,594	00012
02943	EXPERIENCED	CASS	TERRY	D98	2-Jan-80	$29,908	39485
12643	TRAINEE	JEFF	TASHKENT	C82	4-Apr-81	$32,918	87465
32432	TRAINEE	THOMAS	SCHWEIK	F11	7-Nov-81	$26,723	00891
34456	TRAINEE	HANK	MORRISON	T32	1-Mar-82	$30,000	87289
38462	EXPERIENCED	BILL	SWAY	T32	5-May-80	$54,000	00012
38465	EXPERIENCED	JOANNE	FREIBURG	E46	20-Feb-80	$23,908	48475
39485	EXPERIENCED	DEE	TERRICK	D98	2-May-77	$55,829	00012
48475	EXPERIENCED	GAIL	CASSIDY	E46	2-May-78	$55,407	00012
48573	TRAINEE	SY	KELLER	T32	2-Aug-81	$31,546	87289
49001	EXPERIENCED	DAN	ROBERTS	C82	7-Jul-79	$41,395	87465
49843	TRAINEE	BART	HAMMER	D98	4-Aug-81	$26,392	39485
78923	EXPERIENCED	LYDIA	HARRISON	F11	19-Jun-79	$40,747	00891
83764	EXPERIENCED	JIM	MEADER	T32	4-Apr-80	$41,029	87289
84375	EXPERIENCED	MARY	NALEVO	D98	3-Jan-76	$56,847	39485
87289	EXPERIENCED	LOUISE	DEPALMA	G20	28-Feb-79	$57,598	00012
87465	EXPERIENCED	ANTHONY	IACOBONE	C82	2-Jan-73	$58,462	00012
87701	TRAINEE	NATHANIEL	CHONTZ	F11	28-Jan-82	$24,502	00891
88001	EXPERIENCED	DAVID	LITELLA	G20	11-Nov-80	$34,933	87289
90342	EXPERIENCED	BRUNO	DONCHIKOV	C82	9-Aug-78	$35,952	87465
91023	TRAINEE	STAN	WITTGEN	G20	23-Dec-81	$25,023	87289
99029	EXPERIENCED	RANDY	PODERESIAN	C82	24-May-79	$33,738	87465

Index

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V

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November 1987

DATATRIEVE-11
Guide to Writing Reports

AD-U051A-T1

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This update contains changes and additions made to the *DATATRIEVE-11 Guide to Writing Reports* for Version 3.2.

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DATATRIEVE–11
Guide to Writing Reports

Order No. AA-U051A-TK
Including AD-U051A-T1

November 1987

This manual describes the DATATRIEVE–11 Report Writer.

OPERATING SYSTEMS: RSX–11M
RSX11M–PLUS
RSTS/E
Micro/RSX
Micro/RSTS
VMS with RSX–11

SOFTWARE VERSION: DATATRIEVE–11 V3.2

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Organization (structure of subject matter)	☐	☐	☐	☐
Figures (useful)	☐	☐	☐	☐
Examples (useful)	☐	☐	☐	☐
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Page layout (easy to find information)	☐	☐	☐	☐

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Reader's Comments

DATATRIEVE-11
Guide to Writing Reports
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Including: AD–U051A–T1

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Accuracy (software works as manual says)	☐	☐	☐	☐
Completeness (enough information)	☐	☐	☐	☐
Clarity (easy to understand)	☐	☐	☐	☐
Organization (structure of subject matter)	☐	☐	☐	☐
Figures (useful)	☐	☐	☐	☐
Examples (useful)	☐	☐	☐	☐
Index (ability to find topic)	☐	☐	☐	☐
Page layout (easy to find information)	☐	☐	☐	☐

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