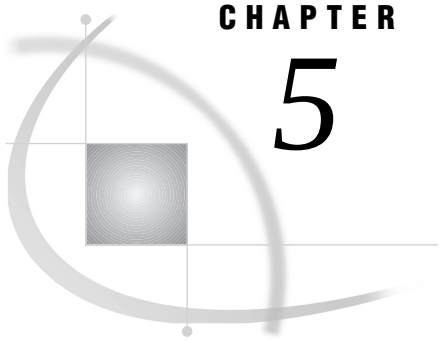

CHAPTER

5

Doing More with the Report Engine

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Introduction

You can use the Report Engine to build different types of reports that are based on SAS tables. You also can create reports based on queries that were created by using the Query window or the SQL Editor window. (See Chapter 10, "Query and Reporting," on page 157 and Chapter 11, "Using the SQL Editor," on page 205 for information on the Query window and the SQL Editor window.) By using the Report Engine, you can create lists; tables; graphics, including horizontal and vertical bar charts, pie charts, and plots; and dynamic reports with drill-down features. You can easily change from one report style to another using the Report Engine.

The "Using the Report Engine" chapter in *Getting Started with the SAS System Using SAS/ASSIST Software* introduced the Report Engine and showed you how to create a simple listing report and a drill-down report. This chapter explores the Report Engine in more depth.

Opening and Using the Report Engine Window

To open the Report Engine window, follow this selection path:

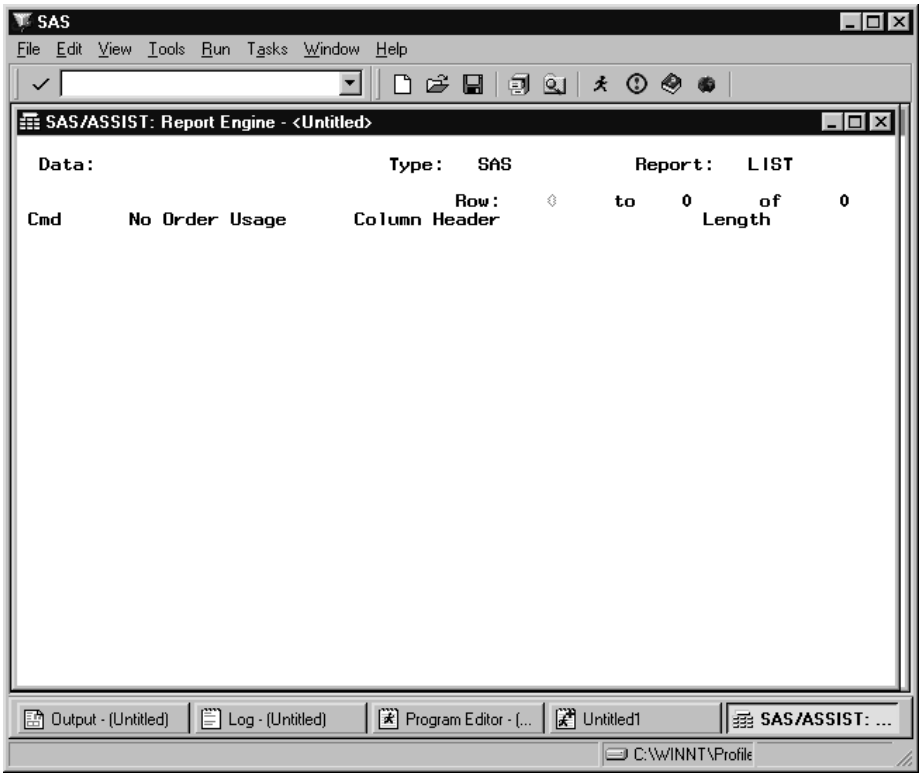
Tasks ► Report Writing ► Design Report ► Report Engine

You also can open the Report Engine window by following this selection path:

Tasks ► Data Management ► Query ► Query and Reporting ► Report Engine

The Report Engine window appears.

Display 5.1 Report Engine Window



When you open the Report Engine window, the last report that you created appears. Select **New** from the **File** menu to clear the window. You can use **New** to clear the Report Engine window at any time.

You use commands and make choices from selection lists to produce reports in the Report Engine window. When you press TAB, your cursor moves to any field that contains text that you can edit. The fields in the Report Engine window are described in the following table. Type a **?** in any field and press ENTER to list possible selections for that field.

Table 5.1 Fields in the Report Engine Window

Field	Description
Data	lists the name of the data source. Fill in the **Type** field *before* you select the data source.
Type	lists the type of data, such as a SAS table or query or a query on a DB2 table that you saved from the SQL Editor or the Query window. The default value is **SAS**.
Report	controls the type of report you want to generate. The default value is **LIST**.

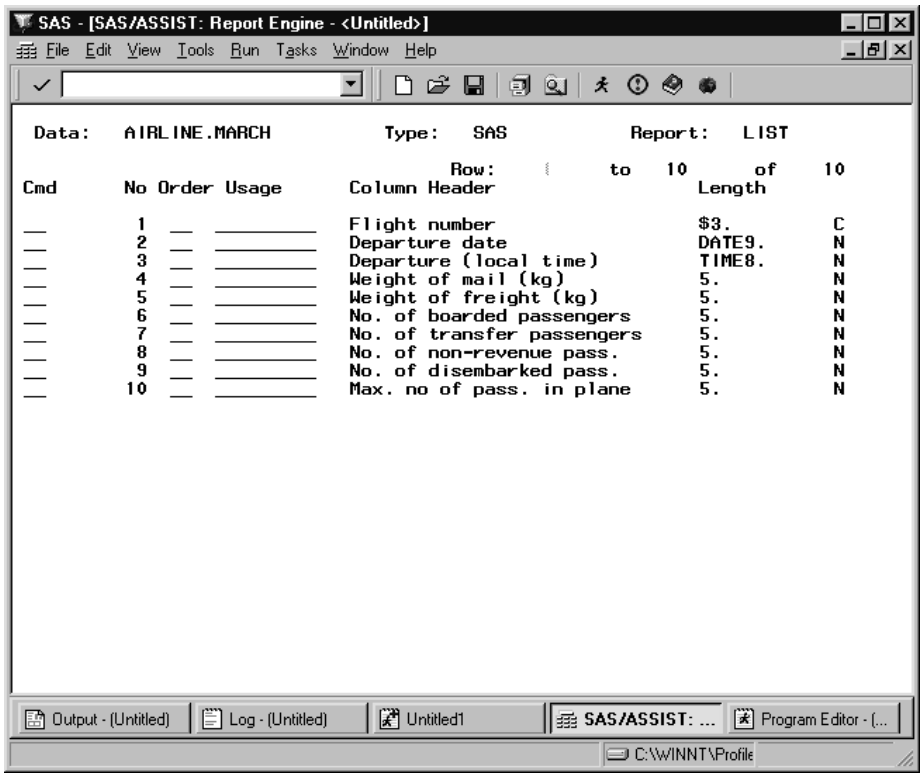
To produce a report, first select the type of data in the **Type** field. You can select SAS tables or views (type SAS), a query that was created by using the Query window (type QUERY), or a query that was created by using the SQL Editor window (type SQL). Queries do not contain any data but rather point to one or more tables.

After you select the type of report, type the name of the data source in the **Data** field. If you type a **?** in the **Data** field and press ENTER, the window that appears depends on what is in the **Type** field:

- If the type is **SQL** or **QUERY**, the Open window appears showing your SQL or QUERY entries. To sort the queries, select **Sort By** from the **Edit** menu and select **Name**, **Description**, or **Date** to reorder the queries listed. Type **S** in the **Cmd** field to select a query.
- If the type is **SAS**, the Select Table window appears. Select a table and select **OK**.

After you select the data source, type of data, and report, the Report Engine window shows you the columns for the data you selected. For example, the following display shows the columns for the AIRLINE.MARCH SAS table. See “Creating the AIRLINE Sample Tables” on page 3 for more information on the AIRLINE sample tables.

Display 5.2 Report Engine With AIRLINE.MARCH Table



To customize your report, you make modifications as described in the rest of this chapter. To run the report, follow this selection path:

Run ► Submit

The report appears in the Report Output window. To return to the Report Engine window after viewing your report, follow this selection path:

File ► Close

You can use the fields described in the following table to manipulate your report in the Report Engine window.

Table 5.2 Fields in the Report Engine Window

Field	Description
Row	indicates the number of the first line of column information shown in the window. If the table has more columns than will fit in the window, the row number is in a different color, and you can type a new number in the **Row** field to begin the display at the specified row number.
to	indicates the column number of the last column shown in the window.
of	indicates the total number of columns in the data source.
Cmd	enables you to specify commands to manipulate the columns in the report. Type a **?** and press ENTER to list all of the commands, which are described in Table 5.3 on page 65.

