

## CHAPTER

## 1

## Getting Started with the Output Delivery System

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### Introduction to the Output Delivery System

The Output Delivery System (ODS) gives you greater flexibility in generating, storing, and reproducing SAS procedure and DATA step output with a wide range of formatting options. ODS provides formatting functionality that is not available from individual procedures or from the DATA step alone. ODS overcomes these limitations and enables you to format your output more easily. You can customize the presentation of your SAS output or you can customize the look of a single output object.

Prior to Version 7, most SAS procedures generated output that was designed for a traditional line-printer. This type of output has limitations that prevents you from getting the most value from your results:

- Traditional SAS output is limited to monospace fonts. With today's desktop document editors and publishing systems, you need more versatility in printed output.
- Some commonly used procedures do not produce output data sets. Prior to ODS, if you wanted to use output from one of these procedures as input to another procedure, then you relied on PROC PRINTTO and the DATA step to retrieve results.

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### A Quick Start to Using ODS

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#### The Purpose of These Examples

The following examples are designed to help you get up and running quickly with ODS. Use them to learn how to produce output that contains more interesting formatting. Then, to learn more about the depth, breadth, and true power of ODS, see "Introduction to the Output Delivery System" on page 3.

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## Creating Listing Output

Creating the listing output is simple –just run a DATA step or PROC step as usual. By default, the LISTING destination is on, and the DATA step and Base SAS procedures create listing output through ODS:

```
options source pagesize=60 linesize=80 nodate;

data employee_data;
  input IdNumber $ 1-4 LastName $ 9-19 FirstName $ 20-29
        City $ 30-42 State $ 43-44 /
        Gender $ 1 JobCode $ 9-11 Salary 20-29 @30 Birth date9.
        @43 Hired date9. HomePhone $ 54-65;
  format birth hired date9.;

      datalines;
1919  Adams      Gerald      Stamford   CT
M     TA2        34376      15SEP48    07JUN75    203/781-1255
1653  Alexander   Susan      Bridgeport CT
F     ME2        35108      18OCT52    12AUG78    203/675-7715
1400  Apple       Troy       New York   NY
M     ME1        29769      08NOV55    19OCT78    212/586-0808
1350  Arthur     Barbara    New York   NY
F     FA3        32886      03SEP53    01AUG78    718/383-1549
1401  Avery      Jerry      Paterson   NJ
M     TA3        38822      16DEC38    20NOV73    201/732-8787
1499  Barefoot   Joseph    Princeton NJ
M     ME3        43025      29APR42    10JUN68    201/812-5665
1101  Baucom     Walter     New York   NY
M     SCP        18723      09JUN50    04OCT78    212/586-8060
1333  Blair     Justin     Stamford   CT
M     PT2        88606      02APR49    13FEB69    203/781-1777
1402  Blalock   Ralph     New York   NY
M     TA2        32615      20JAN51    05DEC78    718/384-2849
1479  Bostic    Marie     New York   NY
F     TA3        38785      25DEC56    08OCT77    718/384-8816
1403  Bowden    Earl      Bridgeport CT
M     ME1        28072      31JAN57    24DEC79    203/675-3434
1739  Boyce     Jonathan  New York   NY
M     PT1        66517      28DEC52    30JAN79    212/587-1247
1658  Bradley   Jeremy    New York   NY
M     SCP        17943      11APR55    03MAR80    212/587-3622
1428  Brady     Christine Stamford   CT
F     PT1        68767      07APR58    19NOV79    203/781-1212
1407  Grant     Daniel    Mt. Vernon NY
M     PT1        68096      26MAR57    21MAR78    914/468-1616
1114  Green     Janice    New York   NY
F     TA2        32928      21SEP57    30JUN75    212/588-1092
;

proc print data=employee_data(obs=12);
  id idnumber;
  title 'Personnel Data';
run;
```

