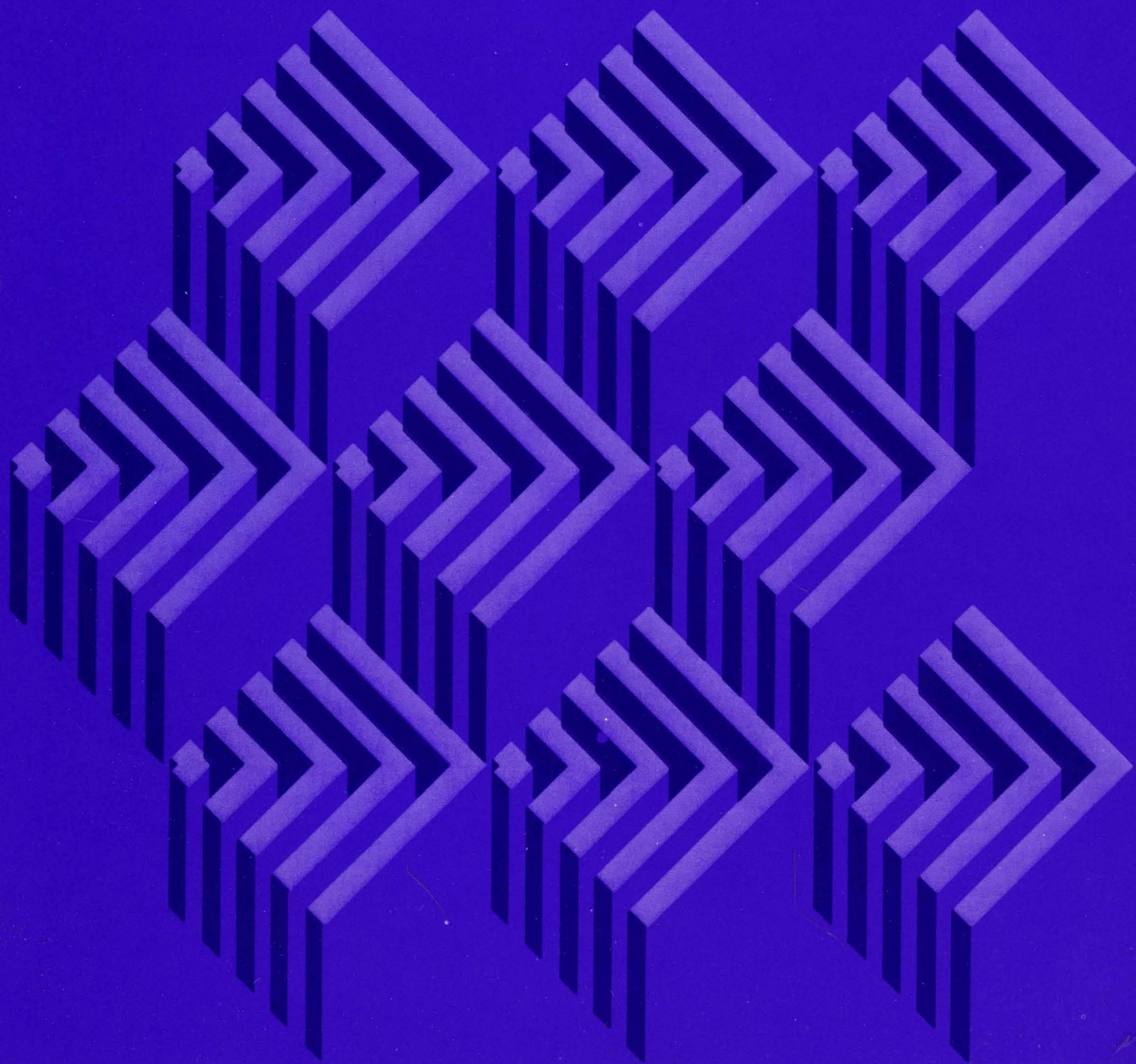




**IBM Displaywriter System  
Guide To  
File Design And Use**



S544-2031-0

**IBM Displaywriter System  
Guide to  
File Design and Use**



### **First Edition (December 1981)**

This publication is for planning purposes. The information herein is subject to change before the products described become available.

This guide contains examples of the types of letters and reports used in daily business operations. To illustrate these examples as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and address used by an actual business enterprise is entirely coincidental.

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### PURPOSE

This publication is designed to serve as an aid for the person(s) responsible for designing files on the IBM Displaywriter System. It includes general files concepts and a detailed description of files and the text documents used with files. This publication is not intended for use as a general training manual. There is a list of related training material under the heading "Related Publications."

### AUDIENCE

This publication is intended for the office personnel responsible for designing files on the IBM Displaywriter System. You do not need to know how to operate the IBM Displaywriter System to use this publication. However, if you will be operating the IBM Displaywriter System as well as designing the files, you may want to complete the operator training prior to using this publication.

Previous knowledge of text processing or files use is helpful, but not mandatory, to use this manual. You must, however, be familiar with the intended files applications and workflow in your organization.

### CONTENTS

This manual contains fourteen chapters and three appendixes:

- "Chapter 1. Introduction" contains an overview of this publication.
- "Chapter 2. What is A File?" introduces general files concepts and defines the characteristics of IBM Displaywriter System files.
- "Chapter 3. Designing a File" contains information about analysis of current information handling, an alternate file type, and potential design problems.
- "Chapter 4. Creating a File" contains information about the possible sources of IBM Displaywriter files. These sources include typing the file,

converting it from text, and having it communicated from a computer.

- "Chapter 5. File Output" explains the options for printing a file or storing the completed output on diskette. It also explains the options for printing unformatted file output and merging a file with text to produce letters, reports, and lists.
- "Chapter 6. Selecting Records" explains how certain records can be chosen from the file for use.
- "Chapter 7. Sorting Records" explains how records can be placed in either alphabetical or numeric order during output.
- "Chapter 8. Math Instructions" contains information about using math calculations in reports and letters.
- "Chapter 9. Storing Math Formats and File Setups" explains how numbers from the file and from math calculations can be formatted so that they print differently depending on the format used. Stored setups for storing the selection criteria and sort fields are also explained.
- "Chapter 10. Repetitive Letters" contains detailed information about merging files with a shell document to produce personalized form letters.
- "Chapter 11. Reports" contains detailed information about merging several records with a shell document to produce a summary report with grouped information.
- "Chapter 12. Reports That Look Like Letters" explains how a personalized form letter can be created that uses information from more than one record.
- "Chapter 13. File Lists" explains how multi-column file lists are created.
- "Chapter 14. Evaluating and Correcting File Problems" contains tips on identifying and correcting problems in faulty file design.
- "Appendix A. Worksheets" contains blank worksheets that can be copied and used for files design.
- "Appendix B. Character Sort Chart" contains a sort chart that shows the character order that the system uses when it sorts records.

- "Appendix C. Converting Text Into Records" contains the rules and considerations for converting a text document into a file.

## RELATED PUBLICATIONS

The other available publications in the IBM Displaywriter System Library include:

- General Information Manual for the IBM Displaywriter System, (G544-0851). This manual provides an introduction to the IBM Displaywriter System. It contains a description of the Displaywriter System components, the functions performed by the various Displaywriter System licensed programs, and examples of some text and record applications.
- Customer Planning Guide for the IBM Displaywriter System, (S544-0852). This manual provides the information the customer needs to prepare for the arrival and setup of the system. The manual discusses such topics as the size and weight of system components, the required system operating environment, and space requirements.
- IBM Displaywriter System Customer Setup Guide, (S544-0858). This guide gives detailed step-by-step instructions for system setup. With this guide, customer personnel can, without training or tools, unpack system components, arrange them in a work area, connect power cords and intermachine cables, prepare units for operation, and run the system verifier test. This guide is shipped with the system.
- IBM Displaywriter System Operator Training Book 1 — Basic Topics Textpack 4, (S544-2034). This manual is the beginning instruction book for the IBM Displaywriter System. It should be completed by all operators. Once operators complete their training with this book, they should be able to perform basic tasks on an IBM Displaywriter System.
- IBM Displaywriter System Operator Training Book 2 — Selectable Topics Textpack 4, (S544-2035). This manual is the second instruction book for the IBM Displaywriter System. It is to be used after the operator has completed Book 1 — Basic Topics. This manual contains information about topics that not all operators need. Operators should complete only those topics relevant to their work.

- IBM Displaywriter System Operator Training — Reportpack, (S544-2030). This manual is the instruction book for using the Reportpack feature on the IBM Displaywriter System. This manual contains information about topics that not all operators need. An operator should complete only those topics relevant to his or her work. A prerequisite for starting this book is completion of the IBM Displaywriter System Operator Training Book 1 — Basic Topics Textpack 4.
- IBM Displaywriter System Problem Determination Guide, (S544-0860). This manual, a part of the IBM Displaywriter System Reference Package Materials, list problems that may occur during the operation of the system. It also describes the procedures that an operator can follow to determine both the cause of the problem and the solution.
- IBM Displaywriter System Work Station Procedures Guides — Textpack 4, (S544-2037). This manual, a part of the IBM Displaywriter System Training/Reference Materials from Textpack 4, is designed to be a bridge between the Operator Training Books and the customer's own work. The "Procedure Guide" section includes guidelines and suggestions for setting up procedures for program and work diskette handling and printer sharing. The "Work Samples Handbook" section contains work samples with step-by-step instructions for processing a document.
- IBM Displaywriter System Work Station Procedures Guide — Reportpack, (S544-2033). This manual is designed to be a bridge between the Operator Training Books and the customer's own file applications. The "Procedures Guide" section contains guidelines and suggestions for setting up procedures for program and work diskette handling. The "Work Samples Handbook" section contains work samples with step-by-step instructions for processing file related documents.
- IBM Displaywriter System Operator Reference Guide — Textpack 4/Reportpack (S544-2032). This manual is the basic reference book for the IBM Displaywriter System's functions, parameters, and possible options. It is a detailed guide to the system. It includes system information, menus, and a quick reference section.
- IBM Displaywriter System Prompts And Messages Guide — Textpack 4/Reportpack, (S544-2021). This manual lists the prompts and messages that appear on the display to guide and inform an operator. The listing

indicates when a prompt or message occurs and actions an operator can take when a response is needed.

IBM Displaywriter System Office Systems Support Center Guide, (S544-0874). This manual contains a description of the services offered, procedures to follow, and information about what to expect when calling the IBM Office Systems Support Center.



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Almost every organization needs stored files of information that are complete, easily accessed, and usable in a variety of ways. These files include personnel files, inventories, lists of customers and suppliers, telephone directories, and other types of information. The file information is used daily to develop a variety of administrative lists, directories, schedules, project and program reports, and letters.

The IBM Displaywriter System is designed to help you handle your files management needs, as well as your text processing needs. The IBM Displaywriter System functions are provided by licensed programs which are contained on diskettes. The IBM Displaywriter System Textpack 4 Licensed Program supports your text processing applications, such as creating and revising documents. The IBM Displaywriter System Reportpack Licensed Program supports the creation, storage, and revision of files. Text created on the Displaywriter can be merged with the files to produce form letters, lists, and reports.

With the IBM Displaywriter System, an operator may create a file of client information and use that file to generate a list of client names and addresses, send personalized letters to selected clients on the list, and prepare a report that summarizes client information.

### HOW TO USE THIS GUIDE

Successful use of a file depends on the proper design of the file. Before you can decide what information should be in a file and in what form, you must determine what the final output documents from the file will be, and you must be aware of the IBM Displaywriter System's capabilities. This guide is designed to give you all the information you need to design and use a file successfully. In some parts of this guide, you may find more information than you need for your application. In that case, simply look through the additional information so that you are aware it is there.

### Using the Worksheets

This guide contains several worksheets that serve as a tool as you design and use your file. These worksheets have three purposes:



1. You can use the worksheets to collect and organize the information necessary to create the file and then create the desired output documents from the file. The worksheets have been designed to help you understand what information is necessary for various tasks.
2. By keeping the worksheets after you've filled them out, you have a written record of the decisions that you made about your file. This can be particularly valuable if you want to review your design later or if someone else needs to fill in for you. The worksheets are the only written information about your file design that you'll have.
3. In addition, if you are not the Displaywriter operator, you can use the worksheets to transmit information about the file to the operator. Since the same worksheets are shown in the operator training material, the Displaywriter operator should be familiar with them and understand how to implement the information from the worksheets on the Displaywriter.

As each worksheet is introduced, you will be told how to complete it. In addition, almost all the examples in this guide are taken from the same personnel file. Many examples show a completed worksheet along with the final document.

Appendix A contains blank copies of each worksheet that you can copy and use later for your own work.

## Using the Chapter Exercises

Much of the information that you will be learning is interrelated. The design of your file depends, in part, on how your file is used and what types of output you want. Because of this, you should read the entire guide before you begin designing your own file.

Review exercises and answers are provided at the end of most chapters. These exercises are designed to give you practice in using the skills that you learned in that chapter. Complete the review exercises, then compare your answers to the answers given. Although in some cases there can be more than one correct answer, be sure that you understand why the correct answer is correct.

To make the exercises more realistic, the same file will be used in all the chapter exercises. It is a sales files that might be kept in a company employing several sales

representatives and it tracks customer information and sales amounts.

## Other Helpful Information

The following features are designed to help you as you use this guide for the first time:

- Important terms are printed in bold type the first time they appear. The terms are defined in context, and definitions of these and other terms are included in the Glossary.

The Glossary also contains an explanation of the symbols and word processing abbreviations that are used in this guide. If you see a symbol in an example that you do not understand, look in the Glossary. The symbols are listed at the beginning of the Glossary before the other entries.

- Chapter summaries at the end of most chapters briefly list the highlights of that chapter. These summaries assume that you have read the chapter. They do not include the detailed background material found in the chapter.
- Some pages do not contain a full page of text. Don't worry — this was done to make it easier for you to see two page figures or a figure and explanatory text at the same time.

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This chapter contains information about:

- general file definitions
- file uses
- file output
- Displaywriter files, records, and fields
- file revisions

### GENERAL FILE DEFINITIONS

A **file** is a collection of related information. For example, a personnel file may consist of the information found in personnel folders.

A **record** is a collection of related words or data that make up one entry in a file. For example, a record can contain all the information about one person, one project, or one department.

A **field** is one piece of information in a record; for example, the first name of a person. A record is made up of fields.

Figure 2-1 shows how files, records, and fields are related.

Each heading in Figure 2-1 (e.g., First Name) names a file field, so in this example there are 21 fields in each record. In this example, each record requires more than one line to print.

### GENERAL FILE USES

Simply having the information stored is not enough. To make the information usable, you may need to do some manipulation of the information, such as:

- **Select** certain records for use. For example, you would want to include all employees' names and telephone numbers in a telephone directory, but a report listing the names of employees eligible for retirement should not include the names of all your employees.