Field	Description
No	indicates the order of the columns. (**No** is an abbreviation for Number). You can change the column order by typing a new order number over the old order number. To drop a column from the report, delete (or type blanks over) the number in this field. The column label and length remain in the window. See the **D** command in Table 5.3 on page 65 for an alternate method of dropping columns from the report.
Order	sorts the column data in the specified order. Type **A** to sort the column data in ascending order. Type **D** to sort the column data in descending order.
Usage	defines what a column represents. Usages change the appearance of the report. You can type the usage into this field or type a **?** for a list of the possible usages. To produce reports other than lists, you must define at least one usage such as GROUP, ACROSS, BREAK, or PAGE. See Table 5.4 on page 69 for a list and description of the usages.
Column Header	indicates the column label. You can change the column label by typing over the existing label. To reset the label to its original value, type an **I** in the **Cmd** field to display the Column Information window. In the Column Information window, select **Reset** and **OK** to return to the original column label value.
Length	indicates both the SAS format and data type of a specific column. You can use any SAS format in this field. The format changes how the column looks on your report. Type a **?** to list SAS formats. A **C** to the right of the column length indicates a character column, whereas an **N** indicates a numeric column.

Modifying a Report Using the Cmd Field

You can use commands in the Report Engine window **Cmd** field to modify your report. Type a **?** in the **Cmd** field to list the commands described in the following table.

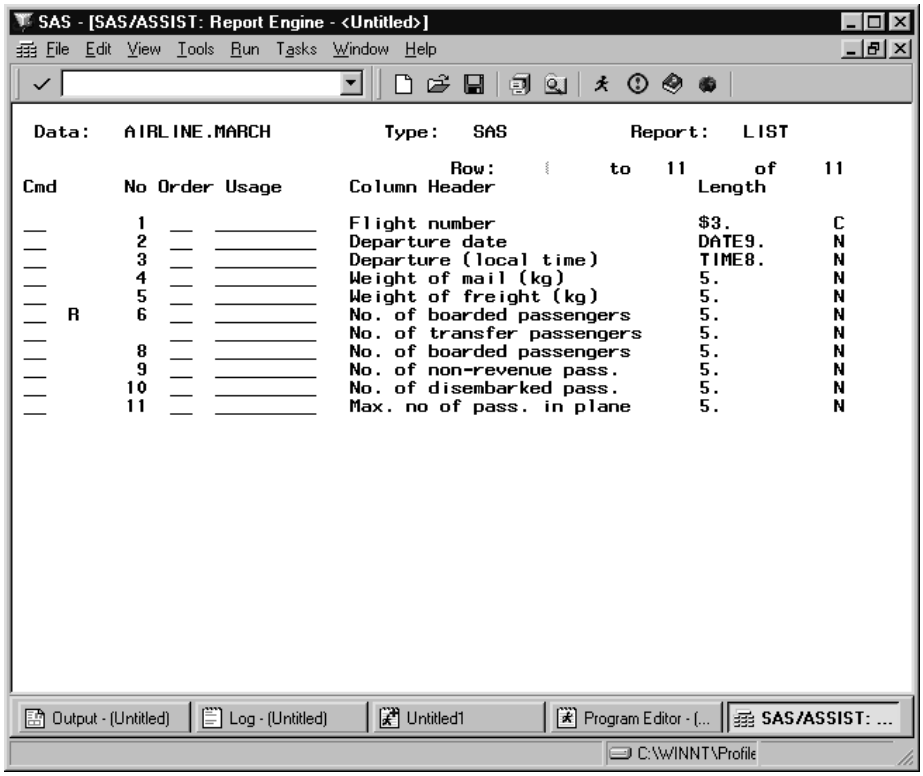
Table 5.3 Cmd Field Commands

Command	Name	Description
I	Column Information	displays detailed information about a column. See “Using the Column Information Window” on page 71 for more information.
R	Repeat	repeats a column.

Command	Name	Description
D	Delete	deletes a column from the report only. To restore deleted columns, select **Reset Columns** from the **Edit** menu. When you delete a column using **D**, all information for that column is removed from the Report Engine window. See the No field in Table 5.2 on page 64 for an alternate method of dropping columns from a report.
T	Subtotal	computes a subtotal on the column for each group defined by a GROUP, PAGE, or BREAK usage. See Table 5.4 on page 69 for more information on usages.

The following display shows the Report Engine window with the command to repeat the **No. of boarded passengers** column. This display also shows that the number in the **No** field for the **No. of transfer passengers** column has been erased to drop the column from the report. After you press ENTER, repeated fields are indicated with an **R** between the **Cmd** and **No** fields; dropped columns are moved to the bottom of the list, and the other columns are renumbered. Any columns used to create subtotals are indicated with a **T**.

Display 5.3 Using the Cmd Field



Modifying a Report's Column Order, Headers, and Formats

You can use fields in the Report Engine window to modify the report's column order, headers, and formats as follows:

- Rearrange the report's columns by changing the numbers of the **No** (Number) field.
- change the column headers by typing a new column header over the existing one.

- Change the presentation of the column in your report by selecting a new format in the **Length** field.

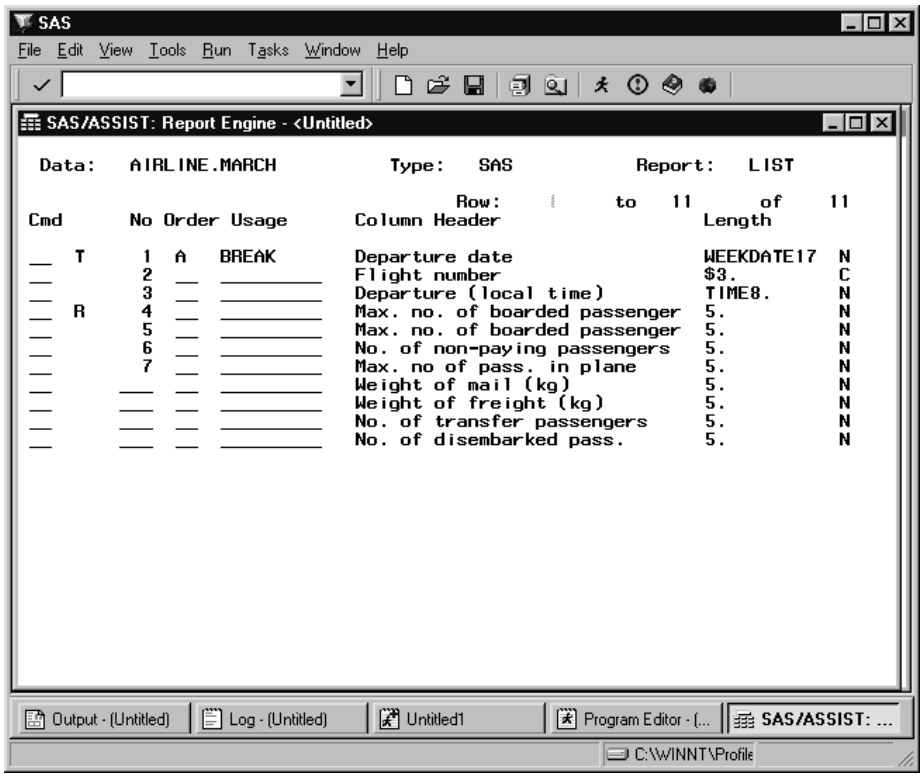
After you make your changes and press ENTER, the columns are reordered in the Report Engine window and are renumbered to account for any dropped columns. Also, the new formats are listed in the **Length** field.