**Output 1.1** Listing Output

Personnel Data							1
Id Number	LastName	First Name	City	State	Gender	Job Code	
1919	Adams	Gerald	Stamford	CT	M	TA2	
1653	Alexander	Susan	Bridgeport	CT	F	ME2	
1400	Apple	Troy	New York	NY	M	ME1	
1350	Arthur	Barbara	New York	NY	F	FA3	
1401	Avery	Jerry	Paterson	NJ	M	TA3	
1499	Barefoot	Joseph	Princeton	NJ	M	ME3	
1101	Baucom	Walter	New York	NY	M	SCP	
1333	Blair	Justin	Stamford	CT	M	PT2	
1402	Blalock	Ralph	New York	NY	M	TA2	
1479	Bostic	Marie	New York	NY	F	TA3	
1403	Bowden	Earl	Bridgeport	CT	M	ME1	
1739	Boyce	Jonathan	New York	NY	M	PT1	

Id Number	Salary	Birth	Hired	HomePhone
1919	34376	15SEP1948	07JUN1975	203/781-1255
1653	35108	18OCT1952	12AUG1978	203/675-7715
1400	29769	08NOV1955	19OCT1978	212/586-0808
1350	32886	03SEP1953	01AUG1978	718/383-1549
1401	38822	16DEC1938	20NOV1973	201/732-8787
1499	43025	29APR1942	10JUN1968	201/812-5665
1101	18723	09JUN1950	04OCT1978	212/586-8060
1333	88606	02APR1949	13FEB1969	203/781-1777
1402	32615	20JAN1951	05DEC1978	718/384-2849
1479	38785	25DEC1956	08OCT1977	718/384-8816
1403	28072	31JAN1957	24DEC1979	203/675-3434
1739	66517	28DEC1952	30JAN1979	212/587-1247

Listing output is the default format; therefore, when you request another format, your programs will create both listing output and output in the requested format. To prevent listing output from being created, use this statement:

```
ods listing close;
```

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## Creating Output in HTML Format

If you want to display output from a SAS program from the web, you can use ODS to create output that is formatted in Hypertext Markup Language (HTML). To create HTML output, use the ODS HTML statement:

```
ods html file='external-file-for-HTML-output';
```

If you do not want to generate listing output in addition to the HTML output, then use this statement:

```
ods listing close;
```

The following program contains a PROC PRINT step that produces output in HTML, but does not produce the default listing output. You can browse this output with Internet Explorer, Netscape, or any other browser that fully supports HTML 3.2 or later.

```
ods listing close;
ods html file='external-file-for-HTML-output';
```

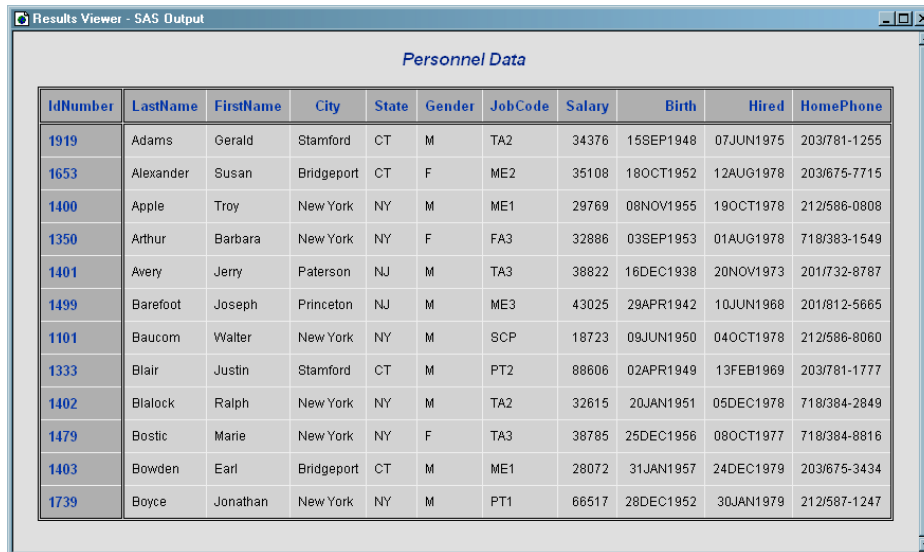
```
proc print data=employee_data(obs=12);
  id idnumber;
  title 'Personnel Data';
run;

ods html close;
ods listing;
```

Note the two ODS statements that follow the PROC PRINT step. To be able to browse your HTML files in a browser, you must execute the ODS HTML CLOSE statement. It is simply good practice to reset ODS to listing output, which is the default setting.