Figure 2-1. Example of a File, a Record, and a Field in a Personnel File

Rec ID	Title	First Name	MI	Last Name	Subtitle	Street Address	City	State	Zip Code	Home Phone	FN Spouse	Yr Born	Mo Born	Day Born	Department
Supervisor	App Date	Salary	Sex	Extension	Hire Yr										
1	Mr.	Brian	K.	Rogers		345 West 6th Street	Dallas	TX	71098	764-1293	Jane	41	12	24	Administration
		Roger Kramer							81/01/05	13495	M	7462		65	
2	Mrs.	Lorna	A.	Boyle		122 North 10th Street	Dallas	TX	71283	736-2938	David	51	04	08	Engineering
		Ronald Crawford							80/05/20	16998	F	2736		75	
3	Ms.	Sue	R.	Burns		1054 Great Oak Road	Dallas	TX	71234	746-2839		55	12	18	Administration
		Roger Kramer							81/01/15	10500	F	2938		80	
4	Mr.	Gerald	S.	Ostrom	Jr.	1020 Far West Drive	Dallas	TX	71923	659-2837	Janet	37	07	31	Marketing
		Patricia Nicholson							80/12/05	25998	M	1726		55	
5	Ms.	Trisha	J.	Park		1532 Wilshire Drive	Irvine	TX	73928	432-5938	John	45	06	11	Planning
		Pauline Shaw							80/11/15	24445	F	3948		70	
6	Mr.	Roger	T.	Norton	III	2045 Duval Road	Dallas	TX	76452	987-3894	Mary	50	02	05	Accounting
		Barbara Wilson							79/12/30	18378	M	2837		68	
7	Ms.	Laverne	W.	Kelly		2020 Madison Avenue	White Rock	TX	73648	345-2783	George	38	03	08	Administration
		Roger Kramer							79/12/15	11892	F	2839		73	
8	Miss	Marilyn	L.	Velasco		1056 Lost Creek Drive	Dallas	TX	71283	768-2839	Michael	48	08	06	Accounting
		Barbara Wilson							80/10/30	16783	F	4958		74	

file

- **Sort** records into alphabetical or numerical order. For example, you might want all names in an employee file to be in order by personnel number or an alphabetized telephone directory.
- Do **math** calculations on some of the fields in the file and print the results of the calculation. For example, if you are doing a sales report, you may want to show the individual sales items and also show the total of the sales, the average sale amount, and other pertinent information that makes the report more meaningful.
- Print only certain fields in a record. You need to be able to extract information not only from a file, but also from a record. The information required depends on the application or use of the information. To print a name on a mailing list, you would use the first name, middle initial, and last name. To print the salutation on a letter, you would probably use only the last name with a title, such as Mr. Jones.

## GENERAL FILE OUTPUT

For a file to be useful, you have to be able to use the information in the file in some type of **file output**. File output usually involves printing some portion of the file with the information formatted in a specific way, such as a name and address list, or inserted into some accompanying text. Generally, there are four different types of printed output:

1. repetitive letters
2. reports
3. multi-column file lists
4. forms

### Repetitive Letters

The **repetitive letter** is a document that has constant text (the text that is the same in every letter) typed in a shell document. A shell document is a text document that is like a form letter, but the shell document uses special codes that tell the system the names of the fields or variables to be merged into the shell document during output or printing.

The shell document is merged with the appropriate file to produce personalized letters that have the contents of

the named field(s) from each record inserted into the shell document at the points marked by the special codes. One letter is produced for each record in the file, unless you select only certain records to be merged with the shell document. Figure 2-2 shows some sample letters produced by merging a shell document with a file.

To: Brian Rogers  
Administration Department

From: Dan P. Andrews

Date: December 15, 1981

I am pleased to announce that, effective January 1, 1982, Greg Randolph, General Plant Manager, has been promoted to headquarters. He will be serving as an Assistant to the Board of Directors.

I am also pleased to announce that Peter Robertson, from the Detroit office, will be replacing Mr. Randolph. He hopes to visit our location soon and he will be chatting informally with many of you.

If you have any questions, please contact your manager, Roger Kramer.

Again, please join me in congratulating Mr. Randolph and welcoming Mr. Robertson.

Dan P. Andrews  
President

To: Lorna Boyle  
Engineering Department

From: Dan P. Andrews

Date: December 15, 1981

I am pleased to announce that, effective January 1, 1982, Greg Randolph, General Plant Manager, has been promoted to headquarters. He will be serving as an Assistant to the Board of Directors.

I am also pleased to announce that Peter Robertson, from the Detroit office, will be replacing Mr. Randolph. He hopes to visit our location soon and he will be chatting informally with many of you.

If you have any questions, please contact your manager, Ronald Crawford.

Again, please join me in congratulating Mr. Randolph and welcoming Mr. Robertson.

Dan P. Andrews  
President

Figure 2-2. Sample repetitive letters



## Reports

A **report** is also created by merging a shell document with a file, but the final document combines information from more than one record. The purpose of a report is to present the file information in the most easily understood, meaningful way. To do this, you can group, format, and summarize the information, and even include math calculations. Figure 2-3 shows some sample reports generated from the file.

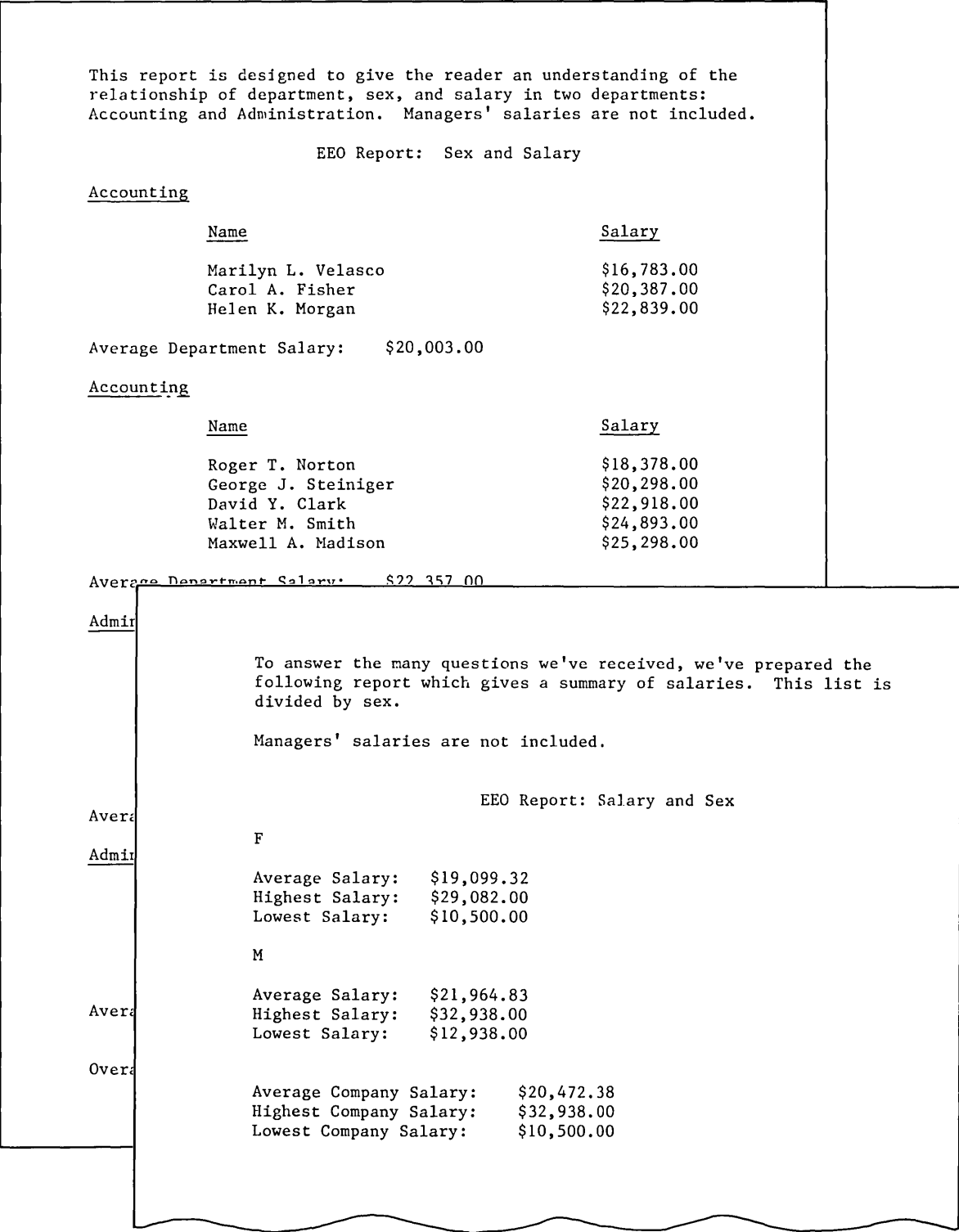


Figure 2-3. Sample file reports

## Multi-Column File Lists

A **multi-column file list** contains information from more than one record, formatted so that more than one column of information is printed. Because a list is simply a listing of information, the information cannot be summarized and math calculations cannot be used.

Figure 2-4 shows two different types of lists that might be created from the same file.

Mr. Michael F. Acker 8798 Main Street White Rock, TX 72839	Mrs. Carol A. Fisher 345 Balboa Drive Dallas, TX 71829																																																																																																																																
Ms. Peggy L. Anderson 2839 Columbus Cove Dallas, TX 72839	Mr. Victor P. Fisher 63583 Windy Trail Drive Dallas, TX 71829																																																																																																																																
Miss Karen J. Benson 556 Singletree Street White Rock, TX 72639	Mrs. Rachel L. Forrest 3847 Cheyenne Drive Irving, TX 73689																																																																																																																																
Mrs. Theresa H. Black 382 Round Circle Dallas, TX 71829	Mr. Ralph R. Garcia 28394 North Causeway Dallas, TX 71829																																																																																																																																
Miss Dorothy P. Boswell 908 Steck Avenue Dallas,	Ms. Debbie S. Goodman 4848 Rome Way																																																																																																																																
Mrs. Lori 122 North Dallas,																																																																																																																																	
Mr. Richard 3846 Sweet Dallas,																																																																																																																																	
Ms. Sue 1054 Green Dallas,																																																																																																																																	
Mr. Simon 283 Oak Dallas,																																																																																																																																	
Ms. Lori 384 Pine White Rock,																																																																																																																																	
Mr. David 10345 Johnson Dallas,																																																																																																																																	
Mr. Ronald 345 Mustang White Rock,																																																																																																																																	
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Figure 2-4. Sample telephone list and name and address list

## Forms

Designing forms requires that information be formatted in a specific way, but in files usage a **form** is either a report (if it requires information from more than one record) or a repetitive letter (if it requires one form per record).

## IBM DISPLAYWRITER SYSTEM FILES

Now that you understand the general concepts about files, you need to know the specific requirements for an IBM Displaywriter file.

An IBM Displaywriter file, like the file shown in Figure 2-1, consists of records. Each record consists of fields. Each IBM Displaywriter file, such as a personnel file or client file, must fit on one diskette. In addition, the entire file, including any new records that you will be adding, cannot exceed 65,000 records. The chart in Figure 2-5 shows various record lengths and approximately how many full records of various lengths can be placed on an IBM 1 and or on an IBM 2D diskette.

The key factors that affect the record capacity of a diskette, other than the defined record length, are:

- The number of fields. Additional fields will reduce capacity from those shown in the chart.
- The number of bytes actually contained in the record. If each field is not filled to its limit, the capacity will increase from those shown in the chart.
- The amount of unused diskette space. As a record is deleted it leaves unusable diskette space. The file must be condensed to make full utilization of that unused space.

**Note:** Displaywriter storage is actually measured in bytes. A byte is generally equivalent to a character, so for convenience this guide uses the term "character." However, you should be aware that, although some symbols and instructions appear on the display as a single character, they require more than one byte of storage space.

Record Size	Number of Fields	IBM 1 Diskette*	IBM 2D Diskette*
100 characters	10 fields	2075 records	7500 records
200 characters	20 fields	1100 records	3950 records
300 characters	30 fields	750 records	2700 records
400 characters	40 fields	570 records	2050 records
500 characters	50 fields	450 records	1650 records
600 characters	60 fields	375 records	1375 records
700 characters	70 fields	325 records	1190 records
800 characters	80 fields	290 records	1040 records
900 characters	90 fields	240 records	930 records
1000 characters	100 fields	210 records	830 records

\* The number of records is approximate and represents 1 file per diskette

Figure 2-5. Estimation of Record Lengths and Diskette Capacity

IBM Displaywriter records are divided into one or more fields, each identified by a name that you assign. Record size is determined by two factors:

1. number of fields (maximum 100 fields per record)
2. number of characters (maximum 1,000 characters per record)

When designing your file, you must consider both the number of fields and the total number of characters in a record. Neither maximum can be exceeded.

IBM Displaywriter files contain named fields which are in the same order in each record and have the same characteristics. The fields in an IBM Displaywriter System record are defined by the following three characteristics.

1. **Field** is any name that the operator assigns to a field. For example, in a name and address file, the

fields might be named "First Name", "Last Name", and so on.

Field names have the following requirements:

- Up to 16 characters in length
- Can contain alphabetic characters, numbers, spaces, and the underscore character
- First character in each field name must be an alphabetic character
- Each field name in a file must be unique

Field names are displayed while you are typing or selecting records. You also use field names to tell the system what field(s) to use when merging a document with a file and in what order to sort records.

2. **Field type** refers to the various characters which can be typed in a field. The three possible field types are character, math, and text. See "Field Types and Maximum Lengths" below for a description of each field type.
3. **Maximum field length** is the longest possible entry in a field. It is set by the operator and limited by the field type for that field. To determine the maximum field length for a field you can use one of two methods:
  - Choose the longest entry in a file and count the number of characters in that entry.
  - Decide upon some informal rule based on your experience with the file. In the examples and exercises in this guide, the general rule is first names (10 characters), last names (15), street addresses (25), and cities (15).

See "Field Types and Maximum Lengths" for more information.

## Field Types and Maximum Lengths

Before typing records into a file on the IBM Displaywriter, the operator must create a file description which contains a field description for each field in the file. A field description defines the field name, field type, and maximum field length for that

field. After the file description is completed, the operator can type the records.

As the file information is typed into the fields, the IBM Displaywriter System compares the typed information to the field descriptions. The system allows the operator to type only characters that match the field type for a field and that do not exceed the maximum field length. If the operator tries to type the wrong type of characters in a field or to type more characters than permitted by the maximum field length for that field, the system will not accept the information and will alert the operator to the error.

### Character Field Type

Alphabetic and numeric characters, punctuation, and spaces can be typed in a **character field**. (See **1** in Figure 2-6.) No control characters, such as tabs or carrier returns, are allowed. (A control character is a non-printing, word processing character used in formatting text.)

You can select specific records or sort the records in alphabetic or numeric order based on the information in a character field. You can not do math calculations with the numbers in a character field.

### Maximum Field Length for Character Fields

A character field has a maximum field length of 80 characters.

### Math Field Type

A **math field** can contain only numbers, a decimal point, and a plus or minus sign. (See **2** in Figure 2-6.) The plus or minus sign and the decimal point are optional.

Any field that contains only numbers (and a decimal point and/or a plus or minus sign) should be described as a math field. Designating the field as a math field allows the system to check the input so that only numbers are typed. In addition, a math field is the only field type that can be used for math calculations.

Remember, however, that certain numbers such as telephone numbers (394-3829, for example) and Social Security numbers (583-28-3849) have hyphens in them so they must be described as character fields, not math fields.



<u>Rec ID</u>	<u>Title</u>	<u>First Name</u>	<u>MI</u>	<u>Last Name</u>	<u>Department</u>
	<u>Extension</u>	<u>Hire Yr</u>			
	<u>comments</u>				
1	7462	65		Brian K. Rogers	Administration
	Recent evaluations good. Shows management potential. Suggest he be given more in-house training.				

Figure 2-6. Sample Character, Math, and Text Fields

You can select specific records or sort the records in numeric order based on the information in a math field. You can also perform math calculations using the contents of a math field.

Maximum Field Length for Math Fields

Math fields have a maximum field length of 17 characters which includes:

- one character for a positive or negative sign
- one character for a decimal point
- 15 digits

You do not type any characters that might precede or follow the number, such as a dollar sign, or any commas (thousands separators). These are automatically added later by a math format control when the file is used. (Math format controls are explained in more detail in Chapter 9.)

Text Field Type

A **text field** contains alphabetic and numeric characters, science and math symbols, and control characters, such as tabs and carrier returns. (See **3** in Figure 2-6.) A text field is an informative or descriptive field that is only to be printed.

For example, you could use a text field to record open-ended comments that exceed 80 characters in length (the maximum for a character field). You could also use a text field for information that contains science or math symbols, or format information.

You cannot select specific records or sort records based on the information in a text field.

### Maximum Field Length for Text Fields

A text field has a maximum field length of 500 characters. To save space within the file, a text field can contain one or more **Include Instructions** which, when the field is printed, will retrieve and print text typed in a regular text document.