Note: If the table has been sorted, you can set the User Profile option **Column Order** to automatically put the BY column or columns at the top of the list in the Report Engine window. See Appendix 2, "Customizing SAS/ASSIST Software," on page 241 for information. △

The following display shows the Report Engine window with the AIRLINE.MARCH data file with the following modifications:

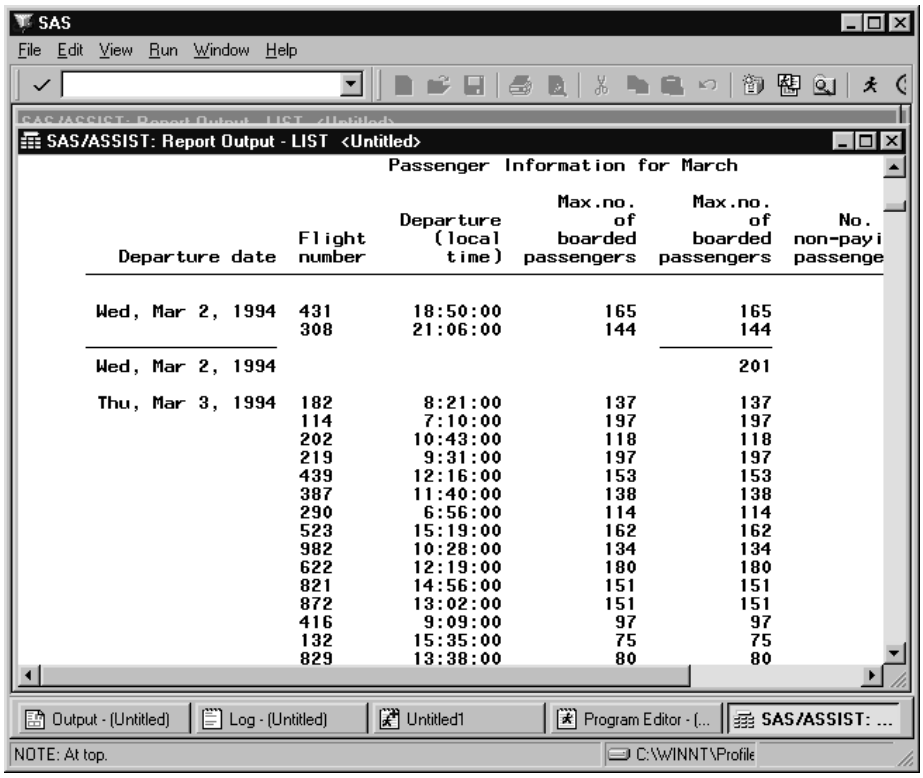
- The **Weight of mail (kg)**, **Weight of freight (kg)**, **No. of transfer passengers**, and **No. of disembarked pass.** columns have been dropped from the report by erasing their position numbers in the **No** field.
- The order of the **Departure date** and **Flight number** columns has been reversed.
- The column header for the **No. of non-revenue pass.** column has been changed to **No. of non-paying passengers.**.
- The format for the **Departure date** column has been changed to **WEEKDATE17.** using the Column Information window (see "Using the Column Information Window" on page 71 for details).
- The **Departure Date** column has been sorted in ascending order.
- The width for all columns has been changed to 10, except for the width for **Flight number**, which has been changed to 6, and the **Departure Date** column, which has been changed to 17 to accommodate its new format. Column widths do not appear in the Report Engine window; you view and change the column width in the Column Information window. See "Using the Column Information Window" on page 71 for more information
- The title "Passenger Information for March" has been added by selecting **Titles** from the **Edit** menu, and centered by selecting **Page Layout** from the **Edit** menu. Title information does not appear on the Report Engine window.
- The repeated **No. of boarded passengers** column has been assigned a usage of **MAX**, the column header has been changed to **Max. No. of boarded passengers**, and the width has been changed to 10. For information on changing usages, see "Modifying a Report with Usages" on page 69.
- The **Departure date** column has been assigned a usage of **BREAK** so that the report breaks on each new date value.

Display 5.4 Report Engine Window with Modifications to AIRLINE.MARCH Table



The following display shows the modified list report for the passenger data in the AIRLINE.MARCH table. The report has been scrolled forward to show that the maximum number of boarded passengers for a single flight for each day is given at the bottom of the data for each day.

Display 5.5 AIRLINE.MARCH Listing Report With Modifications



Passenger Information for March

Departure date	Flight number	Departure (local time)	Max.no. of boarded passengers	Max.no. of boarded passengers	No. non-payi passenge
Wed, Mar 2, 1994	431	18:50:00	165	165	
	308	21:06:00	144	144	
Wed, Mar 2, 1994				201	
Thu, Mar 3, 1994	182	8:21:00	137	137	
	114	7:10:00	197	197	
	202	10:43:00	118	118	
	219	9:31:00	197	197	
	439	12:16:00	153	153	
	387	11:40:00	138	138	
	290	6:56:00	114	114	
	523	15:19:00	162	162	
	982	10:28:00	134	134	
	622	12:19:00	180	180	
	821	14:56:00	151	151	
	872	13:02:00	151	151	
	416	9:09:00	97	97	
	132	15:35:00	75	75	
	829	13:38:00	80	80	

Modifying a Report with Usages

The values of **Usage** define what a column represents and change the appearance of the report. The following table describes the different values of **Usage**. Note that SUM, MEAN, MIN, MAX, AVG, COUNT, N, and NMISS are aggregate (or summary) functions.

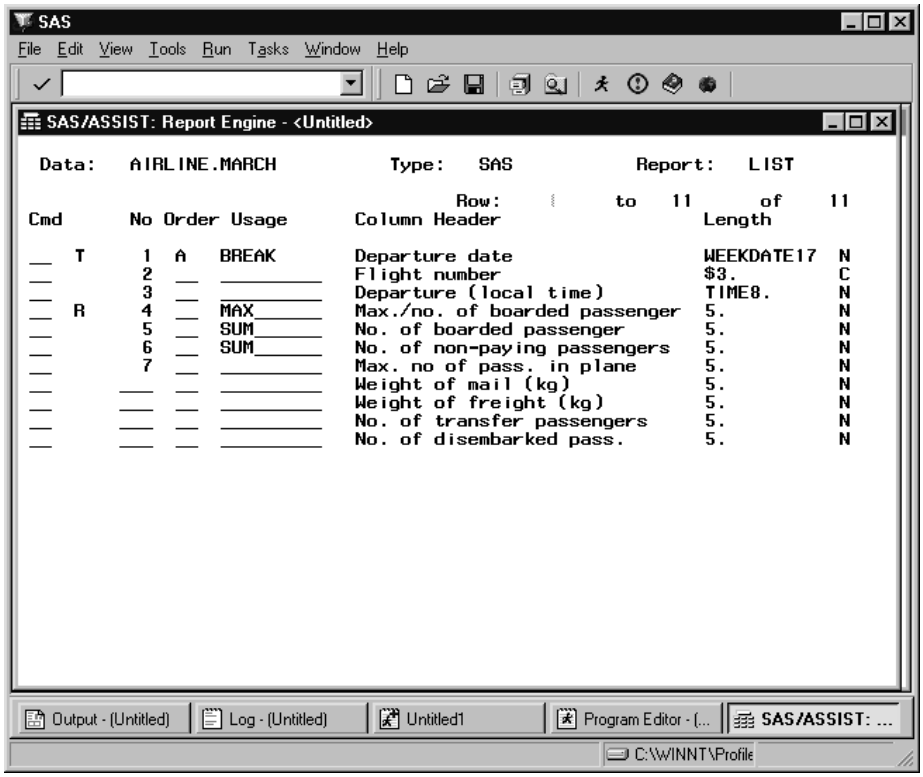
Table 5.4 Usages

Usage	Description
PAGE	creates a new page at each new column value. PAGE is used with the ACROSS, GROUP, or BREAK usages. PAGE is valid only with a report of type TABLE. With other types of reports, PAGE is used like a GROUP usage. The corresponding SAS/GRAPH option for this usage is BY, which creates a new page for each BY value.
GROUP	groups data by the values in the column. The corresponding SAS/GRAPH option for this usage is GROUP, which organizes bars and pies into groups by different values of the GROUP variable.
ACROSS	groups the report into subgroups across the report. The corresponding SAS/GRAPH option for this usage is ACROSS, which is used to place multiple pies "across" on a page and also is used by the LEGEND statement.