### Display 1.1 HTML 3.2 Output

The following output is formatted in HTML 3.2 output and viewed in an Internet Explorer 5.0 browser.



The screenshot shows a window titled 'Results Viewer - SAS Output' displaying a table of personnel data. The table has 11 columns: IdNumber, LastName, FirstName, City, State, Gender, JobCode, Salary, Birth, Hired, and HomePhone. The data is presented in a grid format with alternating row colors.

IdNumber	LastName	FirstName	City	State	Gender	JobCode	Salary	Birth	Hired	HomePhone
1919	Adams	Gerald	Stamford	CT	M	TA2	34376	15SEP1948	07JUN1975	203/781-1255
1653	Alexander	Susan	Bridgeport	CT	F	ME2	35108	18OCT1952	12AUG1978	203/675-7715
1400	Apple	Troy	New York	NY	M	ME1	29769	08NOV1955	19OCT1978	212/586-0808
1350	Arthur	Barbara	New York	NY	F	FA3	32886	03SEP1953	01AUG1978	718/383-1549
1401	Avery	Jerry	Paterson	NJ	M	TA3	38822	16DEC1938	20NOV1973	201/732-8787
1499	Barefoot	Joseph	Princeton	NJ	M	ME3	43025	29APR1942	10JUN1968	201/812-5665
1101	Baucom	Walter	New York	NY	M	SCP	18723	09JUN1950	04OCT1978	212/586-8060
1333	Blair	Justin	Stamford	CT	M	PT2	88606	02APR1949	13FEB1969	203/781-1777
1402	Bialock	Ralph	New York	NY	M	TA2	32615	20JAN1951	05DEC1978	718/384-2849
1479	Bostic	Marie	New York	NY	F	TA3	38785	25DEC1956	08OCT1977	718/384-8816
1403	Bowden	Earl	Bridgeport	CT	M	ME1	28072	31JAN1957	24DEC1979	203/675-3434
1739	Boyce	Jonathan	New York	NY	M	PT1	66517	28DEC1952	30JAN1979	212/587-1247

## Producing Output in Multiple Formats at the Same Time

A simple way to produce output in multiple formats at one time is to produce the default listing output and then request an additional format, such as HTML, PDF, RTF, or PostScript.

```
ods html file='HTML-file-pathname.html';
ods pdf file='PDF-file-pathname.pdf';
ods rtf file='RTF-file-pathname.rtf';
ods ps file='PS-file-pathname.ps';

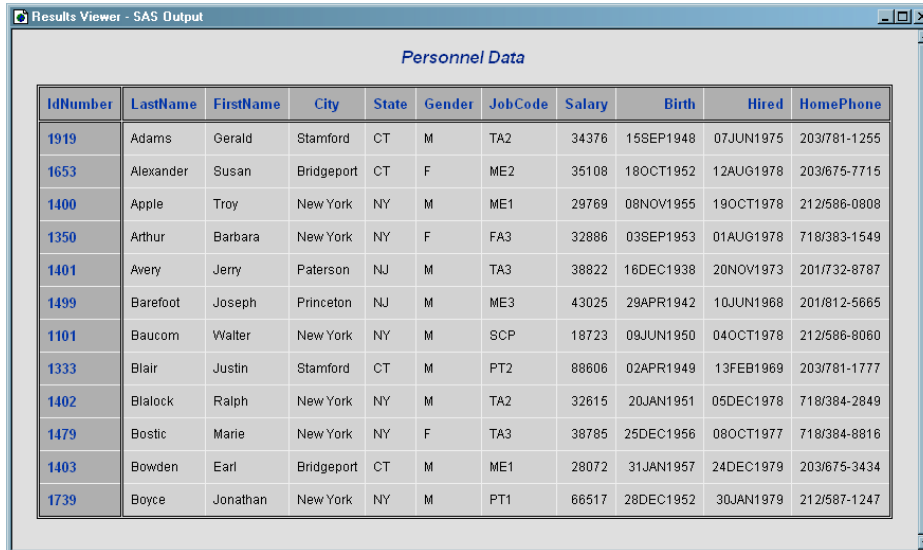
proc print data=employee_data(obs=12);
  id idnumber;
  title 'Personnel Data';
run;

ods _all_ close;
ods listing;
```

Note the two ODS statements that follow the PROC statement. The first one closes all files so that you can use them (for example, you could browse the HTML file or send the PDF file to a printer). The final statement opens the LISTING destination so that ODS returns to producing listing output for subsequent DATA or PROC steps in the current session.