These Include Instructions contain:

- the name of the document and the name of the diskette where the text is located
- the page number(s) of the page(s) containing the text
- some system control characters for the Include Instruction itself.

Each Include Instruction uses an average of 30-50 characters of file space. If the text that you want included with the file is longer than 50 characters, an Include Instruction may save file space.

You may also want to use an Include Instruction if you have text that is used with more than one record. Rather than retype the text in each record, you may want to type it once as a text document.

### **Revising Field Types and Maximum Lengths**

You also need to know the restrictions on revision of field types and maximum lengths. You can change a field description after the file is created. However, after the first record has been typed, you can change a field description in a file only as described below.

1. The field type can be changed only to a field type that is less restrictive.
  - A math field, the most restrictive type since it can contain only numeric characters, can be changed to either a character field or a text field.

- A character field, which is less restrictive because it can contain either alphabetic characters or numeric characters, can be changed only into a text field.
- A text field, because it can contain information such as control characters that cannot be used in the other field types, cannot be changed to a different field type.

If there is any doubt about field type, use the more restrictive field description initially since it can be changed later if necessary.

2. After a file is created, the maximum field length can be increased (up to the maximum field length permitted for that field type). You can not decrease the size of the maximum field length after the first record has been typed.

This restriction is designed to protect any records that you may have in the file. The system can not check file contents while you are revising the field descriptions. So, if you were allowed to shorten a maximum field length, you might invalidate some information already typed into the file.

As your file description nears the maximum character size of 1,000 characters, be particularly careful about describing longer maximum field lengths than necessary. Be conservative and describe the maximum field length as the length of the longest entry in each field, remembering that if necessary you can increase the maximum field length.

If you have to change the field type to a more restrictive field type or decrease a maximum field length, you must first create a new file with the desired file description, and then duplicate the records to the new file. You'll find more information on duplicating a file in Chapter 4.

## REVIEW QUESTIONS

1. Using the file below, draw a box around a record.  
Circle a field within that record.

<u>Rec ID</u>	<u>First Name</u>	<u>MI</u>	<u>Last Name</u>	<u>Department</u>	<u>Extension</u>
1	Brian	K.	Rogers	Administration	7462
2	Lorna	A.	Boyle	Engineering	2736
3	Sue	R.	Burns	Administration	2938
4	Gerald	S.	Ostrom	Marketing	1726
5	Trisha	J.	Park	Planning	3948

2. True/false. A repetitive letter uses the information from more than one record.
3. True/false. A report uses the information from more than one record.
4. What is the maximum number of characters in a Displaywriter record?
5. What is the maximum number of fields in a Displaywriter record?
6. What are the three field types?
7. Which field type cannot be changed to another field type after a file has been created?
8. Can you decrease the maximum field length after the file description is created and a record is typed?

# REVIEW ANSWERS

1.

<u>Rec ID</u>	<u>First Name</u>	<u>MI</u>	<u>Last Name</u>	<u>Department</u>	<u>Extension</u>
1	Brian	K.	Rogers	Administration	7462
2	Lorna	A.	Boyle	Engineering	2736
3	Sue	R.	Burns	Administration	2938
4	Gerald	S.	Ostrom	Marketing	1726
5	Trisha	J.	Park	Planning	3948

2. False. Each repetitive letter uses the information from only one record. One letter is produced for each selected record in the file.
3. True. A report uses the information from more than one record. A report compiles the information from all the selected records in a file into one final document.
4. The maximum number of characters in a Displaywriter record is 1,000.
5. The maximum number of fields in a Displaywriter record is 100.
6. The three field types are character, math, and text.
7. A text field cannot be changed to another field type after a file has been created because it can contain control characters and symbols that are not allowed in either character or math fields.
8. You cannot decrease the maximum field length after a record has been typed into a file, unless you duplicate the records into a file with a different field description. However, you can decrease the maximum field length after a field description has been created, if no records have been typed into the file.

## CHAPTER SUMMARY

- A Displaywriter file must fit on one diskette.
- A Displaywriter record can contain:
  - up to 100 fields
  - up to 1,000 characters
- Displaywriter fields are described in the following chart.

Field Type	Field Length	Can Contain			Can Be Used To	
		Numbers	Alphabetic Characters	Symbols and Control Characters	Sort	Select
Math	1-17	X			X	X
Character	1-80	X	X		X	X
Text	1-500	X	X	X		

Figure 2-7. Field Characteristics by Field Types

- Revisions of field descriptions can be made:
  - before a record has been typed, to a less restrictive field type:
    - a math field can be changed to a character field or text field
    - a character field can be changed to a text field
    - a text field cannot be changed to any other field type
  - after a record has been typed, through duplication to a file with different field descriptions but the same field names
- File output includes:
  - repetitive letters - one output document per record
  - reports and lists - one output document for the file

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This chapter contains information about:

- analyzing current information management
- potential design problems and recommendations for avoiding them
- using an alternate type of file with complete and partial records
- creating a sample file

### CURRENT INFORMATION MANAGEMENT

Now that you know what an IBM Displaywriter file requires, you can begin your actual files design. The files design procedure begins with data collection. During this phase of files design you need to collect ideas to determine what information needs to be in the file.

To do this, first look at the current means of tracking information in your office. Some of the questions you need to answer include:

- What are the files that you want to store on the IBM Displaywriter?
- Where do those files come from? For example, is the information now on forms, typed lists, or index cards? Where does the information originally come from?

In your organization, you might find that when an employee fills out a personnel form, 1) the information is then entered into a computer file, 2) the form itself is stored in a folder, and 3) some information from that form, such as name and telephone numbers, might be kept in a rotary file or on a typed list.

- What lists, reports, and letters are now being generated from the information in the proposed file? What other types of output would you like to be able to do?
- Are there other things that you would like to be able to do with the information in the file, such as sort



the information into alphabetical or numerical order or perform mathematical calculations?

### What Files Are Kept Now?

As a first step, determine whether files are now being kept in any of the common forms shown below.

- typewritten lists
- rotary files
- index card files (these might be stored in boxes, drawers, trays, tubs, or rotary files)
- printed forms
- ledgers
- microfiche
- microfilm
- metal name and address plates

After you've checked these potential sources for files, talk to people who work in the area where a file is kept. They may be able to supply additional information about how the file is maintained and used.

### What Are the Fields of Information?

Once you identify the existing files, start defining the purposes of each file by completing the following three steps.

1. List the fields of information stored in an existing file on a copy of the File Design Worksheet. For each field you need to list:
  - a Field Name (maximum of 16 characters)
  - a Field Type
  - the maximum field length (No. of Characters) for that field

You also can use the optional Comments section for additional information about each field. If, for example, the names of states should be typed into the file as two-digit abbreviations, then make a note in the Comments sections for the field for state.

Figure 3-1 shows how a File Design Worksheet was filled in for the sample personnel file.

List everything that needs to be recorded and tracked. Decisions as to what information is important will be made later.

FILE DESIGN WORKSHEET

FIELD NAME	FIELD TYPE*	NUMBER OF CHARACTERS**	COMMENTS
Title	char	4	include punctuation
First Name	"	10	
M-I	"	2	include punctuation
Last Name	"	15	
Subtitle	"	4	
Street Address	"	25	
City	"	15	
State	"	2	use abbreviation
Zip Code	math	5	
Home phone	char	8	
FN Spouse	"	10	first name of spouse
Yr Born	math	2	
Mo Born	"	2	
Day Born	"	2	
Department	char	16	
Supervisor	"	25	first and last name
App Date	"	8	YY/MM/DD
Salary	math	6	no decimal point-yearly
Sex	char	1	F or M
Extension	math	4	
Hire Yr.	"	2	year hired

\*character field      \*\* 1-80 characters  
 math field            1-17 characters  
 text field             1-500 characters

Figure 3-1. Sample File Design Worksheet

2. Now look at the sample output documents that you've collected. Circle each piece of variable information on each sample document. (See Figure 3-2 for an example). If the sample document is a list or report, you may find that almost the entire output consists of variable information.
3. Note on the sample document which fields of information the variables represent. These fields might include a customer's name, a contract expiration date, or the amount of a donation. Mark the variables that are the results of math calculations.

### Deciding What Information to Use in Your File

Now that you have a list of potential fields, evaluate which of these fields should be used in the Displaywriter File. Ask yourself these questions.

- What fields in the list that I created on the File Design Worksheet are used in the output sample documents?

If a field is used in the output samples, then it definitely needs to be a field in your file.

- Is there information used in the output samples that is not listed on the File Design Worksheet and is not the result of math calculations?

If there is, this may be a file field. Add these fields to your File Design Worksheet.

- If some fields listed on the File Design Worksheet are not used in the output samples, how is the information from those fields used now?

Decide why this information is included in the existing files. Consider the following possibilities.

- There may be some output samples that you don't have. This can happen if there are letters or reports generated from the existing file that are not done often.
- The information in a field, while not used in any output, is needed to calculate another variable. For example, an employee's date of birth may not be printed in a report, but it is used to determine age and eligibility for retirement.

This report is designed to give the reader an understanding of the relationship of department, sex, and salary in two departments: Accounting and Administration. Managers' salaries are excluded.

EEO Report: Sex and Salary

Accounting

<u>Name</u>	<u>Salary</u>
Marilyn L. Velasco	\$16,783.00
Carol A. Fisher	\$20,387.00
Helen K. Morgan	\$22,839.00
Roger T. Norton	\$18,378.00
David Y. Clark	\$22,918.00
George J. Steiniger	\$20,298.00
Walter M. Smith	\$24,893.00
Maxwell A. Madison	\$25,298.00

Average Department Salary: \$21,474.25 - calculation

Administration

<u>Name</u>	<u>Salary</u>
Sue R. Burns	\$10,500.00
Laverne W. Kelly	\$11,892.00
Dorothy P. Boswell	\$12,827.00
Tracy S. Perry	\$11,456.00
Nancy W. Tweeden	\$14,284.00
Brian K. Rogers	\$13,495.00
Ralph R. Garcia	\$14,893.00
Stanley R. Lambert	\$18,394.00

Average Department Salary: \$13,467.63 - calculation

Overall

January 5, 1982

Lorna A. Boyle  
122 North 10th Street  
Dallas, TX 71283

Dear Mrs. Boyle,

I am delighted to announce that our fifth annual company dinner will be held January 16, 1982 in the Executive Dining Room to celebrate a good year. I am hoping that you'll be attending. Please allow me to extend an invitation to you and David.

In addition to the dinner, there will be dancing afterwards.

Please RSVP to your department secretary by January 10.

Sincerely,

Dan P. Andrews  
President

Figure 3-2. Output Samples With Variables Identified

- The information may not be used for anything. This can happen if information, although not used now, was useful at one time and so is still tracked and stored in the file.

Before you conclude that the information is not useful, however, check with everyone who works with the file. It may be that it is used by someone with whom you did not previously talk. If there is any doubt, it is safer to include the information as a field in the Displaywriter file.

## AVOID SOME POSSIBLE PROBLEMS

At this point, you have a list of the fields that will make up your file. Before you begin to create your file, however, you can avoid some potential problems by proper file design.

Before designing your file, you need to examine five types of commonly used information:

- names
- addresses
- dates
- information (such as inventory numbers) that has both alphabetic and numeric characters
- combined fields

Before you decide how to use these items in your file, you need to consider the following:

### Names

As you design your file, you may consider a person's full name (title, first name, middle initial, and last name) to be one field of information. However, you need to look at how the name will be used in output. The following considerations can affect how the name stored in the file can be used:

1. When you merge your file with a shell document for a list, letter, or report, the system must print all the information in each field used in the shell document. Thus, if a person's full name is in one field, everything in the field (the full name) will be printed each time that field is used.

If you are printing a name and address list for a mailing, then having the person's full name print is desirable. But if you are sending that person a

letter, a salutation such as "Dear Mr. William A. Jones:" is awkward.

To avoid this problem, you can create a separate field for each part of the name. In your file, each name would require three fields: first name, middle initial, and last name. Depending on your planned file use, you may also want to include a field for nicknames.

2. Remember to include a **title field** (Mr., Mrs., etc.) in any file in which you have names. The system does not recognize gender and doesn't know what title belongs with a name. Unless you have a title field in your file, your only solution would be to use one title in the shell document with all names. But you might be embarrassed if you send a letter to Mr. Sally Brown, so it's better to include a title field.
3. Also include a **subtitle field** for such subtitles as "Jr.", "III", etc. If you put the subtitle in the last name field, such as "Brown, Jr.", then the name would print correctly on a mailing list as "Mr. George G. Brown, Jr.". But if you choose to use the last name field in the salutation, it will print as "Mr. Brown, Jr.:" — obviously awkward.

Do not put the comma after the last name in either the last name or the subtitle field. You'll learn in Chapter 5 how to print the comma when there is an entry in the subtitle field, but not print it when the subtitle field is empty.

If you are not sure what your output will require, use five fields for each name: title, first name, middle initial, last name, and subtitle. This arrangement will give you the maximum flexibility for using the name in output.

## Addresses

As you design the file, you may consider putting an entire address, such as the one following this paragraph, in one field. However, putting the entire address in one field prevents you from selecting certain records or sorting them into a specific order. You might, for example, want to sort your file so that the letters print in zip code order. You can do this only if the zip code is in a field by itself. Or, if you want to select all the records for people living in Texas, the states must be in a separate field.

Printed Address

Mr. John Q. Doe  
4736 South Main Street  
Austin, Texas 78764

Name and Address Fields

1	Mr.	2	John	3	Q.	4	Doe
5	4736 South Main Street						
6	Austin	7	Texas	8	78764		

For maximum flexibility, you should use one field for the street or postal address, one field for the city, one field for the state, and one field for the zip code.

Dates

The IBM Displaywriter recognizes only alphabetic characters or numbers, not dates. To include dates within your file, carefully consider how you will use the dates. Two primary considerations, printing dates and using dates to sort records, are discussed below.

Printing A Date

If you want the written date to print out in your final document (such as, "Your lease will expire on June 20, 1982."), then the date must be typed in your file that way. However, if you attempt to sort the records, the system alphabetizes the records. When that happens, December 17, 1982 appears before October 17, 1982 because D comes before O in the alphabet.

So, to print a written date in your final documents, you need one field for the printing date (June 1, 1982) and another field that contains the date in numbers (82/06/01) which can be sorted correctly. There is, however, more than one way to design a numeric date field. The considerations involved are described in the next two sections.

Sorting Date by Year, Month, and Day

If you want to sort the records based on dates or to select the records that contain certain dates, you need to have the dates typed as numbers. But, the system recognizes these fields as numbers, not dates. The following paragraphs explain how the system sorts these numbers. (As a shortcut, refer to dates written in numbers as MM for month, DD for day, and YY for year.)

If you type a date as MM/DD/YY (such as 08/01/82 for August 1, 1982 and 08/13/78 for August 13, 1978), then the system reads the numbers as 080182 and 081378. These records are read and sorted in this order:

080182  
081378

When the records are sorted this way, August 1, 1982 is listed as occurring before August 13, 1978. (The slashes don't affect the sort order if you use them consistently throughout your file. You can also choose not to use slashes in your dates.)

To avoid similar problems, you should use YY/MM/DD (or YYMMDD) in your date field and always use two digits for each part of the date. For example, January 5, 1982 would be 82/01/05. (You don't need to add the 19 on the year unless your file has dates in different centuries.)

### Sorting Dates by Month and Day

Look again at your planned file use. Typing the dates as YY/MM/DD causes the records to sort first by year, then by month, then by day. In Figure 3-3, the employee records are in order by birth date.