Usage	Description
BREAK	computes one summary for each column in a LIST report. With other types of reports, BREAK is used like a GROUP usage.
SUM	computes the sum of the values. The corresponding SAS/GRAPH option for this usage is SUM, which prints the value of the sum statistic above bars.
MEAN	computes the mean of the values. The corresponding SAS/GRAPH option for this usage is MEAN, which is the value of the statistic for the variable being used for calculations.
MIN	computes the smallest value
MAX	computes the largest value
AVG	computes the average of the values (equal to mean)
COUNT	computes the number of nonmissing values
N	computes the number of nonmissing values
NMISS	computes the number of missing values

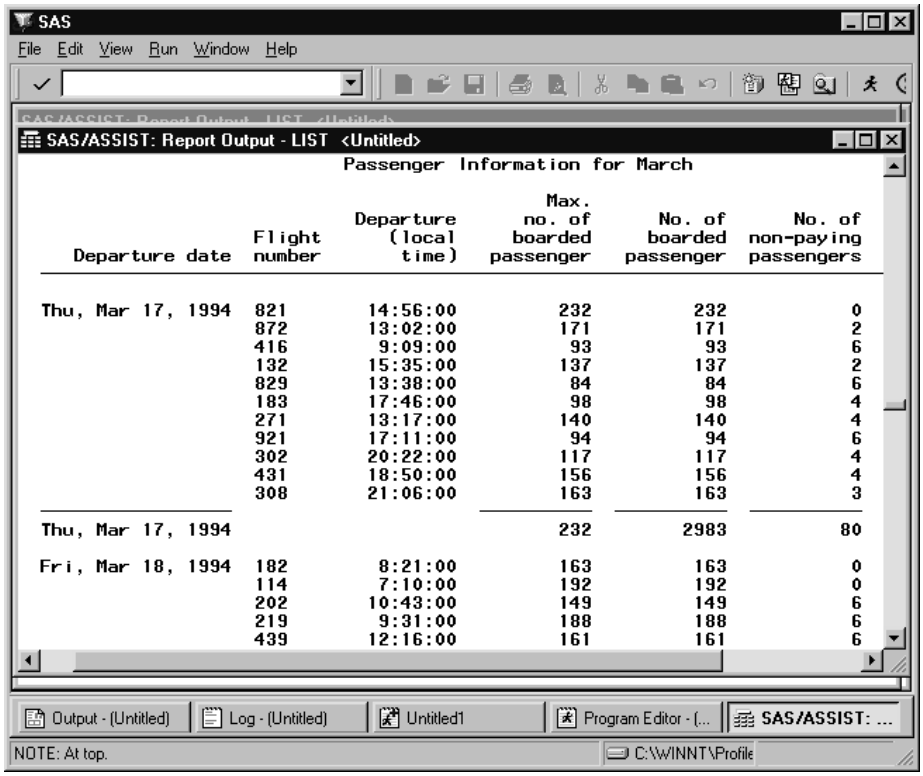
The following display shows the AIRLINE.MARCH table in the Report Engine window. All of the modifications made in the previous section are in effect; in addition, the report has been further modified so that the report shows totals (SUM usage) for the number of boarded and nonpaying passengers. A forward slash (**/**) has been inserted in the column header for the **Max No. of boarded passengers** so the header breaks after the word **Max**.

Display 5.6 Report Engine Window with AIRLINE.MARCH Table and More Modifications



The following display shows the passenger information report grouped by date with the sum of the boarded passengers, the maximum number of boarded passengers, and the sum of the nonpaying passengers. The report has been scrolled forward to show the sums for the boarded and nonpaying columns.

Display 5.7 AIRLINE.MARCH Listing Report with More Modifications



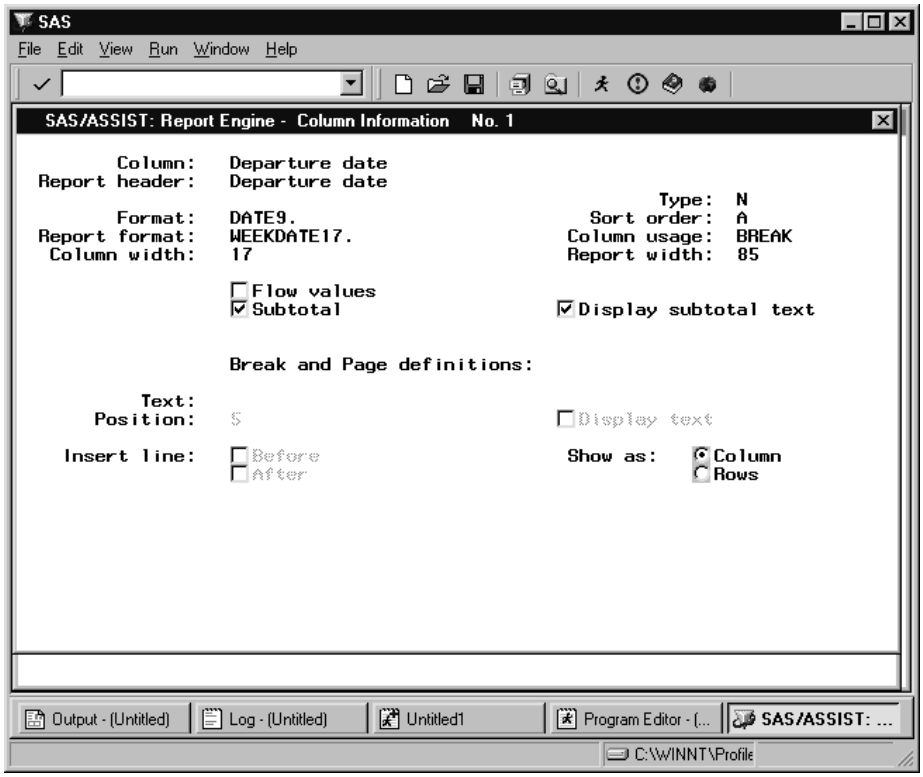
Passenger Information for March

Departure date	Flight number	Departure (local time)	Max. no. of boarded passenger	No. of boarded passenger	No. of non-paying passengers
Thu, Mar 17, 1994	821	14:56:00	232	232	0
	872	13:02:00	171	171	2
	416	9:09:00	93	93	6
	132	15:35:00	137	137	2
	829	13:38:00	84	84	6
	183	17:46:00	98	98	4
	271	13:17:00	140	140	4
	921	17:11:00	94	94	6
	302	20:22:00	117	117	4
	431	18:50:00	156	156	4
	308	21:06:00	163	163	3
Thu, Mar 17, 1994			232	2983	80
Fri, Mar 18, 1994	182	8:21:00	163	163	0
	114	7:10:00	192	192	0
	202	10:43:00	149	149	6
	219	9:31:00	188	188	6
	439	12:16:00	161	161	6

Using the Column Information Window

To display information about a column, type **I** in the **Cmd** field for the desired column and press ENTER. The following display shows the information for the **Departure Date** column, as modified in the previous sections.

Display 5.8 Column Information Window



When you press TAB in this window, your cursor moves to any field that you can select or that contains text that you can edit to update the information in this window. The information in this window varies according to the type of usage associated with a column.

To reset the **Report Header** and **Report Format** to their original values, select **Reset** from the **Edit** menu.

The fields on the Column information window are described in the following table.

Table 5.5 Fields in the Column Information Window

Field	Description
Column	indicates the column label stored with the source table.
Report Header	indicates the column label to be used in the report.
Format	indicates the column format stored with the source table.
Report format	indicates the column format to be used in the report.
Column width	indicates the width of the column in the report.
Type	indicates the type of column data, **C** for character data, **N** for numeric data.
Sort order	specifies how the column data are sorted in the report. **A** specifies that the column data is sorted in ascending order in the report. **D** specifies that the column data is sorted in descending order in the report.
Column Usage	indicates the usage for the column. To produce reports other than lists, you must define at least one of the following usages: GROUP, ACROSS, BREAK, or PAGE. See Table 5.4 on page 69 for more information.

Field	Description
Report Width	indicates the total width of the report.
Flow values	specifies that character columns longer than the width indicated in the **Width** field are flowed to multiple lines.
Subtotal	writes a summary line (a line containing summaries of statistics and computed variables) for each group defined by a BREAK, GROUP, or PAGE usage. This parameter is available only on columns with a BREAK, GROUP, or PAGE usage.
Display subtotal text	prints the value of the group to the left of the subtotals. This parameter is available only on columns with a BREAK, GROUP, or PAGE usage for which the **Subtotal** parameter has been selected.

The following parameters are available only on columns with BREAK or PAGE usages.

Table 5.6 Additional Fields in the Column Information Window for Columns with BREAK or PAGE Usages

Field	Description
Show as	**Column** displays the value of each group in a column to the left of the other columns. **Rows** displays the value of each group in a line above the data for each group. Selecting **Rows** activates the other BREAK and PAGE fields.
Position	indicates where the group value appears, in spaces from the left margin.
Display text	determines whether the group value appears in the report.
Text	If **Display text** is checked, the text you supply in the **Text** field is used instead of the group value. Leave this field blank to display the group value.
Insert line	determines whether to insert blank lines above and below the group value.

Choosing a Different Report Type

You can use the Report Engine window to create several types of reports. You can change from one type of report to another in one of two ways:

- within the Report Engine window, type a new value in the **Report** field before running the report. Alternatively, type **?** in the field and press ENTER to list the types of reports; then select the type of report.
- after you run one type of report, select a new type of report from the **Run** menu in the Report Output window.