### Display 1.2 HTML 3.2 Output

The following output is formatted in HTML 3.2 output and viewed in an Internet Explorer 5.0 browser.

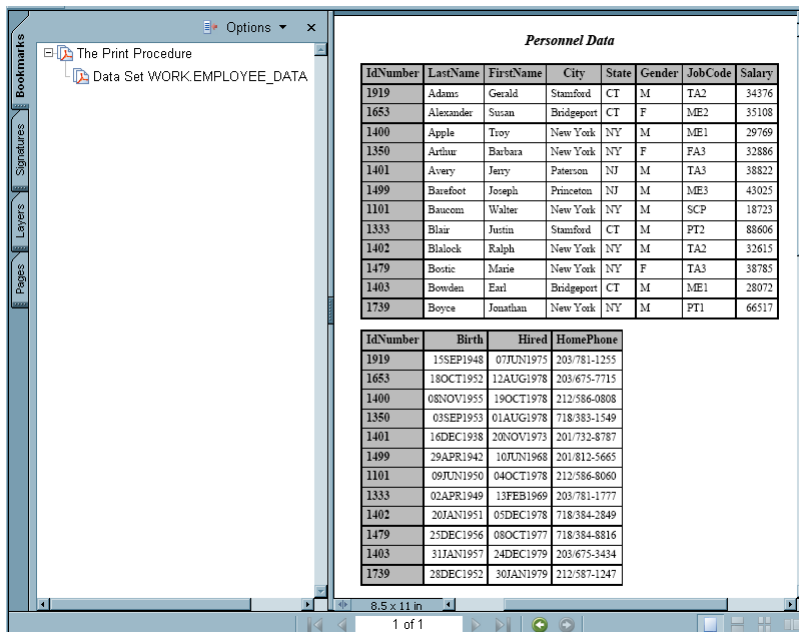


The screenshot shows a window titled "Results Viewer - SAS Output" displaying a table titled "Personnel Data". The table has 11 columns: IdNumber, LastName, FirstName, City, State, Gender, JobCode, Salary, Birth, Hired, and HomePhone. The data is presented in a standard HTML table format with a blue header row.

IdNumber	LastName	FirstName	City	State	Gender	JobCode	Salary	Birth	Hired	HomePhone
1919	Adams	Gerald	Stamford	CT	M	TA2	34376	15SEP1948	07JUN1975	203/781-1255
1653	Alexander	Susan	Bridgeport	CT	F	ME2	35108	18OCT1952	12AUG1978	203/675-7715
1400	Apple	Troy	New York	NY	M	ME1	29769	08NOV1955	19OCT1978	212/586-0808
1350	Arthur	Barbara	New York	NY	F	FA3	32886	03SEP1953	01AUG1978	718/383-1549
1401	Avery	Jerry	Paterson	NJ	M	TA3	38822	16DEC1938	20NOV1973	201/732-8787
1499	Barefoot	Joseph	Princeton	NJ	M	ME3	43025	29APR1942	10JUN1968	201/812-5665
1101	Baucum	Walter	New York	NY	M	SCP	18723	09JUN1950	04OCT1978	212/586-8060
1333	Blair	Justin	Stamford	CT	M	PT2	88606	02APR1949	13FEB1969	203/781-1777
1402	Blalock	Ralph	New York	NY	M	TA2	32615	20JAN1951	05DEC1978	718/384-2849
1479	Bostic	Marie	New York	NY	F	TA3	38785	25DEC1956	08OCT1977	718/384-8816
1403	Bowden	Earl	Bridgeport	CT	M	ME1	28072	31JAN1957	24DEC1979	203/675-3434
1739	Boyce	Jonathan	New York	NY	M	PT1	66517	28DEC1952	30JAN1979	212/587-1247

### Display 1.3 PDF Output

The following output is formatted in PDF and viewed with Adobe Acrobat.