Employee Records Sorted by Year, Month, and Day of Birth			
Year	Month	Day	Name
19	05	07	Allen K. Hunt
28	04	09	Ronald G. Crawford
30	08	12	Richard J. Bradley
32	05	07	Victor P. Fisher
32	11	25	Dorothy P. Boswell
34	12	25	Peggy L. Anderson
35	09	12	Stanley R. Lambert
36	01	05	Michael L. Velasco
37	03	12	Barbara J. Wilson
37	07	31	Gerald S. Ostrom
37	08	06	Maxwell A. Madison
38	01	15	Michael F. Acker
38	03	08	Laverne W. Kelly
38	06	15	Roger P. Kramer
38	06	30	Sherry J. Perkins
40	03	04	Gloria F. Young
40	11	30	Jack E. White
41	05	23	Walter M. Smith
41	06	11	Theresa H. Black
41	08	22	Pauline F. Shaw
41	12	07	Helen K. Morgan
41	12	24	Brian K. Rogers
42	05	07	Roger H. Knight
42	12	07	Rachel L. Forrest
42	12	18	Patricia H. Nelson
43	03	18	Jean T. Davidson
43	03	26	Jeff D. Martin
43	03	28	David Y. Clark
43	09	17	Robert M. Lopez
44	06	04	Lisa G. Schultz
44	06	05	Simon E. Carrigan
44	07	28	Walter A. Smith
45	04	22	Ralph R. Garcia

Figure 3-3. Sample List of Dates Sorted By Year, Month, and Day

This arrangement may meet most of your requirements.

However, you may want to print lists such as a monthly birthday list. In such a list, the records should be in order first by month, then by day, without regard to the year. To do this your file design must be slightly different from YY/MM/DD.

You should separate your date into three fields: year, month, and day. You still type the year as YY, the month as MM, and the day as DD, but each part of the date is in a different field.

You can sort or select the file in various ways. If you want to sort by year, month, and day you would use all three fields; but you can also create your birthday list by using only month and day as selection or sorting criteria. Figure 3-4 shows the same birthdate list as Figure 3-3, but this time the records are sorted by month and day only with the year shown in parentheses.

Employee Records Sorted by Month and Day of Birth			
Month	Day	Year	Name
01	05	36	Michael L. Velasco
01	15	38	Michael F. Acker
01	16	55	Mavis Y. Nelson
02	05	50	Roger T. Norton
02	15	46	Lorna J. Chapman
03	04	40	Gloria F. Young
03	08	38	Laverne W. Kelly
03	08	47	Nancy W. Tweeden
03	12	37	Barbara J. Wilson
03	18	43	Jean T. Davidson
03	26	43	Jeff D. Martin
03	26	57	Tracy S. Perry
03	28	43	David Y. Clark
04	08	51	Lorna A. Boyle
04	09	28	Ronald G. Crawford
04	11	49	Diane K. Preston
04	16	50	Cynthia R. Lee
04	22	45	Ralph R. Garcia
05	07	42	Roger H. Knight
05	07	19	Allen K. Hunt
05	07	32	Victor P. Fisher
05	23	41	Walter M. Smith
05	28	48	James R. Ostrom
06	04	44	Lisa G. Schultz
06	05	44	Simon E. Carrigan
06	11	45	Trisha J. Park
06	11	41	Theresa H. Black
06	12	45	Cecelia B. Kahn
06	15	38	Roger P. Kramer
06	24	45	Thomas W. Jackson
06	28	50	Frank P. Wilson
06	30	38	Sherry J. Perkins

Figure 3-4. Sample List of Dates Sorted by Month and Day

Using three fields for each date does require more fields, but it is more flexible than the YY/MM/DD design. Generally, if you are not sure about all the possible uses of your file, use one field for the written out date that is to be printed only, and one field each for the numeric date for the year, month, and day. If you define the numeric dates as math fields, you can perform math calculations involving the dates.

### Information With Both Alphabetic Characters and Numbers

Occasionally, an inventory number, property description, or other items have both alphabetic characters and numbers. It is critical that you know how that information will be used. If it is to be used for printing only, then it can be contained in one field.

However, to sort or select the records based on that information, you need to determine how the records are sorted now. For example, a part number such as AD206 may contain two pieces of information. The characters AD might refer to a machine type and 206 to the number of the part. The same part for another machine might be an ED206. In this example, you might want to create a list by part number (all 206s regardless of machine type) or of all parts for machine type AD.

Such a field would have to be described as a character field because it contains alphabetic characters as well as numbers. Although you'll learn in more detail in Chapter 7 about how records are sorted, the basic sorting order is:

- graphic characters (any non-alphabetic, non-numeric character such as a %, a &, or a space) first,
- then alphabetic characters,
- then numbers.

Information is sorted from left to right, so the system compares the first (farthest left) character in the sort field in each record. If two or more records have the same character in that position, the system looks at the next character. If that character is also the same in two or more records, the system looks at the third character from the left, and so on until the records have been sorted into order.

Notice how the file containing the following sample part numbers would be sorted, and you'll understand why the sorting order is important. The unsorted file is shown first.

Unsorted File			
Amount	Month	Day	Part Number
150	01	12	AD138
500	05	11	ED118
1500	12	05	LR268
250	06	23	SE238
450	11	30	AD126
578	11	15	AD322

If the system were sorting these part numbers to put them in order, they would appear as they do in the following sorted file.

Sorted File			
Amount	Month	Day	Part Number
450	11	20	AD126
150	01	12	AD138
578	11	15	AD322
500	05	11	ED118
1500	12	05	LR268
250	06	23	SE238

The part numbers appear in this order because the system sorts them by comparing the entries in the Parts Number field from left to right. The first two characters are alphabetic and since alphabetic characters are placed in order before numbers, the part numbers are basically in alphabetical order based on the first two characters in the part number.

Since the system looks at each entry from left to right, there is no way to print a list from this file that puts the part numbers into numeric order using the last three numbers.

If such a sort is necessary, the part numbers must be split into two fields. The first field contains the alphabetic characters, and the second field contains the numeric characters. This arrangement provides the maximum flexibility for sorting and selecting records. (Even though you may have two fields for the part number, it can be printed so that it appears to be one item.)

## Combined Fields

If you need more than 100 fields of information, you can use a combined field for information that you want to track, but not print. In a combined field you use codes for information instead of spelling the information out. In this way, you can compress a number of fields into one field.

For example, instead of designing one field for sex and one field for age, you might design one field and use a

code for sex (M=male, F=female) and a number for age. An entry for a female, age 24, would be F24; a male, age 31, would be entered as M31.

Before you decide to use combined fields in your file, you need to consider carefully how the file is to be used. You can still select records using this method. However, your ability to sort the records is limited. In the previous example, the records with females would always appear before males because F sorts before M. With a combined field like that, it would not be possible to sort the records into order based on age.

In addition, because you cannot print a part of a field, to print a list with names and ages you would have to print the entire field. Instead of printing "Jane Doe, 24", the system would print "Jane Doe, F24".

### COMPLETE AND PARTIAL RECORDS

You may want to design a file in which there are several records that contain much the same information. For example, a sales file might contain one record for each transaction. If one customer placed ten different orders, for example, there would be ten records for that customer. The customer's name, address, and sales representative name would be stored in each of the ten records. Figure 3-5 shows a sample of such a file.

<u>Rec ID</u>	<u>Customer Name</u>	<u>Address</u>	<u>City</u>	<u>ST</u>	<u>Zip</u>	<u>Order</u>	<u>Sales Rep</u>
2 02/18	Universal Industries	90 Elm Street	Pomona	CA	77890	60000	Curtis
3 01/21	Universal Industries	90 Elm Street	Pomona	CA	77890	32000	Curtis
4 04/14	Universal Industries	90 Elm Street	Pomona	CA	77890	89900	Curtis
5 03/18	Universal Industries	90 Elm Street	Pomona	CA	77890	28000	Curtis

Figure 3-5. Records From a Sample Sales File

If you have a file like this, you may want to create a file with **complete** and **partial** records to save file space and typing time.

A **complete record** contains the information that is common to a group of records and that is normally retyped in each record. When you use a file with complete and partial records, this redundant information is typed only in the

complete record. In the sales file, the complete record would contain the customer's name, address, and sales representative's name.

The information, such as amount of order and the date the order was placed, is different in each record. This information is typed into separate, **partial records**. The information in the partial record is unique to that record, except for a key field. A **key field** is a field that exists in both complete and partial records and is used to link a group of records together. In the sales file shown in Figure 3-6 the name of the sales representative is used as the key field to link the complete and partial records together.

<u>Rec ID</u>	<u>Customer Name</u>	<u>Address</u>	<u>City</u>	<u>ST</u>	<u>Zip</u>	<u>Order</u>	<u>Sales Rep</u>
1 01/21	Universal Industries	90 Elm Street	Pomona	CA	77890	32000	Curtis
2 02/04						130890	Curtis
3 02/18						60000	Curtis
4 03/18						28000	Curtis
5 04/14						89900	Curtis
6 05/07						200550	Curtis

Figure 3-6. Sample Sales File with Complete and Partial Records

A file with complete and partial records can be used to produce repetitive letters, and some reports and lists. Figure 3-7 shows a report created from the file in Figure 3-6. (Information on creating this type of report is contained in Chapter 12.)

To: Universal Industries  
90 Elm Street  
Pomona, CA 77890

Below is a list of all sales made to you between January and June, and the total amount due.

<u>Date of Order</u>	<u>Amount of Order</u>
01/21	\$32,000.00
02/04	\$130,890.00
02/18	\$60,000.00
03/18	\$28,000.00
04/14	\$89,900.00
05/07	\$200,550.00
07/15	\$26,000.00
	Total: \$567,340.00

If you have any questions, please contact your sales representative.

Figure 3-7. Sample Report Created From Complete and Partial Records

Before you decide to use a file with complete and partial records, however, look carefully at the possible file uses to ensure that you can create all the necessary file outputs from such a file. There may be some reports or lists you'll want to create that will require all records in a file be complete.

## FINISHING THE DESIGN PROCESS

When you have finished this part of the file design process, you should have a File Design Worksheet that lists the field description for each field in your file. Your File Design Worksheet will be used as the basis for creating your file and serves as a written record of your file design.

You're now ready to create an actual IBM Displaywriter file. To give you practice, there are file exercises at the end of each chapter that allow you to practice the concepts you learned in the chapter. Please do not begin designing your own file now. Many of the concepts you'll be learning interact with each other and affect your file design.

In the file exercises, there can be more than one correct answer. We've tried to identify the most common correct answers. Be sure that you understand why an answer is correct before going on, because this is the only way we can give you feedback about whether you understand a concept.

When you do begin to design your own file, you should create the file description and type about 20 records into the file. Then create all the shells that you'll need for output and merge these shells with the file. In this way, you can identify most potential problems before you've typed the entire file. If you have a problem, correct that problem in your file and try it again. When you are satisfied that the file is workable, finish typing the rest of the file.

If you encounter problems, relax. Remember that you can revise your field descriptions and you can add new fields to a file by creating new field descriptions. In addition, through the duplication process described in Chapter 4, you can delete fields.



## REVIEW EXERCISES

1. Circle the variable information in the sample output documents below and on the next pages. Identify which variable information is the result of a math calculation.
2. After you've finished Question 1., turn the page and fill in the File Design Worksheet using the output samples as a basis for determining the fields.
3. In addition to the fields that you've listed from the output samples, add fields to track the date of each sale.

**Note:** The names that you assign to the field may differ from those given in the answer on the answer page. Just be sure that the information contained in the field is the same.

### Sample Output Document

Dareco Supply Co.  
1407 8th St.  
Phoenix, AZ 85730

Attention: Mr. Donald F. Smith

Subject: Power Plants

Dear Mr. Smith:

At the request of our Ms. Jones, we are sending you descriptive literature and distributor prices covering the above product lines.

Upon receipt of this information we hope that we shall be favored with a trial order against which we will be pleased to send you an invoice.

Sincerely yours,

Louis Brown  
Sales Coordinator

JPJ/ce

## Sample Output Document

### CUSTOMER LIST

<u>Customer</u>	<u>Contact</u>	<u>Amount</u>	<u>Representative</u>
Cactus Hardware	Mr. Manual Shull	\$18,900.00	Ortiz
City College	Mr. Robert Ries	\$67,300.00	Jones
City Services	Ms. Suzanne Strayer	\$89,900.00	Curtis
Clinical Supply	Mr. Donald Higgins	\$17,450.00	Jones
Community College	Ms. Sharon Smith	\$235,980.00	Ortiz
Dareco Supply Co.	Mr. Donald Smith	\$10,500.00	Jones
Farmers Association	Mr. John Gaus	\$200,550.00	Hull
Farrington Co.	Mr. Timothy Sainz	\$42,500.00	Jones
Global Industries	Ms. Patricia Ross	\$28,000.00	Hull
Hospital Supply Co.	Ms. Donna Ikeda	\$51,790.00	Ortiz
Johnson Manufacturing	Mr. Samuel Smith	\$125,890.00	Hull
Mayan Construction	Ms. Betty Smith	\$110,700.00	Ortiz
Ranchers Inc.	Ms. Brenda Hebert	\$130,890.00	Hull
Rural Implements	Ms. Judy Exline	\$26,000.00	Hull
State Pipe Co.	Mr. Keith Cronin	\$60,000.00	Curtis
State University	Ms. Pamela Ramage	\$54,900.00	Ortiz
Thompson Construction	Ms. Betsy McKane	\$64,350.00	Jones
Tool Setting Co.	Ms. Leslie Garland	\$32,780.00	Jones
Universal Industry	Mr. Thomas Boyd	\$19,975.00	Curtis
Wrench Inc.	Mr. Robert Arino	\$32,000.00	Curtis
TOTAL:		\$1,420,355.00	

## Sample Output Document

### REVENUE ANALYSIS BY INDUSTRY

YEAR-TO-DATE 1981

<u>INDUSTRY</u>	<u>CUSTOMER</u>	<u>AMOUNT</u>	<u>TOTAL</u>
Bld	Mayan Construction	\$110,700.00	
	Thompson Construction	\$64,350.00	
			\$175,050.00
Ed	City College	\$67,300.00	
	Community College	\$235,980.00	
	State University	\$54,900.00	
			\$358,180.00
Frm	Farmers Association	\$200,550.00	
	Ranchers Inc.	\$130,890.00	
	Rural Implements	\$26,000.00	
			\$357,440.00
Med	Clinical Supply	\$17,450.00	
	Dareco Supply Co.	\$10,500.00	
	Hospital Supply Co.	\$51,790.00	
			\$79,740.00
Mfg	Cactus Hardware	\$18,900.00	
	City Services	\$89,900.00	
	Farrington Co.	\$42,500.00	
	Global Industries	\$28,000.00	
	Johnson Manufacturing	\$125,890.00	
	State Pipe Co.	\$60,000.00	
	Tool Setting Co.	\$32,780.00	
	Universal Industry	\$19,975.00	
	Wrench Inc.	\$32,000.00	
			\$449,945.00
YEAR-TO-DATE TOTAL		\$1,420,355.00	
LARGEST AMOUNT		\$235,980.00	
AVERAGE AMOUNT		\$71,017.75	
NUMBER OF CUSTOMERS		20	



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REVIEW ANSWERS

Sample Output Document

Dareco Supply Co.  
1407 8th St.  
Phoenix, AZ 85730

Attention: Mr. Donald F. Smith

Subject: Power Plants

Dear Mr. Smith:

At the request of our Ms. Jones, we are sending you descriptive literature and distributor prices covering the above product lines.

Upon receipt of this information we hope that we shall be favored with a trial order against which we will be pleased to send you an invoice.