You can select the following types of reports:

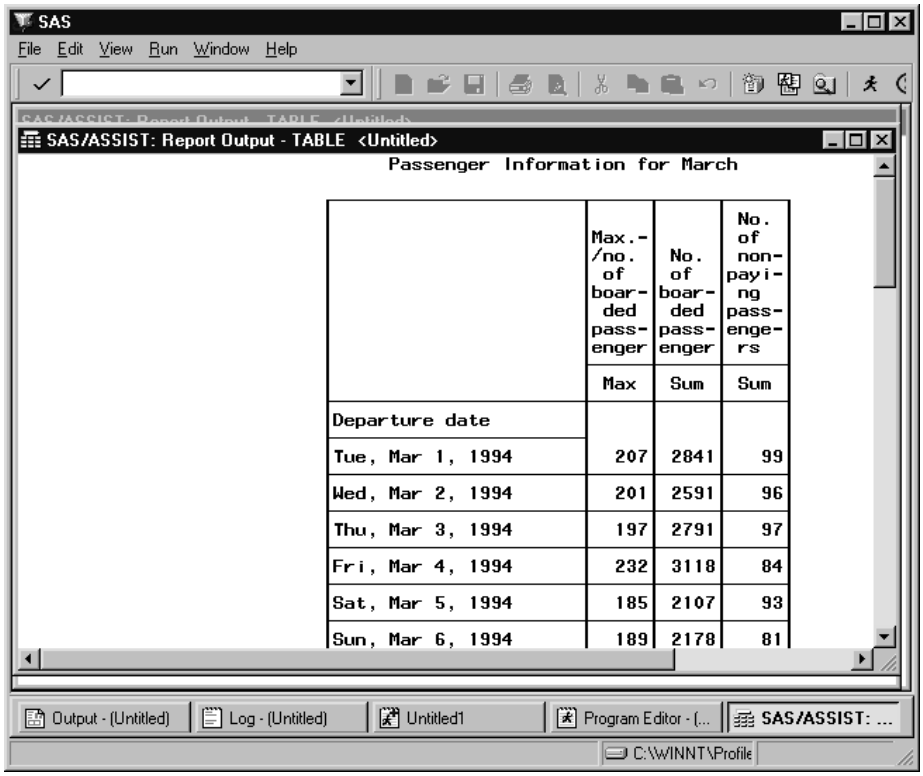
- **LIST** creates a list report
- **TABLE** creates a tabular report
- **DRILL** creates a dynamic report
- **HBAR** creates a horizontal bar chart

- **VBAR** creates a vertical bar chart
- **PIE** creates a pie chart
- **PLOT** creates an X by Y plot.

For any type of report other than **LIST**, you must assign a usage of BREAK, ACROSS, GROUP, or PAGE to at least one column, which becomes the classification column for tabular reports or the chart column for graphical reports.

To see the passenger information report as a table, type **TABLE** in the **Report** field in the Report Engine window. Select **Submit** from the **Run** menu. The following display shows the passenger information report as a table.

Display 5.9 Tabular Report Output

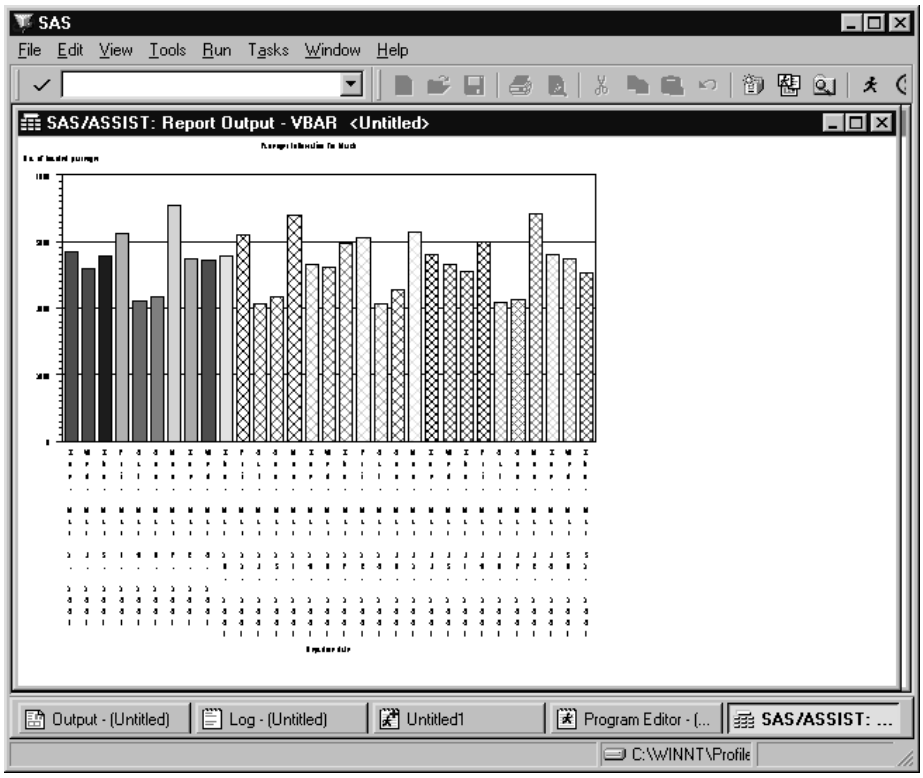


Passenger Information for March

Departure date	Max.-/no. of boar-ded pass-enger Max	No. of boar-ded pass-enger Sum	No. of non-payi-ng pass-enge-rs Sum
Tue, Mar 1, 1994	207	2841	99
Wed, Mar 2, 1994	201	2591	96
Thu, Mar 3, 1994	197	2791	97
Fri, Mar 4, 1994	232	3118	84
Sat, Mar 5, 1994	185	2107	93
Sun, Mar 6, 1994	189	2178	81

To see the passenger information report as a vertical bar chart, select **Vertical Bar** from the **Run** menu of the Report Output window. Alternatively, type **VBAR** in the Report Engine window **Report** field. The following display shows the passenger information report as a vertical bar chart. Note that the format for the DATE column has been changed to DATE9. to make more room for the bars.

Display 5.10 Vertical Bar Chart Output

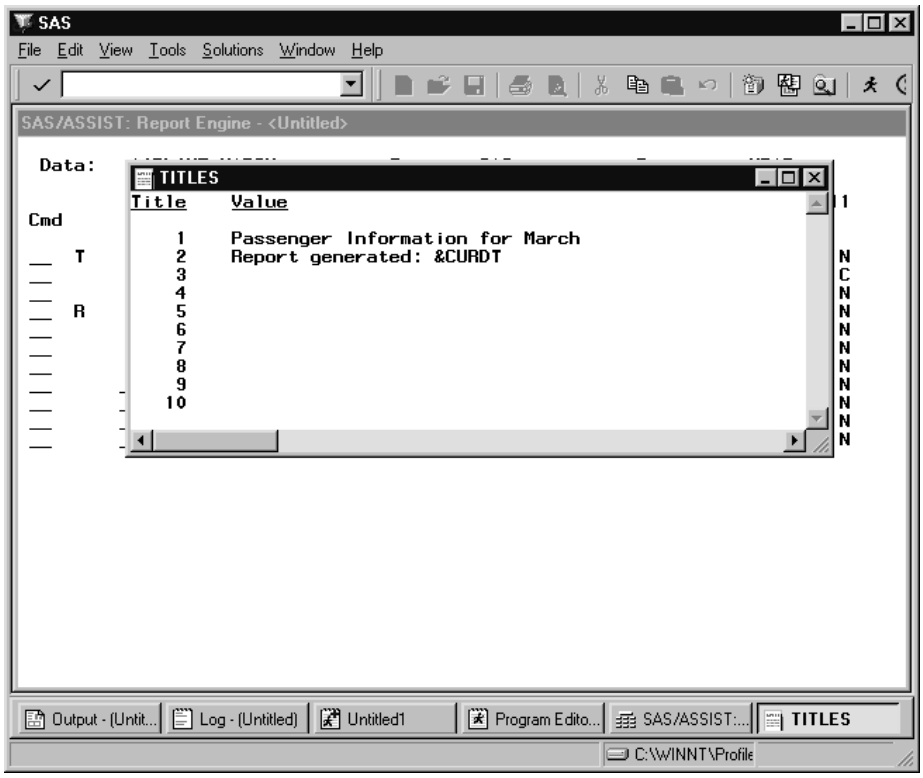


Inserting Date and Time Stamps in Titles and Footnotes

As discussed in the "Using the Report Engine" chapter of *Getting Started with the SAS System Using SAS/ASSIST Software*, you can add titles and footnotes to your report by selecting **`Titles`** or **`Footnotes`** from the **`Edit`** menu of the Report Engine window. You can use the macros &CURDATE, &CURTIME, and &CURDT to automatically generate the current date, the current time, or both the current date and time, respectively, for your output.