The screenshot shows a PDF viewer window titled "The Print Procedure" with a bookmark for "Data Set WORK.EMPLOYEE\_DATA". The PDF content displays the same "Personnel Data" table as in Display 1.2, but in a PDF format. The table is split into two sections: the first section lists employee details (IdNumber, LastName, FirstName, City, State, Gender, JobCode, Salary) and the second section lists birth, hired, and home phone information (IdNumber, Birth, Hired, HomePhone).

IdNumber	LastName	FirstName	City	State	Gender	JobCode	Salary
1919	Adams	Gerald	Stamford	CT	M	TA2	34376
1653	Alexander	Susan	Bridgeport	CT	F	ME2	35108
1400	Apple	Troy	New York	NY	M	ME1	29769
1350	Arthur	Barbara	New York	NY	F	FA3	32886
1401	Avery	Jerry	Paterson	NJ	M	TA3	38822
1499	Barefoot	Joseph	Princeton	NJ	M	ME3	43025
1101	Baucum	Walter	New York	NY	M	SCP	18723
1333	Blair	Justin	Stamford	CT	M	PT2	88606
1402	Blalock	Ralph	New York	NY	M	TA2	32615
1479	Bostic	Marie	New York	NY	F	TA3	38785
1403	Bowden	Earl	Bridgeport	CT	M	ME1	28072
1739	Boyce	Jonathan	New York	NY	M	PT1	66517

IdNumber	Birth	Hired	HomePhone
1919	15SEP1948	07JUN1975	203/781-1255
1653	18OCT1952	12AUG1978	203/675-7715
1400	08NOV1955	19OCT1978	212/586-0808
1350	03SEP1953	01AUG1978	718/383-1549
1401	16DEC1938	20NOV1973	201/732-8787
1499	29APR1942	10JUN1968	201/812-5665
1101	09JUN1950	04OCT1978	212/586-8060
1333	02APR1949	13FEB1969	203/781-1777
1402	20JAN1951	05DEC1978	718/384-2849
1479	25DEC1956	08OCT1977	718/384-8816
1403	31JAN1957	24DEC1979	203/675-3434
1739	28DEC1952	30JAN1979	212/587-1247

### Display 1.4 RTF Output

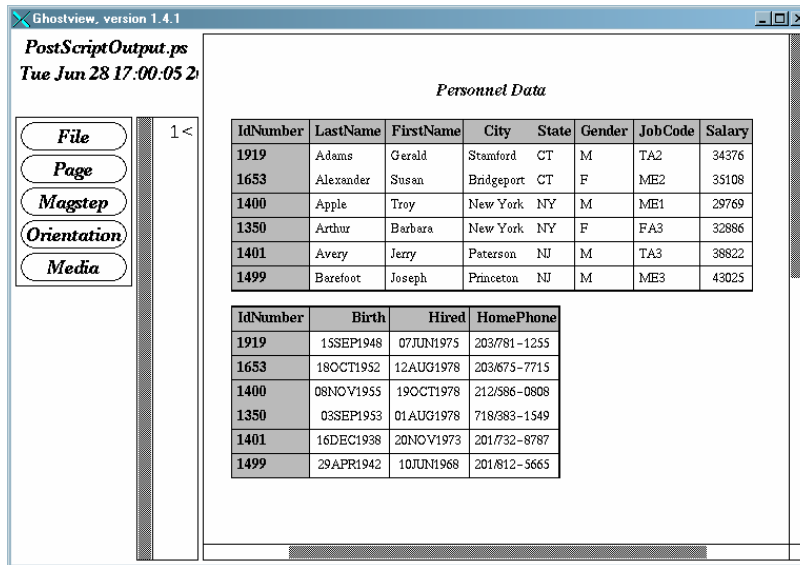
The following RTF output is viewed with Microsoft Word 2000.