Sincerely yours,

Louis Brown  
Sales Coordinator

JPJ/ce

## Sample Output Document

### CUSTOMER LIST

<u>Customer</u>	<u>Contact</u>	<u>Amount</u>	<u>Representative</u>
Cactus Hardware	Mr. Manual Shull	\$18,900.00	Ortiz
City College	Mr. Robert Ries	\$67,300.00	Jones
City Services	Ms. Suzanne Strayer	\$89,900.00	Curtis
Clinical Supply	Mr. Donald Higgins	\$17,450.00	Jones
Community College	Ms. Sharon Smith	\$235,980.00	Ortiz
Dareco Supply Co.	Mr. Donald Smith	\$10,500.00	Jones
Farmers Association	Mr. John Gaus	\$200,550.00	Hull
Farrington Co.	Mr. Timothy Sainz	\$42,500.00	Jones
Global Industries	Ms. Patricia Ross	\$28,000.00	Hull
Hospital Supply Co.	Ms. Donna Ikeda	\$51,790.00	Ortiz
Johnson Manufacturing	Mr. Samuel Smith	\$125,890.00	Hull
Mayan Construction	Ms. Betty Smith	\$110,700.00	Ortiz
Ranchers Inc.	Ms. Brenda Hebert	\$130,890.00	Hull
Rural Implements	Ms. Judy Exline	\$26,000.00	Hull
State Pipe Co.	Mr. Keith Cronin	\$60,000.00	Curtis
State University	Ms. Pamela Ramage	\$54,900.00	Ortiz
Thompson Construction	Ms. Betsy McKane	\$64,350.00	Jones
Tool Setting Co.	Ms. Leslie Garland	\$32,780.00	Jones
Universal Industry	Mr. Thomas Boyd	\$19,975.00	Curtis
Wrench Inc.	Mr. Robert Arino	\$32,000.00	Curtis

TOTAL: \$1,420,355.00 — *calculation*

## Sample Output Document

<u>REVENUE ANALYSIS BY INDUSTRY</u>			
<u>YEAR-TO-DATE 1981</u>			
<u>INDUSTRY</u>	<u>CUSTOMER</u>	<u>AMOUNT</u>	<u>TOTAL</u>
(Bld)	Mayan Construction Thompson Construction	\$110,700.00 \$64,350.00	\$175,050.00 - calculation
(Ed)	City College Community College State University	\$67,300.00 \$235,980.00 \$54,900.00	\$358,180.00 - calculation
(Frm)	Farmers Association Ranchers Inc. Rural Implements	\$200,550.00 \$130,890.00 \$26,000.00	\$357,440.00 - calculation
(Med)	Clinical Supply Dareco Supply Co. Hospital Supply Co.	\$17,450.00 \$10,500.00 \$51,790.00	\$79,740.00 - calculation
(Mfg)	Cactus Hardware City Services Farrington Co. Global Industries Johnson Manufacturing State Pipe Co. Tool Setting Co. Universal Industry Wrench Inc.	\$18,900.00 \$89,900.00 \$42,500.00 \$28,000.00 \$125,890.00 \$60,000.00 \$32,780.00 \$19,975.00 \$32,000.00	\$449,945.00 - calculation
YEAR-TO-DATE TOTAL		\$1,420,355.00	
LARGEST AMOUNT		\$235,980.00	
AVERAGE AMOUNT		\$71,017.75 - calculation	
NUMBER OF CUSTOMERS		20	



FILE DESIGN WORKSHEET

FIELD NAME	FIELD TYPE*	NUMBER OF CHARACTERS**	COMMENTS
<i>Customer Name</i>	<i>char</i>	<i>22</i>	<i>company name</i>
<i>Address</i>	<i>"</i>	<i>25</i>	
<i>City</i>	<i>"</i>	<i>15</i>	
<i>St</i>	<i>"</i>	<i>2</i>	<i>state - use abbreviation</i>
<i>Title</i>	<i>"</i>	<i>4</i>	<i>title of contact person</i>
<i>First Name</i>	<i>"</i>	<i>10</i>	
<i>MI</i>	<i>"</i>	<i>2</i>	<i>include punctuation</i>
<i>Last Name</i>	<i>"</i>	<i>15</i>	
<i>Subtitle</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Contact Mo</i>	<i>math</i>	<i>2</i>	<i>month of last contact</i>
<i>Contact Day</i>	<i>"</i>	<i>2</i>	<i>day of last contact</i>
<i>Contact Yr</i>	<i>"</i>	<i>2</i>	
<i>Order</i>	<i>"</i>	<i>6</i>	<i>amount of sale no decimal point</i>
<i>Sales Rep</i>	<i>char</i>	<i>15</i>	<i>last name only</i>
<i>Rep Title</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Ind</i>	<i>"</i>	<i>4</i>	<i>use code</i>

\*character field      \*\* 1-80 characters  
 math field            1-17 characters  
 text field             1-500 characters

## Sample of the File Created From the File Design Worksheet

<u>Rec ID</u>	<u>Customer Name</u>	<u>Address</u>	<u>City</u>	<u>ST</u>	<u>Zip</u>	<u>Title</u>	<u>First Name</u>	<u>MI</u>
<u>Last Name</u>	<u>Subtitle</u>	<u>Contact Month</u>	<u>Contact Day</u>	<u>Contact Yr</u>	<u>Order</u>	<u>Sales Rep</u>	<u>Rep Title</u>	<u>Ind</u>
1 Smith	Dareco Supply Co.	1407 8th St. 01 05	Phoenix	AZ	85730	Mr.	Donald Ms.	F. Med
2 Ross	Global Industries	913 Dowd Street 01 05	Tucson	AZ	85719	Ms.	Patricia Mr.	A. Mfg
3 Sainz	Farrington Co. Jr.	642 Peach Street 01 08	Pomona	CA	77890	Mr.	Timothy Ms.	P. Mfg
4 Boyd	Universal Industry	90 Elm Street 01 12	Pomona	CA	77890	Mr.	Thomas Mr.	L. Mfg
5 Smith	Mayan Construction	66 Ash Street 01 12	El Centro	CA	77459	Ms.	Betty Ms.	Bld
6 Gaus	Farmers Association	356 Rural Road 02 13	El Centro	CA	77459	Mr.	John Mr.	E. Frm
7 Garland	Tool Setting Co.	1240 9th Street 02 21	Phoenix	AZ	85730	Ms.	Leslie Ms.	A. Mfg
8 Ries	City College	23 N. Central 02 25	Tucson	AZ	85719	Mr.	Robert Ms.	J. Ed
9 Exline	Rural Implements	2456 River Road 02 27	Tubac	AZ	85620	Ms.	Judy Mr.	K. Frm
10 Ramage	State University	56 W. 10th Street 03 12	Nogales	AZ	85621	Ms.	Pamela Ms.	I. Ed
11 Cronin	State Pipe Co.	45 E. Sand Road 03 16	Nogales	AZ	85621	Mr.	Keith Mr.	D. Mfg
12 Ikeda	Hospital Supply Co.	2 W. Alameda 03 20	San Diego	CA	77892	Ms.	Donna Ms.	P. Med

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## CHAPTER SUMMARY

- Analyzing current information management procedures requires answering the following questions:
  - What files are kept now?
  - What fields make up these files?
  - How is the information in the files used?
- Potential design problems and the recommendations for avoiding them are:
  - Names - Use five fields: title, first name, middle initial, last name, and subtitle
  - Addresses - Use four fields: street, city, state, and zip code
  - Dates - Use four fields: a printing date, and year, month, and day fields
  - Field with alphabetic and numeric information - separate into different fields
  - Combined fields - use only if you need the extra fields made available by compressing the information into one field
- Complete and partial records can be used in some types of files and may save space and typing time by reducing the amount of redundant information that must be typed.
- The File Design Worksheet was used in this chapter.

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Creating a file requires only two steps. First, using the File Design Worksheet, you create a file description that contains a field description for each field. Second, after the field descriptions are created, the actual file information is typed.

This chapter contains information about:

- creating a file description
- adding records to the file by typing them
- adding records that were created on other equipment to the file

### CREATING A FILE DESCRIPTION

The information for the field description can be taken directly from the File Design Worksheet. The field name, field type, and maximum field length for each field are entered on a field description menu similar to the one shown in Figure 4-1.

FILE DESIGN WORKSHEET

FIELD NAME	FIELD TYPE*	NUMBER OF CHARACTERS**	COMMENTS
<i>Title</i>	<i>char</i>	<i>4</i>	<i>include punctuation</i>
<i>First Name</i>	<i>"</i>	<i>10</i>	
<i>M-I</i>	<i>"</i>	<i>2</i>	<i>include punctuation</i>
<i>Last name</i>	<i>"</i>	<i>15</i>	
<i>Subtitle</i>	<i>"</i>	<i>4</i>	
<i>Street Address</i>	<i>"</i>	<i>25</i>	
<i>City</i>	<i>"</i>	<i>15</i>	
<i>State</i>	<i>"</i>	<i>2</i>	<i>use abbreviation</i>

Create Field | Personnel File | | | |

DISK01 | | | | |

FIELD DESCRIPTION

ID	ITEM	YOUR CHOICE	POSSIBLE CHOICES
a	Field Name	Title	
b	Field Type	2	1 = Math 2 = Character 3 = Text
c	Maximum Length	4	1 - 17 : Math 1 - 80 : Character 1 - 500 : Text

When finished with this menu, press ENTER.

Type ID letter to choose ITEM; press ENTER:

Figure 4-1. Field Description Menu

## Record ID

The first field in every file is a system-generated field, Record ID. The system uses this field to track records, and it assigns the Record IDs in increments of one. Thus, the first record typed into the file is assigned Record ID 1, the second record is Record ID 2, and so on. Each time a record is added, it is assigned a Record ID one digit higher than the Record ID of the last record in the file. If a record is deleted, the Record IDs of the other records in the file remain the same, and the Record ID of the deleted record is unused.

While you cannot directly change the Record ID of a record, you can use the system to renumber the records so that any unused Record IDs are used. For example, if the record with Record ID 3 was deleted, Record ID 3 cannot be used for another record unless you use the system to renumber the records. When records are renumbered, the Record IDs are assigned in the same order as the records are stored in the file.

## Field Order

Each field appears in the record in the same order as the field descriptions were created. For instance, the first field description created is the first field in the file (after the Record ID, which is inserted automatically), the second field description created is the second field, and so on. Figure 4-2 shows how the file headings appear on the screen after all the field descriptions are created. A heading line displays the name of each field.

Merge File/Text		Personnel File				
DISK01						
RECORD SELECTION						
Rec_ID	Title	First Name	MI	Last Name	Subtitle	
1	⌘	⌘	⌘	⌘	⌘	

Figure 4-2. Sample Record Screen

The order in which the fields appear in the file does not generally matter. You can temporarily rearrange the



fields in any order for such tasks as revising the record. Before the file is printed you usually will rearrange the fields in the file and print only some of the fields.

As a general rule, if most of the file information comes from a single form or source document, create the field descriptions so that the fields are in the same order as they appear in the source documents. It may be easier to type in the information if you can simply follow the form. If, however, the file information comes from many sources, you may want to arrange the fields in whatever order seems convenient for the person who must compile the information.

## ADDING RECORDS TO A FILE

New records can be added to a file by more than one method. Typing the records is the most common method of adding records. However, records can be added that were originally:

- typed as text documents
- created on other compatible office equipment
- communicated from a suitably programmed host computer

You can use combinations of the methods described in this chapter to add records to a file. For example, you may duplicate selected records to the file, then type some records, and add others previously typed as text. The primary consideration for adding records is that the records added must be compatible with the field names, field types, and maximum field lengths defined in the file description.

### Adding Typed Records

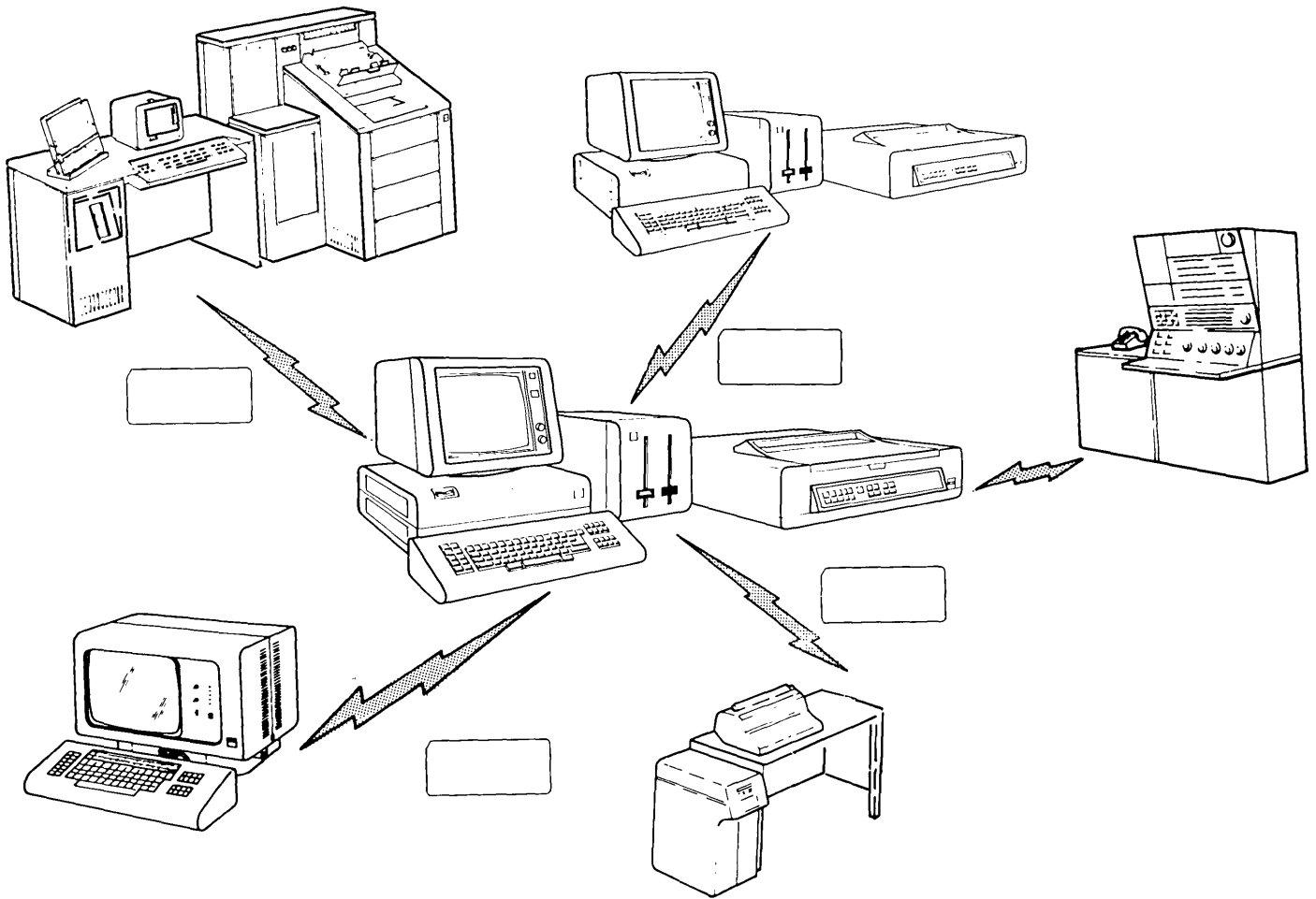
As you type the file information, the system checks the information against the field description for that field. The system allows you to type only characters that are consistent with the field description for that field.

For example, if you try to type an alphabetic character in a math field, the system will not accept the character and will inform you that the alphabetic character is invalid in that field. The system will respond in a similar fashion with a different error message if you try to type more characters than the maximum field length allows. This system checking helps insure the integrity of the information in a file.

## Adding Records From Other Sources

Records can be added in several ways besides being typed directly into the file. There are four major sources of records:

1. Records typed on the Displaywriter System as a text document, such as a variable fill-in list or a statistical table
2. Records created on other compatible office equipment, such as an IBM Office System 6, the IBM 5520 Administrative System, or any IBM mag card typewriter
3. Records stored on a suitably programmed IBM computer
4. Records from one IBM Displaywriter file added to another existing IBM Displaywriter file or used to create a new file



## Records Converted From Text

The same method is used to add records created on other compatible office equipment or typed as a text document to an IBM Displaywriter file. The original information must first be stored as a text document. Records that were created on other office equipment must be either 1) communicated to the IBM Displaywriter System as text or 2) if the information is stored on magnetic cards, it can be read into a text document via an IBM 6361 Mag Card Reader.