In the **`Value`** field for each line of the title, type the text and the macro you want to use. An example of an edited TITLES window is shown in the following display.

Display 5.11 Edited TITLES Window



Select **Close** from the **File** menu. When prompted, select **Yes** to save the changes. When you run your report, the &CURDT macro generates both the current date and time automatically. You can assign a format to the macros &CURDATE, &CURTIME, and &CURDT in your user profile by using the Date format, Time format, and Datetime format options for a profile type of REPORT ENGINE. See "Setting User Profile Options" on page 241 for additional information about user profile options.

You can also edit titles and footnotes by selecting **Report Output Manager** from the **View** menu. In the **Cmd** field next to the report you want to change, type **E** and press ENTER. The code for your report appears in the Edit window where you can edit your titles and footnotes as well as the rest of your report.

Note: Any changes that you make to your report in the Edit window are saved only if you save your output to an external file or a SAS file. When you save your report in the Report Engine window, changes made in the Edit window are not saved with your report. △

Additional Report Engine Options

The **Edit** menu contains additional options that enable you to customize your report. This section describes items on the **Edit** menu that are not discussed elsewhere in this chapter.

Grand Totals

The **Grand Totals** item enables you to display overall totals for the report. You can display column grand totals or row grand totals.

Follow these directions to display column grand totals.

1 For LIST reports, specify a usage of BREAK, GROUP, or PAGE for a column. For TABLE reports, specify a usage of GROUP for a column.

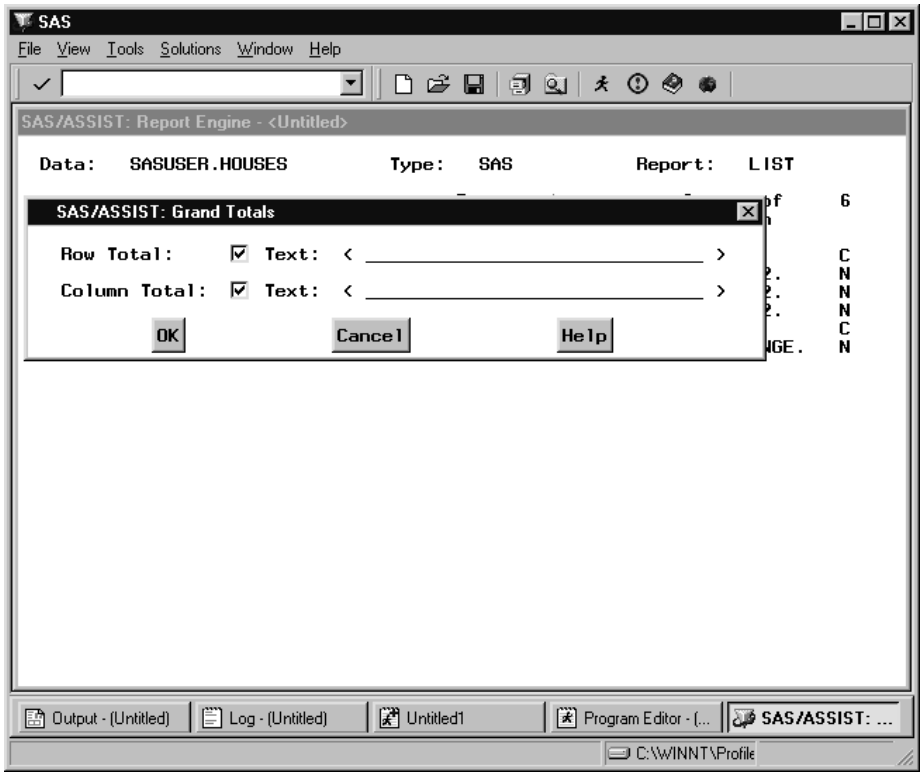
2 Specify a statistics usage (such as MIN, MAX, MEAN, and so on) on at least one column. This statistic will be calculated on that column in each BREAK, GROUP, or PAGE value and for the overall report.

3 Follow this selection path:

Edit ► Grand Totals

The Grand Totals window appears.

Display 5.12 Grand Totals Window



4 Type some identifying text (for example, **Overall**) in the **Column Total** field. Select **Text** if it is not already selected.

5 Select **OK**. Run the report.

To display row grand totals, follow the above directions, except use an ACROSS usage instead of BREAK, PAGE, or GROUP. Also, use the **Row Total** field to enter your identifying text.

Note: Sometimes the grand total identifying text does not appear in the report output. Usually this happens because the line size is not large enough to accomodate the text. To solve this problem, select **Page Layout** from the **Edit** menu and specify a larger value for **Line Size**. △

Subset Data

The **Subset Data** item opens the Build a WHERE Clause to Subset Your Data, enabling you to apply a WHERE clause to your data when creating your report. For details on this window, see the "Report Writing" chapter in *Getting Started with the SAS System Using SAS/ASSIST Software*.

Limit Output Rows

The **Limit Output Rows** item opens the Limit Number of Output Rows window, enabling you to limit the report output to the number of rows you specify. The default is **MAX**, or all rows.

Row Title Space

The **Row Title Space** item is used only for the TABLE report style. Selecting this item opens a dialog box which enables you to set the width of the row title, that is, the left column or columns which identify the contents of the row.

Saving Reports

Saving a Report to a SAS Catalog

To save Report Engine window selections for future use, select **Save As** from the **File** menu in the Report Engine window. The Save As window appears.

Type a name and, optionally, a description for the report and the catalog where you want to save the report. Select **OK** to save the report or **Cancel** to cancel the save. If the report name exists, you are prompted to select **OK** again to write over the existing report, or you can type a new name for the report. After you name the report, you can use **Save** from the **File** menu to save the report again.

For a list of existing reports, type a **?** in the **Name** field of the Save As window. You can type **S** in the **Cmd** field to select a report from the resulting selection list. For a list of available catalogs, type a **?** in the **Catalog** field. Select the catalog from the resulting selection list.

Report Engine window selections are saved as type REPORT.

Saving Report Output to a SAS Catalog

To save a report output to a SAS catalog for future use, select **Save As** from the **File** menu in the Report Output window. The Save As window appears.

Type a name and optional description for the report output and the catalog where you want to save the report output. Select **OK** to save the report output or **Cancel** to cancel the save. If the report output name exists, you are prompted to type a new name or to select **OK** again to write over the existing report output.

You can view a selection list of existing OUTPUT entries and catalogs in the same manner as described in the previous section.

Report output is saved as type OUTPUT. You can access your saved output using the Result Manager or the Report Output Manager. Refer to Chapter 9, “Doing More with Results,” on page 145 for additional information.

Saving a Report to an External File

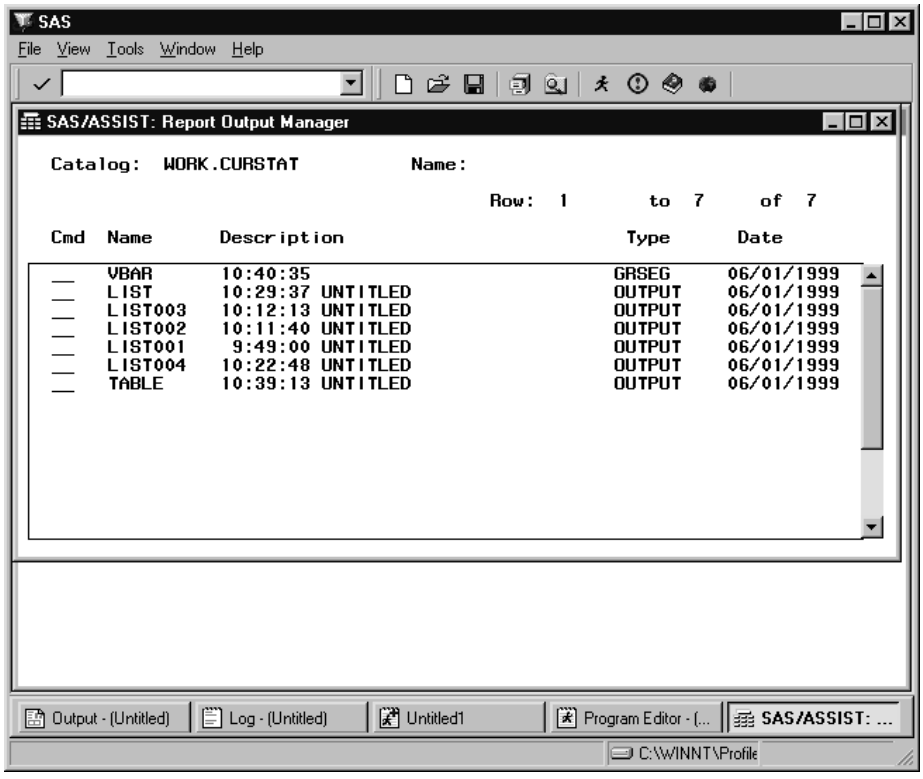
Before you save your report to an external file, make sure that the value for the **`Output window`** User Profile option is set to **`Report`** in your user profile. See Appendix 2, “Customizing SAS/ASSIST Software,” on page 241 for more information.