*Personnel Data*

IdNumber	LastName	FirstName	City	State	Gender	JobCode	Salary	Birth	Hired	HomePhone
1919	Adams	Gerald	Stamford	CT	M	TA2	34376	15SEP1948	07JUN1975	203/781-1255
1653	Alexander	Susan	Bridgeport	CT	F	ME2	35108	18OCT1952	12AUG1978	203/675-7715
1400	Apple	Troy	New York	NY	M	ME1	29769	08NOV1955	19OCT1978	212/586-0808
1350	Arthur	Barbara	New York	NY	F	FA3	32886	03SEP1953	01AUG1978	718/383-1549
1401	Avery	Jerry	Paterson	NJ	M	TA3	38822	16DEC1938	20NOV1973	201/732-8787
1499	Barefoot	Joseph	Princeton	NJ	M	ME3	43025	29APR1942	10JUN1968	201/812-5665
1101	Baucom	Walter	New York	NY	M	SCP	18723	09JUN1950	04OCT1978	212/586-3060
1333	Blair	Justin	Stamford	CT	M	PT2	88606	02APR1949	13FEB1969	203/781-1777
1402	Blalock	Ralph	New York	NY	M	TA2	32615	20JAN1951	05DEC1978	718/384-2849
1479	Bostic	Marie	New York	NY	F	TA3	38785	25DEC1956	08OCT1977	718/384-8816
1403	Bowden	Earl	Bridgeport	CT	M	ME1	28072	31JAN1957	24DEC1979	203/675-3434
1739	Boyce	Jonathan	New York	NY	M	PT1	66517	28DEC1952	30JAN1979	212/587-1247

### Display 1.5 PostScript Output

The following PostScript output is viewed with Ghostview.



**Output 1.2** Listing Output

This output is traditional SAS listing output.

Personnel Data											5
Id		First		Job							
Number	LastName	Name	City	State	Gender	Code	Salary	Birth	Hired	HomePhone	
1919	Adams	Gerald	Stamford	CT	M	TA2	34376	15SEP1948	07JUN1975	203/781-1255	
1653	Alexander	Susan	Bridgeport	CT	F	ME2	35108	18OCT1952	12AUG1978	203/675-7715	
1400	Apple	Troy	New York	NY	M	ME1	29769	08NOV1955	19OCT1978	212/586-0808	
1350	Arthur	Barbara	New York	NY	F	FA3	32886	03SEP1953	01AUG1978	718/383-1549	
1401	Avery	Jerry	Paterson	NJ	M	TA3	38822	16DEC1938	20NOV1973	201/732-8787	
1499	Barefoot	Joseph	Princeton	NJ	M	ME3	43025	29APR1942	10JUN1968	201/812-5665	
1101	Baucom	Walter	New York	NY	M	SCP	18723	09JUN1950	04OCT1978	212/586-8060	
1333	Blair	Justin	Stamford	CT	M	PT2	88606	02APR1949	13FEB1969	203/781-1777	
1402	Blalock	Ralph	New York	NY	M	TA2	32615	20JAN1951	05DEC1978	718/384-2849	
1479	Bostic	Marie	New York	NY	F	TA3	38785	25DEC1956	08OCT1977	718/384-8816	
1403	Bowden	Earl	Bridgeport	CT	M	ME1	28072	31JAN1957	24DEC1979	203/675-3434	
1739	Boyce	Jonathan	New York	NY	M	PT1	66517	28DEC1952	30JAN1979	212/587-1247	

**Where to Go from Here**

- *Examples of ODS output:* To see the types of output that you can create with ODS, see “Gallery of ODS Samples” on page 14.
- *Essential concepts in ODS:* For concepts that will help you to understand and to use ODS to your best advantage, see “Introduction to the Output Delivery System” on page 3.
- *Creating more complex HTML pages:* With ODS, you can create HTML pages that include a frame and a table of contents. For more information, see “ODS HTML Statement” on page 101 and Appendix 2, “ODS and the HTML Destination,” on page 677. You can see many examples of HTML output in *Base SAS Procedures Guide* online documentation.
- *ODS statements:* For reference information on the ODS statements, see Chapter 5, “Dictionary of ODS Language Statements,” on page 67. These statements control the many features of the Output Delivery System.
- *Using ODS with the DATA step:* With the addition of ODS-related options to the FILE and PUT statements, you can use ODS to produce enhanced DATA step reports. See Chapter 3, “Output Delivery System and the DATA Step,” on page 39.
- *Creating your own templates:* For even more control over formatting, you can create your own templates for formatting output. See Chapter 7, “TEMPLATE Procedure: Overview,” on page 293.