Once the information is as a text document, it can be converted into an IBM Displaywriter file. For a document to be converted, the format of the text within the document must be such that it can be divided logically into records and fields compatible with the records and fields defined in the IBM Displaywriter file.

Appendix C explains the conversion rules and considerations involved in converting text into a file.

## Records Received From Computer

A file stored on a suitably programmed host computer can be communicated to the IBM Displaywriter for file use. When the file is communicated, the IBM Displaywriter receives it as a text job. It then must be converted to a file. For instructions on converting text into a file job, see Appendix C.

Before the file is communicated from the computer, you should consult the data processing personnel who handle the computer file to determine the file contents. All of the same file concerns discussed in Chapter 3 still apply. You will want to look at the computer file fields that contain names, addresses, dates, and other items to determine whether the information is usable.

In some cases, the computer file may have to be altered before it is communicated to the IBM Displaywriter. For example, the name field in the computer file may contain the entire name, and the proposed file output may require that the name be broken into more than one field. You can either:

- divide the field while the file is stored as a text job, then convert the file, or
- before that information is communicated to the IBM Displaywriter, the name field can be divided into separate fields

A field, however, cannot be automatically divided after the file is stored on the IBM Displaywriter System as a file.

### Duplicating Records From Another IBM Displaywriter File

You may have records in one IBM Displaywriter file that can be used in another IBM Displaywriter file. Rather than retyping these records, you can duplicate some or all of the records in the **source file**. The Duplicate Selected Records function allows you to:

- duplicate all of the records from a source file or duplicate only selected records
- duplicate some or all of the fields in a file
- rearrange the order of the fields within a record so that the fields appear in a new file in a different order
- sort the records to duplicate them to the new file in a specific order

There are two situations in which you might use the Duplicate Selected Records function to add records to a file. In the first case, you use the records to create a new file, and in the second, you add the records to an existing file.

**DUPLICATING RECORDS TO CREATE A NEW FILE:** When you duplicate records to create a new file, you do not have to create new field descriptions. If you don't create new field descriptions, the source file field descriptions are automatically duplicated along with the records.

The new file has its own Record IDs. The first record duplicated is Record ID 1, the second is Record ID 2, and so on.

**DUPLICATING RECORDS TO AN EXISTING FILE:** At other times, you might find it useful to add records from one file to another file.

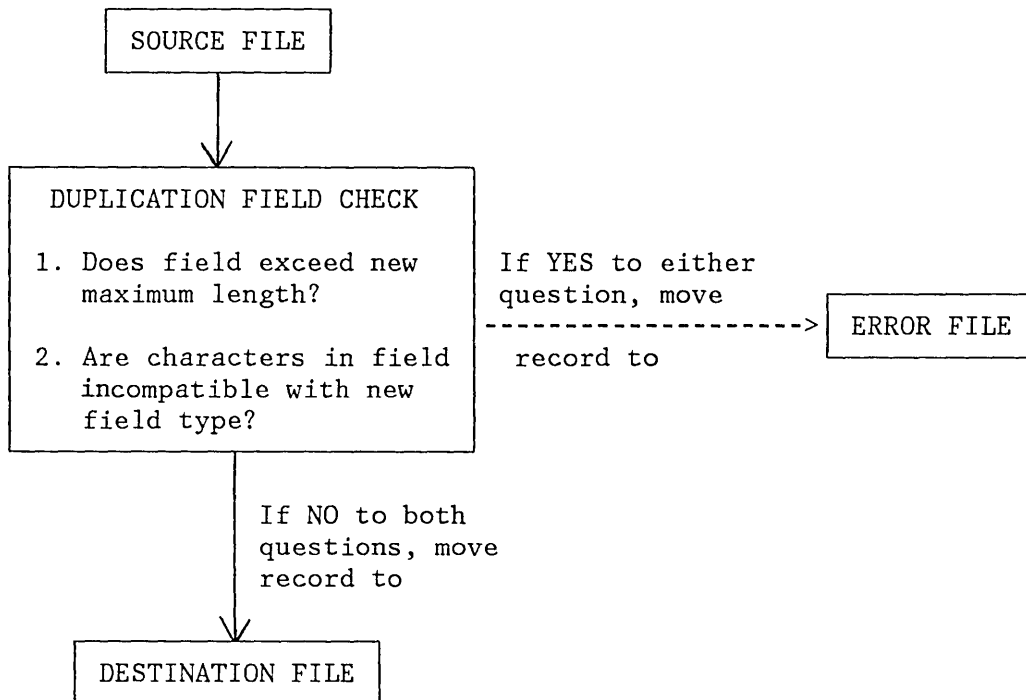
During duplication, the source file and the **destination file** (the file being added to) are compared. Only those fields in the source file with field names identical to the field names in the destination file are copied. If you want to duplicate records into a file and the field names do not match, you must change the field names in one of the files. For example, if one file has a field named AMT and the same field in the other file is named Amount,

you cannot duplicate the records until you change that field name in one of the files.

The field types do not have to match, as long as the information in a field is not in violation of the new field description. (For example, you can not duplicate alphabetic characters into a math field.)

The maximum field length of a field in the destination file can be either shorter or longer than the maximum field length of that field in the source file.

During the duplication process, the system checks each record before duplicating it into the destination file. If it finds a field that contains either 1) more characters than allowed by the maximum field length for that field in the source file, or 2) characters that violate the field type for that field in the destination file, then it duplicates that record into an error file. You can look at the error file after the duplication process is completed. If you still want to duplicate these records, the error must be corrected before duplicating the records from the error file to the destination file.



Creating new field descriptions, and then duplicating the information from an existing file into the new file provides you with an opportunity to correct some design

errors. For example, you find that you described a field containing all numbers as a character field, but you now want use the information in that field in math calculations. You cannot change the original field description, but you can set up a new file description that is correct. Then you can duplicate the records from the existing file into the new file.

DUPLICATING AN ENTIRE FILE: Duplicate Selected Records can be used to duplicate an entire file. However, you can also duplicate an entire file just as you would duplicate a text document. To do this, you must duplicate all the records in the file and all the fields in each record. The new file is an exact duplicate of the old file, and the Record IDs are the same in both files.

You can use this mode of duplication if you have a file that you want to copy while preserving the Record IDs. For example, you may want to make a copy of the file to serve as a backup file. The backup file could be used if the original file is accidentally damaged or destroyed.

## OTHER RECORDS FUNCTIONS

The IBM Displaywriter has some additional functions that help with file information management. First, the system can **count** all selected records (those that meet specific selection criteria) and display the total. This function can be useful in evaluating file content.

Second, the system can automatically **delete** selected records. You can specify selection criteria and delete any record that matches the selection criteria. This function allows you to delete more than one record without having to look at each record separately. If you have records with expiration dates, for example, you might want to delete those records when those expiration dates occur.

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## REVIEW QUESTIONS

1. True/false. You can choose not to have Record IDs in your file.
2. True/false. Rearranging fields for editing or printing does not permanently change your file.
3. What two things does the system check for as information is added to the file?
4. True/false. Using Duplicate Selected Records to duplicate the file prevents you from duplicating all the records in the file.
5. True/false. If you are duplicating records into an existing file, the system will recognize AMT and AMOUNT as being the same fields.



## REVIEW ANSWERS

1. False. Record IDs are system-generated, and each record in a file must have a Record ID.
2. True. Rearranging fields for editing or printing is only a temporary change. It does not permanently change your file. The only way to permanently change the order of the fields in a record is to duplicate the file using Duplicate Selected Records. You can then specify that the fields appear in the new file in a specific order.
3. As information is added to the file, the system checks it to be sure that the information does not violate the field type for that field and that the maximum field length is not exceeded.
4. False. Using Duplicate Selected Records to duplicate the file does not prevent you from duplicating all the records in the file. It does, however, allow you to do some additional record handling such as sorting records, duplicating only some fields, or rearranging the order of the fields.
5. False. If you are duplicating records into an existing file, the system will not recognize AMT and AMOUNT as being the same fields. It will not duplicate the contents of one of these fields into the other. The field names must be identical for successful duplication.

## CHAPTER SUMMARY

- A file description must be created and stored on diskette before you can add records to a file.
- The field descriptions that make up a file description list the field name, type, and maximum length for each field in the file.
- A Record ID is added to every record by the system. The operator cannot change a Record ID, but can use the system to renumber all records.
- The field order can be temporarily rearranged for editing or printing.
- Records from the following sources can be added to a file:
  - converted from a text document
  - received from a suitably programmed computer
  - duplicated from another Displaywriter file
- Other records functions include:
  - counting the number of records
  - deleting multiple selected records

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This chapter contains information about:

- the possible output media for a Displaywriter file
- unformatted output directly from the file
- output created by merging the file with a shell document
- conditional text that prints under some circumstances, but not others

### FILE OUTPUT

There are three possible types of file output:

1. The file can be printed, either directly from the file or after being merged with a shell document.
2. The file output can be stored as a text document on a diskette, either directly from the file or after being merged with a shell document. The file output is the same as it would be if it had been printed.
3. The file output can be both printed and stored on diskette, either directly from the file or after being merged with a shell document.

For convenience, any time we talk about a file being outputted, we will say that it is printed. However, remember that there are more ways to output the file than just printing.

### FILE OUTPUT WITHOUT MERGE

Printing a file using the system-generated format produces a document like Figure 5-1. The system provides a page header that contains the field names directly above the field entries. The header and records are wrapped (moved to the next line) if multiple lines are necessary. They are wrapped only at field boundaries, where possible.

The space provided for each field is wide enough to hold the maximum-length field value allowed for that field, as specified in the field description. If the field name is longer than the maximum length for that field, then the

<u>Rec ID</u>	<u>Title</u>	<u>First Name</u>	<u>MI</u>	<u>Last Name</u>	<u>Subtitle</u>	<u>State</u>	<u>Zip Code</u>
<u>Street Address</u>	<u>City</u>	<u>Yr Born</u>	<u>Mo Born</u>	<u>Day Born</u>	<u>Department</u>		
<u>Home Phone</u>	<u>FN Spouse</u>	<u>App Date</u>	<u>Salary</u>	<u>Sex</u>	<u>Extension</u>	<u>Hire Yr</u>	
<u>Supervisor</u>							
1	Mr.	Brian	K.	Rogers			
345 West 6th Street				Dallas		TX	71098
764-1293	Jane	41	12	24		Administration	
Roger Kramer		81/01/05	13495	M	7462		65
2	Mrs.	Lorna	A.	Boyle			
122 North 10th Street				Dallas		TX	71283
736-2938	David	51	04	08		Engineering	
Ronald Crawford		80/05/20	16998	F	2736		75
3	Ms.	Sue	R.	Burns			
1054 Great Oak Road				Dallas		TX	71234
746-2839		55	12	18		Administration	
Roger Kramer		81/01/15	10500	F	2938		80
4	Mr.	Gerald	S.	Ostrom	Jr.		
1020 Far West Drive				Dallas		TX	71923
659-2837	Janet	37	07	31		Marketing	
Patricia Nicholson		80/12/05	25998	M	1726		55
5	Ms.	Trisha	J.	Park			
1532 Wilshire Drive				Irvine		TX	73928
432-5938	John	45	06	11		Planning	
Pauline Shaw		80/11/15	24445	F	3948		70

Figure 5-1. File Output Without Merging

length of the field name is used to determine how much space is allowed for that field.

The field entries are printed exactly as they appear on the screen. Numbers are printed as they were typed. Include Instructions in a text field are not resolved and do not retrieve any text (as they normally would if the file were merged and printed).

Before printing the file, you can:

- temporarily rearrange the order of the fields
- temporarily delete fields you don't want printed
- select records using the select function described in Chapter 6
- sort the file using up to five sort fields, as described in Chapter 7

You can also create a format document that can be used with the file output. A format document, as its name implies, is used only to provide format information for the file output. (It is not a shell document and cannot contain any text.) With a format document, the file can be printed:

- sideways on the paper
- with the fields lined up
- with text headers or footers, including page numbers

However, the space provided for each field is still determined by the maximum field length or the length of the field name, whichever is longer.

<u>Rec ID</u>	<u>First Name</u>	<u>MI</u>	<u>Last Name</u>	<u>City</u>	<u>State</u>	<u>Zip Code</u>
<u>Department</u>	<u>Extension</u>					
1	Brian	K.	Rogers	Dallas	TX	71098
	345 West 6th Street Administration	7462				
2	Lorna	A.	Boyle	Dallas	TX	71283
	122 North 10th Street Engineering	2736				
3	Sue	R.	Burns	Dallas	TX	71234
	1054 Great Oak Road Administration	2938				
4	Gerald	S.	Ostrom	Dallas	TX	71923
	1020 Far West Drive Marketing	1726				
5	Trisha	J.	Park	Irvine	TX	73928
	1532 Wilshire Drive Planning	3948				
6	Roger	T.	Norton	Dallas	TX	76452
	2045 Duval Road Accounting	2837				
7	Laverne	W.	Kelly	White Rock	TX	73648
	2020 Madison Avenue Administration	2839				

Figure 5-2. File Output Using a Format Document

## MERGE FILE/TEXT OVERVIEW

In merge file/text, a file is merged with a shell document. The shell document describes the desired format of the output and identifies fields from the file to be inserted into the output document. It also identifies where the fields and any constant text or associated text are to be inserted. Text processing functions, such as headers, footers, pagination requirements, and page numbering, can be used with shell documents. The shell document is stored and can be reused.

When the shell document is merged with a file, the system inserts the information contained in the fields specified into the output document. The number of output documents produced depends on the type of merge file/text being done and the number of records selected.

You can merge a file with text to produce either reports or repetitive letters. The repetitive letter function allows you to combine fields from individual records with a shell document to produce one output document per record. See Figure 2-2 in Chapter 2 for an example of repetitive letters produced from a file.

Reports allow you to combine fields from all selected records with a shell document to produce one output document. See Figure 2-3 and Figure 2-4 in Chapter 2 for an example of reports and lists generated from a file. Notice that reports and lists use the information from more than one record.

## Creating a Shell Document

Shell documents are created in a text mode. At the point in the document where information from a field is to be inserted, the operator uses a Variable key to tell the system that the inserted information will differ in each letter.

The variable information can be:

- a field name
- a field number (the first field added to the file would be field 1, etc.)
- an answer variable from a math calculation

If the variable information is information from a math field or an answer variable from a math calculation, then a math format can also be specified. (Chapter 9 contains more information on math formats.)

Figure 5-3 shows a shell document with variable information as it appears if the shell document is printed without merging it with a file. The variable information appears surrounded by the variable sign,  $\nabla$ . All instructions (such as Include Instructions and Math Instructions) are surrounded by a  $\nabla$ .



```
/years_service = 81 - Hire_Yr/
/percent = years_service * .01/
/bonus = percent * Salary/
```

December 15, 1981

```
¶Title¶ ¶First_Name¶ ¶MI¶ ¶Last_Name¶/If Not Empty,Subtitle/, ¶Subtitle¶/End If/
¶Street_Address¶
¶City¶, ¶State¶ ¶Zip_Code¶
```

Dear ¶Title¶ ¶Last\_Name¶:

This past year has been a banner year for us, and we would like to thank you for your help in making it that way. I'm pleased to announce that the Board of Directors has voted to give each employee a bonus of 1% of his or her salary for each year of service.

Since you have been with us for ¶years\_service,3¶ years, your bonus is \$¶bonus,1¶. This amount will be added to your next paycheck.

Again, I'd like to thank you for your help and congratulate you on a fine year.

Sincerely,

Dan P. Andrews  
President

December 15, 1981

Mr. Brian K. Rogers  
345 West 6th Street  
Dallas, TX 71098

Dear Mr. Rogers:

This past year has been a banner year for us, and we would like to thank you for your help in making it that way. I'm pleased to announce that the Board of Directors has voted to give each employee a bonus of 1% of his or her salary for each year of service.