To save the report to an external file, follow this path from the Report Engine Window or the Report Output Window:

View ▶ Report Output Manager

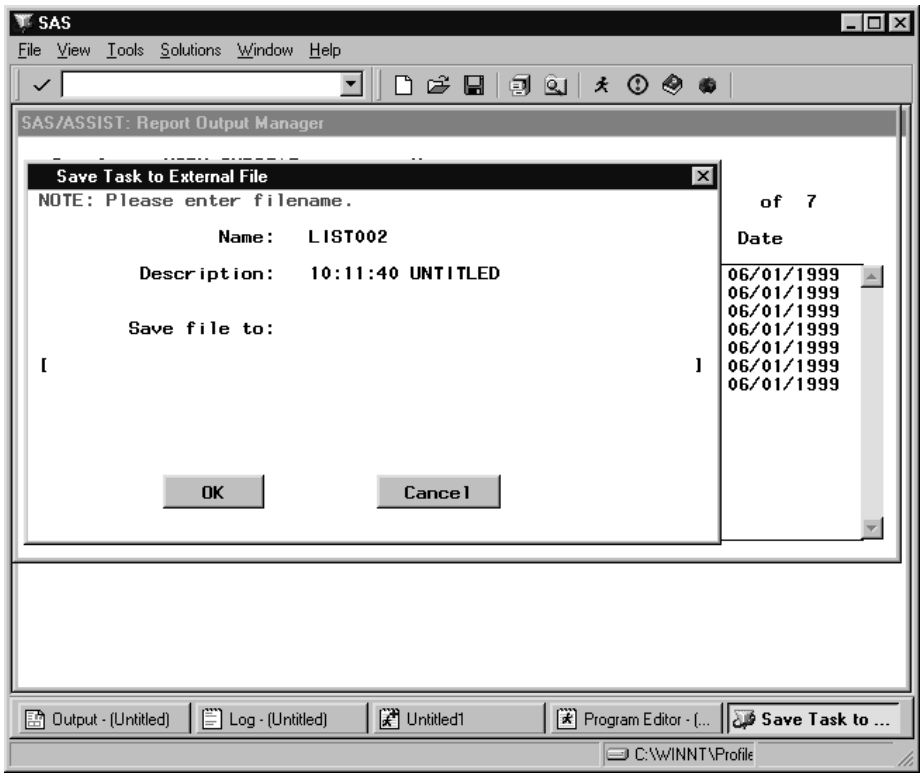
The Report Output Manager window appears as shown in the following display.

Display 5.13 Report Output Manager Window



Type **`F`** (for File) in the **`Cmd`** field next to the report you want to save and press ENTER. The Save Task to External File window appears as shown in the following display.

Display 5.14 Save Task to External File Window

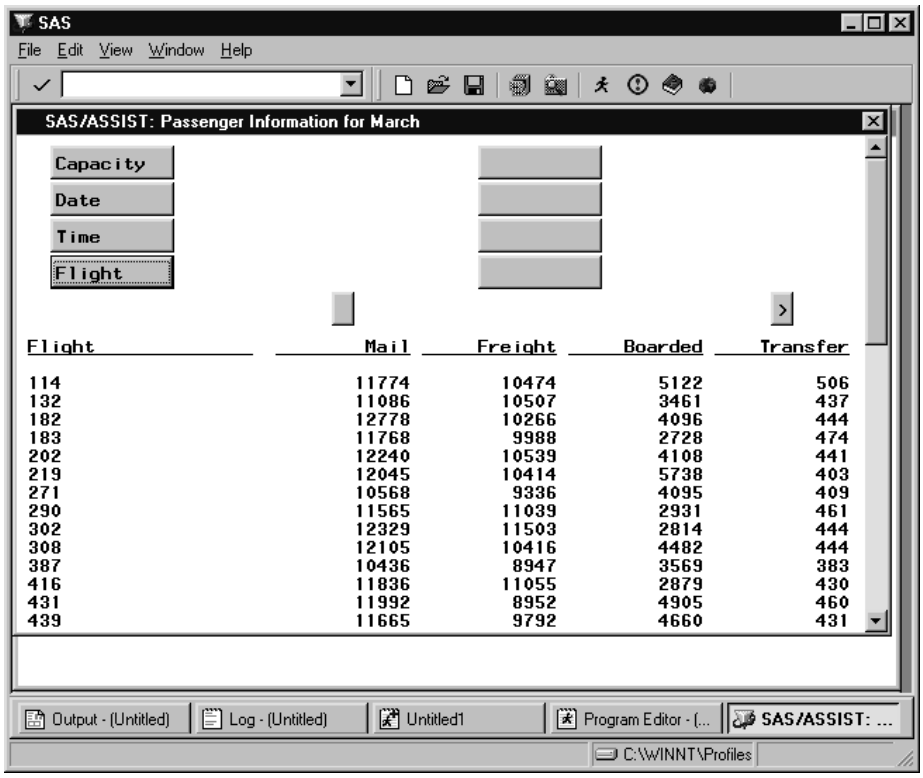


In the **Save file to** field, type the name of the external file where you want to store the report and select **OK**. Select **Close** from the **File** menu to return to the Report Engine window.

Saving a Dynamic Report as a SAS Table

Dynamic (or drilldown) reports are described in detail in the "Using the Report Engine" chapter of *Getting Started with the SAS System Using SAS/ASSIST Software*. You can save the information for a column in a dynamic report to a SAS table or view. For example, if you select **Flight** to see the column values for the aggregation level as shown in the following display, you can save the data in the report to a SAS table or view.

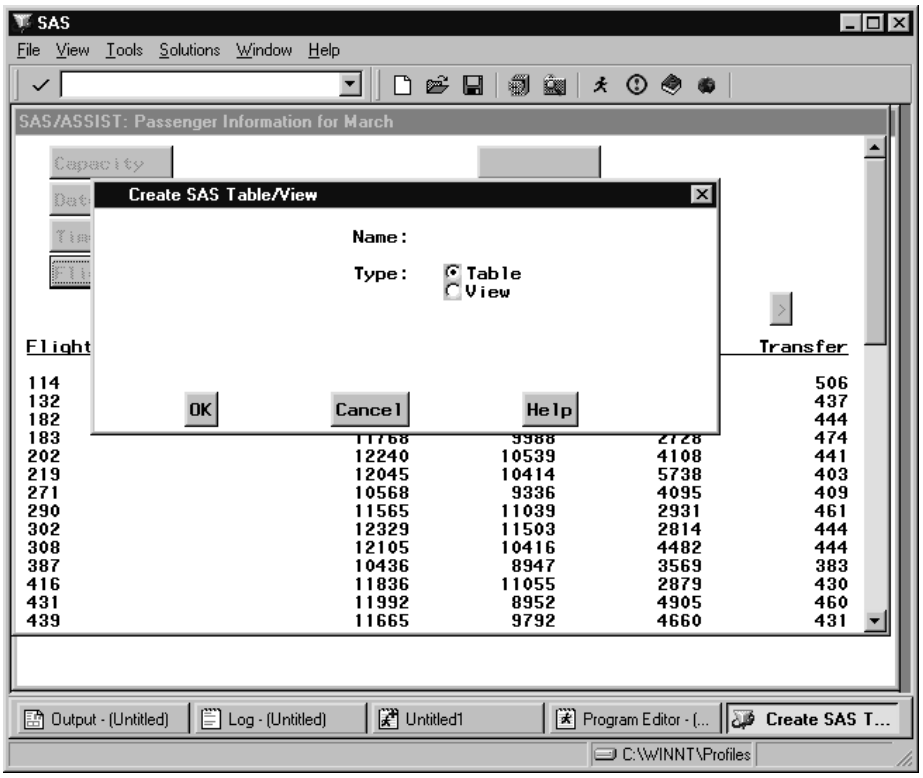
Display 5.15 Dynamic Report With Flight Information



To save information from a dynamic report to a SAS table, follow these instructions:

1 Select **`Save As SAS Table...`** from the **`File`** menu. The Create SAS Table/View window appears.

Display 5.16 Create SAS Table/View Window

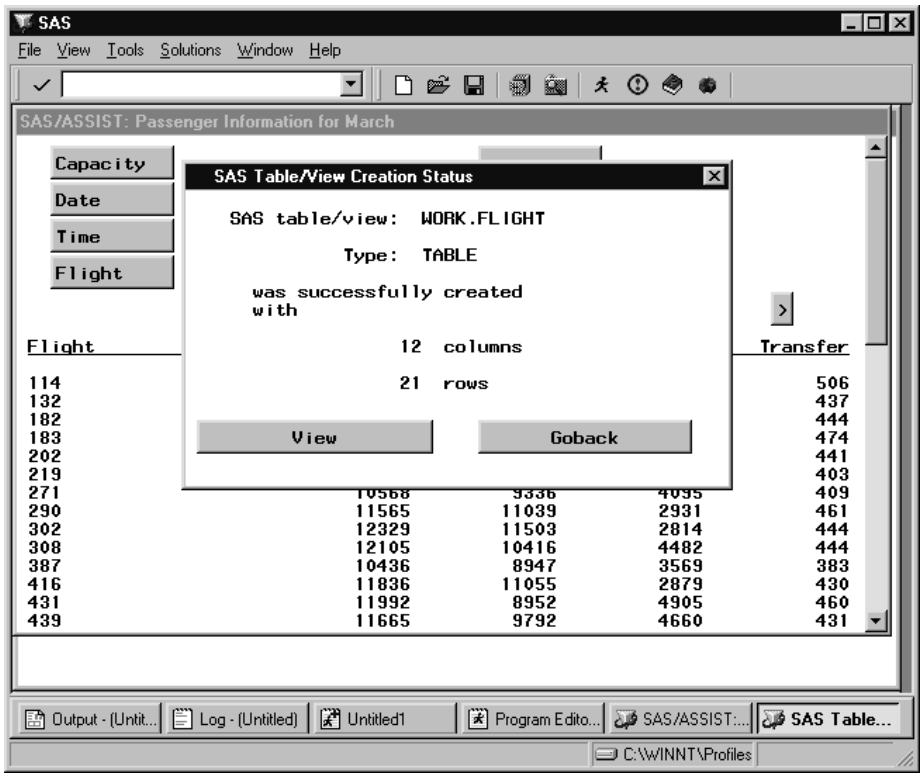


2 In the **Name** field, type the two-level name of the SAS table or view that you want to create. If you omit the libname, the table is placed in the temporary WORK library.

3 Select **Table** or **View** for the **Type**.

4 Select **OK**. The SAS Table/View Creation Status window appears, as shown in the following display, indicating that the table or view was created.

Display 5.17 SAS Table/View Creation Status Window

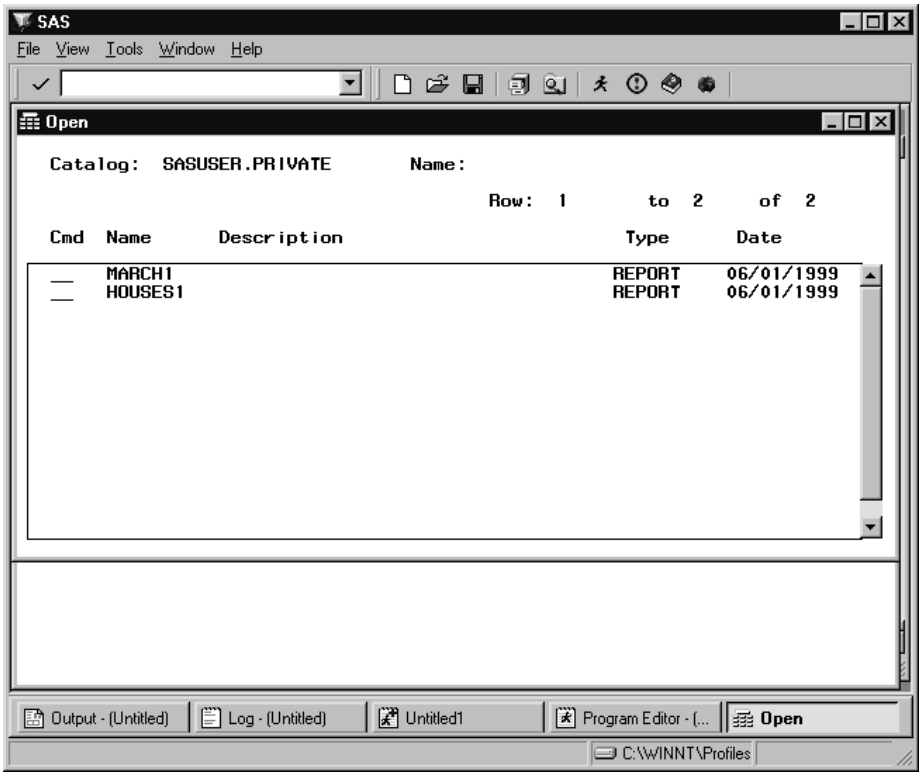


5 Select **View** to browse the table or view that you just created. After you have finished browsing the table or view, select **Close** from the **File** menu to return to the SAS Table/View Creation Status window. Select **Goback** to return to the Dynamic Report window.

Opening an Existing Report

To open an existing report from the Report Engine window, select **Open** from the **File** menu. The Open window appears, as shown in the following display.

Display 5.18 Open Window for Reports



You can type **S** in the **Cmd** field and press ENTER to select and open a report in the Report Engine window. To sort the reports, select **Sort By** from the **Edit** menu and select **Name**, **Description**, or **Date** to reorder the reports listed.

Selecting Other Data

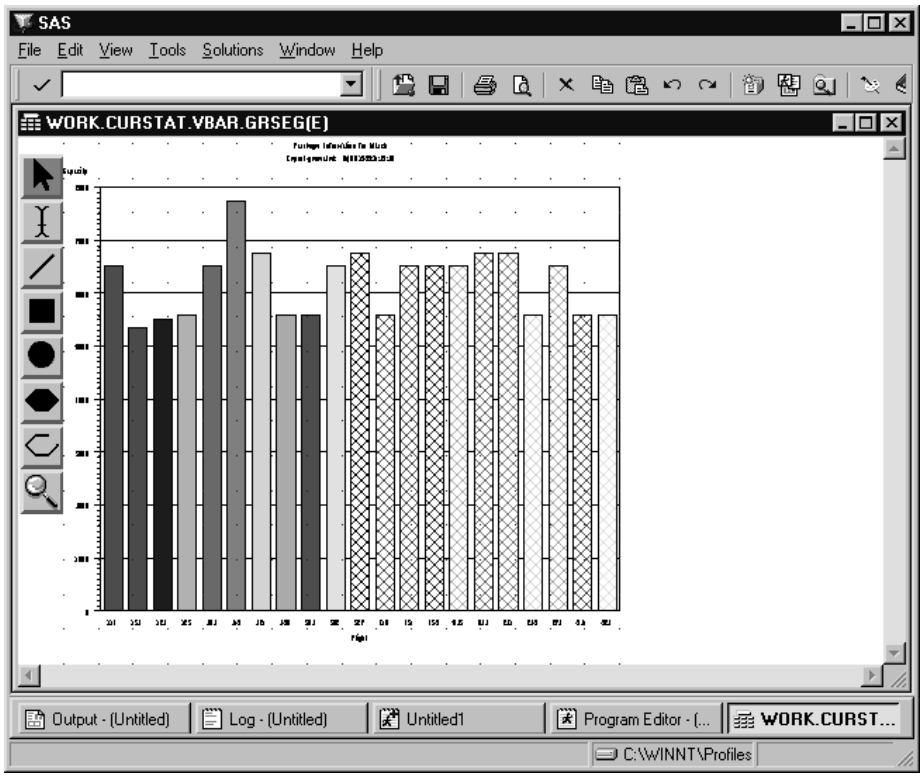
In the Report Engine window, you can select new tables and queries and retain modified column information. For example, you may have a query that is based on the AIRLINE.MARCH data file. If you change the format for the **Departure date** column from DATE7. to DATE9. for the report and then select another query with a **Departure date** column, the new report also uses the DATE9. format.

To select another query or table, fill in the **Data** and **Type** fields as described in "Opening and Using the Report Engine Window" on page 62.

Editing a Graph Interactively

If you create a graph, you can edit the graph interactively. From the Report Output window, select **Edit Report** from the **Edit** menu to invoke the SAS/GRAPH software interactive graphics editor, as shown in the following display. You must have SAS/GRAPH software installed to edit a graph interactively. Refer to the online help for this window for more information.

Display 5.19 Editing a Graph Interactively



To return to the Report Output window, select **End** from the **File** menu.

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