Since you have been with us for 16 years, your bonus is \$2,159.20. This amount will be added to your next paycheck.

Again, I'd like to thank you for your help and congratulate you on a fine year.

Sincerely,

Dan P. Andrews  
President

Figure 5-3. Sample Shell Document and Letter

The shell document can also contain conditional text, which is text is printed only under certain circumstances. Conditional text is explained in the next section.

## How to Use Conditional Text in Merge File/Text

At times you may want to have text printed if there is an entry in a field, but not if the field is blank (has no entry). For example, if a person's name has a subtitle (such as Jr. or III) you'll want to print the person's name, a comma and a space, then the subtitle (for example, George A. Johnson, Jr.). But if there is no subtitle, then you don't need the comma and space after the name.

If you put the comma and space in your shell document as constant text, you'll get names like "Susan K. Brown, ", because the comma and space will print after every name.

The **conditional text** function allows you to tell the system that certain specified text is to be printed only under certain conditions. There are three different possible conditions.

1. The conditional text is to be printed only if there is an entry in the specified field. For instance, a comma and a space after a name will print only if there is an entry in the subtitle field. If the subtitle field is empty, the comma and space will not print.
2. The conditional text is to be printed only if there is **not** an entry in the specified field.

For example, a letter to employees notifying them of missing information in their personnel records might be set up so that if a field is blank, a sentence identifying the missing information is printed (for example, "We do not have your current home telephone number."). Otherwise, if the field has an entry, the sentence does not print.

3. One piece of conditional text is to be printed only if there is an entry in the specified field; otherwise, a different piece of conditional text is to be printed.

As an example, Figure 5-4 shows two letters sent to employees. If there is a name in the FN Spouse field, the employee's spouse's name is printed from the file. But if the field is blank, the phrase "a companion" is printed. (The shell document is also

shown, with the conditional text instruction highlighted.)

January 5, 1982

¶First\_Name¶ ¶MI¶ ¶Last\_Name¶/If Not Empty,Subtitle/, ¶Subtitle¶ /End If/  
¶Street\_Address¶  
¶City¶, ¶State¶ ¶Zip\_Code¶

Dear ¶Title¶ ¶Last\_Name¶:

I am delighted to announce that our fifth annual company dinner will be held  
January 16, 1982 in the Executive Dining Room to celebrate a good year. I am  
hoping that you'll be attending. Please allow me to extend an invitation to you  
and /If Not Empty, FN Spouse/¶FN Spouse¶./End If//If Empty, FN Spouse/ a companion./End If/

In addition to the dinner, there will be dancing afterwards.

Please RSVP to your department secretary by January 10.

Sincerely,

Dan P. Andrews  
President



Figure 5-4 (Part 1 of 2). Sample Letters With Conditional Text

January 5, 1982

Brian K. Rogers  
345 West 6th Street  
Dallas, TX 71098

Dear Mr. Rogers:

I am delighted to announce that our fifth annual company dinner will be held January 16, 1982 in the Executive Dining Room to celebrate a good year. I am hoping that you'll be attending. Please allow me to extend an invitation to you and Jane.

In addition to the dinner, there will be dancing afterwards.

Please RSVP to your department secretary by January 10.

Sincerely,

Dan P. Andrews  
President

January 5, 1982

Sue R. Burns  
1054 Great Oak Road  
Dallas, TX 71234

Dear Ms. Burns:

I am delighted to announce that our fifth annual company dinner will be held January 16, 1982 in the Executive Dining Room to celebrate a good year. I am hoping that you'll be attending. Please allow me to extend an invitation to you and a companion.

In addition to the dinner, there will be dancing afterwards.

Please RSVP to your department secretary by January 10.

Sincerely,

Dan P. Andrews  
President

Figure 5-4 (Part 2 of 2). Sample Letters With Conditional Text

A conditional text instruction is made up of three parts:

1. the name of the field that the conditional text is based on (in Figure 5-4 the field was FN Spouse).
2. whether the field should have an entry for the conditional text to print, or whether the field should be empty.
3. the text that is to be printed. This can be both constant text and information from the file. If you want to print information from the file, you must specify each field name as a variable just as you do in the regular text in the shell document.

**Note:** When you use conditional text, a math field containing only a 0 (zero) is read as blank (no entry), but a character field containing a single space is read as having an entry.

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## REVIEW QUESTIONS

1. True/false. All file output must be printed.
2. True/false. A list is a type of repetitive letter since it repeats file information.
3. True/false. Variable information can come from the file or from a math calculation.
4. Write the conditional text instruction for the examples below. For each example, fill in:

1. If "Field Name"
2. is "Not Empty/Empty"
3. print "Conditional Text"

- a. Your file has a field named "Salutation" to provide the salutation for letters. If you don't have a name in this field, you'd like the word "Gentlemen" placed in the salutation of your letter.

1. If \_\_\_\_\_
2. is \_\_\_\_\_
3. print \_\_\_\_\_

- b. Your file has a field named "Letter" that contains a date that a customer was sent an important sales letter, but not all customers were sent the sales letter. You want to send another letter to all customers, but you want to print "We sent you a letter earlier this year." in the letter to the customers who received the first letter.

1. If \_\_\_\_\_
2. is \_\_\_\_\_
3. print \_\_\_\_\_

- c. Your employee file has a field named "EmerContact" which contains the name of a person to be contacted in the event of an emergency. You want to send out a memo to have employees verify that the contact name is correct. If there is a contact name, the memo should read "Our records show that the person to be contacted in case of an emergency is (fill in the person's name)."

If the record doesn't show a contact name, you want to ask the employee to provide one by saying, "You have not designated someone to be contacted in case of an emergency. Please do so as soon as possible."

1. If

---

2. is

---

3. print

---

BUT

1. If

---

2. is

---

3. print

---



## REVIEW ANSWERS

1. False. File output can be printed, stored on a diskette as a text job, or both.
2. False. A list is a type of report since it produces one output document for a file. A repetitive letter produces one output document for each record.
3. True. Variable information may be either file information or an answer variable from a math calculation.
4.
  - a.
    1. If Salutation
    2. is empty
    3. print "Gentlemen."
  - b.
    1. If Letter
    2. is not empty (has an entry)
    3. print "We sent you a letter earlier this year."
  - c.
    1. If EmerContact
    2. is not empty (has an entry)
    3. print "Our records show that the person to be contacted in the case of an emergency is ~~EmerContact~~."

BUT

    1. If EmerContact
    2. is empty
    3. print "You have not designated someone to be contacted in case of an emergency. Please do so as soon as possible."

## CHAPTER SUMMARY

- File output can be:
  - printed
  - stored on diskette as a text job
  - stored on diskette as a text job and printed
- File information can be outputted directly from the file without merging it from a shell document, but it prints in a system-generated format.
- Merge file/text is used to merge a file with a shell document. There are three types of merge file/text:
  1. repetitive letters which produce one output document per record
  2. reports which produce one output document per file
  3. lists which produce one output document per file
- A shell document can contain as variables:
  - field names
  - field numbers
  - answer variables from math calculations
- Conditional text is used to print text under certain conditions and not print it under others. Depending on the conditional text instruction, conditional text may print:
  1. if the specified field is not empty (has an entry)
  2. if the specified field is empty
  3. or two conditional text instructions can be combined so that one piece of text prints if the field is not empty and a different piece of text prints if the field is empty

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## Selecting Records

Once your file has been created, you'll want to begin using it. One of the important criteria for files management discussed in the introduction is the capability to select or choose certain records for use. IBM Displaywriter record selection allows you to do this.

Record selection involves searching the file for records that meet the record selection criteria typed into the Record Selection frame. Each record in the file, beginning with the first, is compared against the criteria. If the record matches the criteria, it is displayed, merged, printed, or duplicated; if it does not match, it is not used and the next record is compared against the criteria.

Each record selection criterion consist of three parts:

1. the field to be searched,
2. a comparison criterion (such as "greater than") which specifies the basis for comparison, and
3. the comparison value that the value in the field must match.

### COMPLETING THE RECORD SELECTION SPECIFICATIONS

Record Selection Specifications are used with most of the worksheets you'll be using, such as the Report Design Worksheet (which is discussed in Chapter 11). You'll use the Record Selection Specifications to specify the selection criteria to be used for those outputs. To complete the Record Selection Specifications, you'll need to list the:

1. field name
2. comparison criteria
3. comparison value for each field.
4. logical criteria(s), if there is more than one comparison criterion for a field
5. line number, if there is more than one line of selection criteria

In the rest of this chapter, you'll learn how to use record selection. A completed Record Selection Specifications sheet is shown with each sample record selection frame.

## COMPARISON CRITERIA

There are four primary comparison criteria:

- = (equal to) means that the characters in the field being searched must match the comparison value exactly. If you are searching a field named "State" for a value equal to California, only those records with California in that field will be selected. You can also search for a record that has no value in a field by specifying '='.
- ≠ (not equal to) means that the characters in the field being searched must **not** match the comparison value. You use this comparison criterion to exclude a group of records from use.
- > (greater than) means that the value in the field being searched is higher than the comparison value. If you are searching a field named "Salary," you may not be interested in records where the salary is exactly the same as the one you specify, but you want the records selected when the salary is more than a certain amount.

Think of the letters of the alphabet as being numbered, with A=1 and Z=26. If you use >K in a character field, for example, the letters selected will be those that follow K in the alphabet.

- < (less than) means that the value of the number in the field being searched is lower than the comparison value. Again, you may be searching for records that have a salary less than the amount you specify.

In addition, these comparison criteria can be combined to give you two more comparison criteria:

- => or >= (equal to or greater than) means that the number in the field being searched is the same as the comparison value or higher. For example, you might search a field named "Salary" for those salaries equal to or greater than \$15,000.
- =< or <= (equal to or less than) means that the number in the field being searched is the same as the comparison value or less. You also might search a field named "Salary" for those salaries equal to or less than \$15,000.

## LOGICAL CRITERIA

In many cases, you'll search for a value between two limits or a value matching one of a number of criteria. To do so, you use logical criteria along with the comparison criterias. The two logical criteria are:

1. & (AND)
2. | (OR)

An & (AND) tells the system that for a value in a field to be selected, it must meet all the selection criteria listed. For example, if you want to print a list of everyone in the file whose salary is greater than \$10,000 and less than \$20,000, you would do the following. You already know that your comparison criteria would be >10000 and <20000, so you simply replace your verbal "and" with the logical criteria & to create >10000 & <20000.

The record selection frame would look like the Record Selection frame shown below. (For clarity, we've rearranged some of the fields and deleted the fields that we aren't using, just as you might do. We'll also show you only a partial representation of the Record Selection frame.)

### RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Salary	>10000 & <20000



Rec_ID	First_Name	MI	Last_Name	Salary
				> 10000 & < 20000

An | (OR) tells the system that for a record to be selected, the value in the field can match any of the selection criteria for that field. For example, if you want to select the records of anyone who is in either the Engineering or Personnel department, you know that you would specify = **Engineering** or = **Personnel**. Now just replace the your verbal "or" with the logical criteria |. The record selection frame, with the fields rearranged for easier revision, would look like this:

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Department	= Engineering   = Personnel.



First Name	Last Name	Salary	Department
			= Engineering   = Personnel

You can also use combinations of AND and OR. Just keep in mind that any selection criteria linked with ANDs will all have to be met for a record to be selected. If the selection criteria are linked with ORs, any record meeting any of the selection criteria will be selected.

Suppose you want to compare the records of employees hired in the first quarter and the last quarter of the year. To set up your selection criteria, you need to tell the system to select the records with dates in January, February, and March (first quarter) and October, November, and December (last quarter). The dates are typed as numbers in the Month field.

The first part of the selection criteria would be selecting records for the first quarter. The selection criteria might be one of the following:

Month => 01 & Month =< 03

Month = 01 | Month = 02 | Month = 03

The first method of writing the selection criteria sets a range between 01 and 03. If a date is 01, 03 or between those two numbers, it will be selected. The second method of writing the selection criteria contains a list of all the months that a date could match and be selected. Either method is correct, but we'll use the first method, creating a range, in our example.

The selection criteria for selecting the employees hired in the last quarter of the year is same, but with different months as comparison values. When the two sets of selection criteria are combined, they must be combined with an | (OR) sign so that the selection criteria is:

Month => 01 & Month =< 03 | Month => 10 & Month =< 12

First Quarter

Last Quarter

Notice that in the selection criteria, the | (OR) sign separates the selection criteria into two sets of selection criteria. A hire date that falls into the first quarter or the last quarter would be printed on the list.

The & (AND) sign connects all the selection criteria up to the limits of the | (OR) sign and allows each range to be specified separately.

If you had used an & (AND) sign instead of an | (OR) sign in the previous example, your selection criteria would have been:

Month => 01 & Month =< 03 & Month => 10 & Month =< 12

The selection criteria above will not produce a list because it asks for dates that are between January and March and also between October and December. (Remember that an & (AND) means that all selection criteria must be met for a record to be selected.) But it is impossible for a date to be in both quarters, so no record would be selected.



## SELECTING RECORDS BASED ON THE CRITERIA IN MORE THAN ONE LINE

The record selection frame (such as the one in Figure 6-1), has room for up to 12 lines of selection criteria under each field name. When multiple lines of selection criteria are used, the system assumes an | between each line.

Figure 6-1 shows two lines of selection criteria. The system reads the selection criteria and selects any record that contains the name of a person:

1. in the Engineering or Personnel department with a salary between \$10,000 and \$20,000 **OR**
2. in the Marketing department with a salary equal to or over \$30,000

### RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Salary	> 10000 & < 20000
1	Department	= Engineering   = Personnel
2	Salary	=> 30000
2	Department	= Marketing



Last Name	Salary	Department
	> 10000 & < 20000 => 30000	= Engineering   = Personnel = Marketing

Figure 6-1. Selection Criteria on More than One Line

When you use multiple lines of selection criteria, the system reads each line independently. Remember that the system assumes an | between the lines, so any record that meets the selection criteria on any one line will be used.

Of course, if a record is selected because it meets the selection criteria on one line, the system does not

compare it to the selection criteria on the other line(s). A record is not printed more than once even though it may meet the selection criteria on more than one line.

As an example, if the records from the file were printed using the selection criteria shown in Figure 6-1, the list shown in Figure 6-2 would be the result.

<u>Name</u>	<u>Department</u>	<u>Salary</u>
Lorna A. Boyle	Engineering	16998
Karen J. Benson	Personnel	12932
Thomas W. Jackson	Personnel	12938
Simon E. Swanson	Engineering	18890
Robert M. Lopez	Personnel	13389
Patricia H. Nelson	Marketing	34829
Mavis Y. Nelson	Personnel	10987
Diane K. Preston	Engineering	18909
Victor P. Fisher	Marketing	31839
Theresa H. Black	Personnel	18938
Simon E. Carrigan	Personnel	16589

Figure 6-2. List Produced Using Multiple Lines of Selection Criteria

## SELECTING RECORDS BASED ON CRITERIA IN MORE THAN ONE FIELD

So far you've learned about selecting records based on the values in one field of a record. To select a record based on the values in more than one field, you simply use the selection criteria for each field just as though you were qualifying only on that field. The system assumes an & between the fields on the same line in the record selection frame.

If you were to use the selection criteria shown in Figure 6-3, the system would read it as select all records for a person in either the Engineering or Personnel department with a salary that is greater than \$10,000 and less than \$20,000. For a record to be selected, it must contain one of the two acceptable departments and a salary that is within the specified range.

### RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Salary	> 10000 & < 20000
1	Department	= Engineering   = Personnel



Last Name	Salary	Department
	> 10000 & < 20000	= Engineering   = Personnel

Figure 6-3. Sample Selection Criteria Used in More Than One Field

Records for people in either the Engineering or Personnel department but with a salary less than \$10,000 or more than \$20,000 will not be selected. Records that contain a salary in the right range, but do not list the department as Engineering or Personnel will also not be selected.

Remember that when you specify selection criteria for more than one field in a file, the system reads the selection criteria as though there were an **&** between the fields. Any record selected has to contain values matching the specified selection criteria for each field.

### USE OF IGNORE CHARACTERS IN THE SELECTION FUNCTION

Ignore characters tell the system that you are specifying a comparison value for only part of the value in the field, and that you don't care about other, non-specified part of the value. There are two types of ignore characters.

1. Each **ignore character**, tells the system to ignore one specific character in a field during a search.

Suppose your file has a combined field with a code for sex and a two digit number for age (for example, F26 for a female, age 26). You can use an ignore character to tell the system to ignore the code for sex and look only at the two digit number for age. You can also use two ignore characters to tell the system to ignore the two digit number and look only at the code for sex. Figure 6-4 shows how an ignore character would look in a selection frame used to select only 24 years olds regardless of sex.

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Combined	ignore. 24



Last Name	Salary	Combined Field
		= • 24

Figure 6-4. Selection Criteria With An Ignore Character

2. An **ignore rest (of-field) character** tells the system to ignore any characters in the field that are to the right of the ignore rest character. This can be used when you want to compare the selection criteria to only the first part of a field.

For example, if you wanted to select all the records that contained a last name beginning with K, your selection frame would look like Figure 6-5.

### RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Last Name	=K [ignore rest]



Last Name	Salary	Combined Field
=K?		

Figure 6-5. Selection Criteria With Ignore Characters

In the selection frame in Figure 6-5, you are telling the system that the only comparison value is a K at the beginning of the field. All other characters in the field are to be ignored. If you had used just "=K", the system would have selected records that contained only the letter K.

### WHEN CAN YOU USE THE SELECT FUNCTION?

The select function can be used during the following procedures:

- revising or displaying records
- counting or deleting records
- duplicating selected records
- printing a file or storing it to diskette
- merging a file with text (letters, lists, reports)

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## REVIEW EXERCISES

On the following page are copies of Record Selection Specifications and selection problems. Using the file information on the File Design Worksheet shown below fill in a set of Record Selection Specifications for each selection problem.

FILE DESIGN WORKSHEET

FIELD NAME	FIELD TYPE*	NUMBER OF CHARACTERS**	COMMENTS
<i>Customer Name</i>	<i>char</i>	<i>22</i>	<i>company name</i>
<i>Address</i>	<i>"</i>	<i>25</i>	
<i>City</i>	<i>"</i>	<i>15</i>	
<i>St</i>	<i>"</i>	<i>2</i>	<i>state - use abbreviation</i>
<i>Title</i>	<i>"</i>	<i>4</i>	<i>title of contact person</i>
<i>First Name</i>	<i>"</i>	<i>10</i>	
<i>MI</i>	<i>"</i>	<i>2</i>	<i>include punctuation</i>
<i>Last Name</i>	<i>"</i>	<i>15</i>	
<i>Subtitle</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Contact Mo</i>	<i>math</i>	<i>2</i>	<i>month of last contact</i>
<i>Contact Day</i>	<i>"</i>	<i>2</i>	<i>day of last contact</i>
<i>Contact Yr</i>	<i>"</i>	<i>2</i>	
<i>Order</i>	<i>"</i>	<i>6</i>	<i>amount of sale no decimal point</i>
<i>Sales Rep</i>	<i>char</i>	<i>15</i>	<i>last name only</i>
<i>Rep Title</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Ind</i>	<i>"</i>	<i>4</i>	<i>use code</i>

\*character field      \*\* 1-80 characters  
 math field            1-17 characters  
 text field             1-500 characters

1. Select all the records with orders less than \$50,000.

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA

2. Select those customers with names beginning with K or S. (There is more than one selection method you can use.)

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA



3. Select all the records for customers from Arizona with orders that are equal to or more than \$15,000 and equal to or less than \$60,000.

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA

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REVIEW ANSWERS

1.

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Order	< 50000

2.

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Customer Name	= K [ignore rest]
2	Customer Name	= S [ignore rest]

OR

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Customer Name	>K &lt;L / >S &lt;T

Both selection methods shown will work. In the first method you must put the selection criteria on separate lines, as shown.

In the second method, it is necessary to establish a range. If you used =K, you would get only the records in which the customer's name was the letter K. Remember that an = sign requires an exact match between the value in the field and the comparison value. Using a range between the letter K and the letter L will give you all records in which the customer's name comes after K but before L.

3.

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	ST	=AZ
1	Order	=>15000 &lt; =<60000

Remember to put the selection criteria for both fields on one line because you are searching for records with customers from Arizona and with orders

between \$15,000 and \$60,000. If you put them on separate lines, you'll get the records for all customers from Arizona, regardless of size of order, as well as the records for all customers with orders between \$15,000 and \$60,000, regardless of location. If the selection criteria are on separate lines, the system reads an implied | between them.

## CHAPTER SUMMARY

- The select function is to used choose specific records for use.
- Each selection specification must include:
  - a field name
  - a comparison criteria
  - a comparison value
- There are six comparison criteria:
  1. = (equals)
  2. ≠ (not equals)
  3. < (less than)
  4. > (greater than)
  5. => (equal to or greater than)
  6. =< (equal to or less than)
- There are two logical criteria:
  1. & (AND)
  2. | (OR)
- You can have select criteria in more than one field. The selection criteria for the fields are linked with an implied & (AND).
- You can have up to 12 lines of selection criteria. The lines are linked with an implied | (OR).
- You can use an ignore character to tell the system that you don't care about the value in a specific character position in the field. There are two types of ignore characters:
  1. an ignore character covers one character position
  2. an ignore rest (of field) character covers all the characters to the right of the character you want to ignore
- The select function can be used during:
  - revising or displaying records
  - counting or deleting records
  - duplicating selected records
  - printing a file or storing it to diskette
  - merging a file with text (letters, lists, reports)

- The Record Selection Specifications worksheet is used in this chapter.

## Sorting Records

Whether you use all the records in a file or only selected ones, at times you may want to sort the records into some specific order. The sort function on the IBM Displaywriter System enables you to put records into order based on the values in the sort fields.

The character sorting chart in Appendix B shows the exact sort order, but generally the system sorts the records in the following order:

1. graphic characters, such as \$, &, %, or a required space, first,
2. then the letters of the alphabet,
3. then numbers

### HOW TO COMPLETE THE SORT SPECIFICATIONS

The Sort Specifications are used with most of the worksheets that you will be using, such as the Report Design Worksheet (which is discussed in Chapter 11). You'll use the Sort Specifications to specify what the sort fields are and whether the records should be sorted from low-to-high or high-to-low. The first field name listed is used for the first sort, the second field name is used for the second sort, and so on.

You'll learn how to use the sort function in the following sections. Completed Sort Specifications are shown with each sample of a sorted list.

### USING THE SORT FUNCTION

To use the sort function, you need to specify:

- the field to be sorted on (the sort field), and
- whether the records should be placed in order from low-to-high (low numbers first) or high-to-low (high numbers first).

If the sort field contains alphabetic characters, low-to-high means A-Z and high-to-low means Z-A.



The system then places the records in order based on the the values in the sort field. The method the system uses to sort the record is described below.

Suppose the sort field contains last names and the system is sorting the records from low-to-high. The system looks at the first character in each name, then the second character, and so on. When the system compares the names "Able" and "Abner," for example, it sees that the first two characters are the same. It keeps comparing characters until it finds a difference. In this case, when the system checks the third character, it places Able before Abner because "l" comes before "n" in the alphabet.

If the system checks all the characters in the sort field and cannot find any difference, records having the same values appear in the order in which they were added to the file. The first record added to the system would be placed before the second record added to the system, and so on.

## SORTING RECORDS USING MORE THAN ONE SORT FIELD

You can sort records based on the values in up to five fields. Using the file shown in Figure 7-1, suppose that you want to put the records in order by name. You would use three sort fields: Last Name, First Name, and MI (middle initial).

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	<i>Last Name</i>	<u>LOW TO HIGH</u> / HIGH TO LOW
FIELD TO BE SORTED SECOND	<i>First Name</i>	<u>LOW TO HIGH</u> / HIGH TO LOW
FIELD TO BE SORTED THIRD	<i>MI</i>	<u>LOW TO HIGH</u> / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW



Lambert, Stanley R.	5483
Lee, Cynthia R.	2837
Lopez, Robert M.	3782
Madison, Maxwell A.	3956
Martin, Jeff D.	3856
Morgan, Helen K.	2583
Nelson, Mavis Y.	8293
Nelson, Patricia H.	5434
Norton, Roger T.	2837
Ostrom, Gerald S.	1726
Ostrom, James R.	3847
Park, Trisha J.	3948
Perkins, Sherry J.	3553
Perry, Tracy S.	2839
Preston, Diane K.	3894
Rogers, Brian K.	7462
Schultz, Lisa G.	5839
Shaw, Pauline F.	5840
Smith, Walter A.	5938
Smith, Walter M.	3874
Steiniger, George J.	8379
Swanson, Simon E.	5849
Tweeden, Nancy W.	8293
Velasco, Marilyn L.	4958
Velasco, Michael L.	2748
White, Barbara N.	5394
White, Jack E.	3868
Wilson, Barbara J.	2647

Figure 7-1. Part of the Name and Telephone Extension List

The system does a series of steps to sort the records.

1. Since Last Name is the first sort field, the system organizes the records in order by last name.
2. Then the system determines whether any records have the same last name.
3. If a group of records all contain the same last name, as they do in the sample file, the system then organizes those records in order by first name.
4. Finally, the system determines whether any records still have the same values (in this case, the same last name and first name). If any do, the system then organizes those records by middle initial.
5. If any records have the same values for all the sort fields (in this case, the same last name, first name, and middle initial), the records with the same values are used in the order as they were entered in the file. So the first record that contains a name is displayed, printed, or duplicated first; the second record containing that name is used second; and so on.

When the sorting process is finished, the system has alphabetized the names, just as you would have done it by hand.

If you are sorting on more than one field, remember that you can specify not only the sort fields but also the way each field is sorted (low-to-high or high-to-low).

Suppose you are sorting a list like the one in Figure 7-2 with the records sorted first by department, then by salary. You specify department as the first sort field and have it sorted low-to-high so that the departments are in alphabetical order. Within each department you want the salaries listed with the high salaries first, so you specify salary as the second sort field and have it sorted high-to-low.


## WHEN CAN YOU USE THE SORT FUNCTION?

The sort function can be used during the following procedures:

- printing a file or storing it to diskette
- merging a file with text (letters, lists, reports)
- duplicating selected records

### SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	<i>Department</i>	<u>LOW TO HIGH</u> HIGH TO LOW
FIELD TO BE SORTED SECOND	<i>Salary</i>	LOW TO HIGH / <u>HIGH TO LOW</u>
FIELD TO BE SORTED THIRD		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW



Accounting	\$36,278.00	Wilson
Accounting	\$25,298.00	Madison
Accounting	\$24,893.00	Smith
Accounting	\$22,918.00	Clark
Accounting	\$22,839.00	Morgan
Accounting	\$20,387.00	Fisher
Accounting	\$20,298.00	Steiniger
Accounting	\$18,378.00	Norton
Accounting	\$16,783.00	Velasco
Administration	\$36,283.00	Kramer
Administration	\$18,394.00	Lambert
Administration	\$14,893.00	Garcia
Administration	\$14,284.00	Tweedden
Administration	\$13,495.00	Rogers
Administration	\$12,827.00	Boswell
Administration	\$11,892.00	Kelly
Administration	\$11,456.00	Perry
Administration	\$10,500.00	Burns
Engineering	\$38,283.00	Crawford
Engineering	\$32,938.00	Hunt
Engineering	\$27,978.00	Forrest
Engineering	\$27,898.00	Acker
Engineering	\$23,890.00	Davidson
Engineering	\$20,294.00	Lee
Engineering	\$18,909.00	Preston
Engineering	\$18,890.00	Swanson
Engineering	\$16,998.00	Boyle
Marketing	\$34,829.00	Nelson
Marketing	\$31,839.00	Fisher
Marketing	\$29,082.00	Perkins
Marketing	\$28,382.00	Knight
Marketing	\$27,892.00	White
Marketing	\$25,998.00	Ostrom
Marketing	\$25,849.00	Kahn
Marketing	\$25,482.00	Chapman
Marketing	\$22,098.00	Goodman
Personnel	\$25,829.00	Smith
Personnel	\$23,928.00	Velasco
Personnel	\$20,283.00	Anderson
Personnel	\$18,938.00	Black
Personnel	\$16,589.00	Carrigan
Personnel	\$13,389.00	Lopez
Personnel	\$12,938.00	Jackson
Personnel	\$12,932.00	Benson
Personnel	\$10,987.00	Nelson
Planning	\$33,587.00	Shaw
Planning	\$32,893.00	Bradley
Planning	\$25,677.00	White
Planning	\$24,445.00	Park
Planning	\$20,289.00	Young
Planning	\$20,283.00	Wilson
Planning	\$17,583.00	Martin
Planning	\$13,283.00	Ostrom
Planning	\$12,384.00	Schultz

Figure 7-2. Sample File Sorted by Department and Salary

## REVIEW EXERCISES

On the next page are copies of the Sort Specifications and sort problems. Using the file information from the File Design Sheet below and the Sort Order Chart in Appendix B, fill in the Sort Specifications for each sort problem.

### FILE DESIGN WORKSHEET

FIELD NAME	FIELD TYPE*	NUMBER OF CHARACTERS**	COMMENTS
<i>Customer Name</i>	<i>char</i>	<i>22</i>	<i>company name</i>
<i>Address</i>	<i>"</i>	<i>25</i>	
<i>City</i>	<i>"</i>	<i>15</i>	
<i>St</i>	<i>"</i>	<i>2</i>	<i>state - use abbreviation</i>
<i>Title</i>	<i>"</i>	<i>4</i>	<i>title of contact person</i>
<i>First Name</i>	<i>"</i>	<i>10</i>	
<i>MI</i>	<i>"</i>	<i>2</i>	<i>include punctuation</i>
<i>Last Name</i>	<i>"</i>	<i>15</i>	
<i>Subtitle</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Contact Mo</i>	<i>math</i>	<i>2</i>	<i>month of last contact</i>
<i>Contact Day</i>	<i>"</i>	<i>2</i>	<i>day of last contact</i>
<i>Contact Yr</i>	<i>"</i>	<i>2</i>	
<i>Order</i>	<i>"</i>	<i>6</i>	<i>amount of sale no decimal point</i>
<i>Sales Rep</i>	<i>char</i>	<i>15</i>	<i>last name only</i>
<i>Rep Title</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Ind</i>	<i>"</i>	<i>4</i>	<i>use code</i>

\*character field      \*\* 1-80 characters  
 math field            1-17 characters  
 text field             1-500 characters

- Sort the records so that they are in alphabetical order by state and city.

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED SECOND		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED THIRD		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

- Sort the records so that they are in order by sales representative with the records with the largest orders listed first.

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED SECOND		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED THIRD		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

- Sort the records so that they are in order by date of contact with the most recent dates first.

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED SECOND		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED THIRD		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

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REVIEW ANSWERS

1.

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	<i>St</i>	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED SECOND	<i>City</i>	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED THIRD		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

2.

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	<i>Sales Rep</i>	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED SECOND	<i>Order</i>	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED THIRD		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

3.

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	<i>Contact Yr</i>	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED SECOND	<i>Contact Mo</i>	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED THIRD	<i>Contact Day</i>	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

## CHAPTER SUMMARY

- Sorting puts the records in alphabetic or numeric order.
- You can sort the records on one to five fields.
- You can specify for each field whether the sort is to be low-to-high or high-to-low (A-Z or Z-A).
- The sort function can be used when:
  - printing a file or storing it to diskette
  - merging a file with text (letters, lists, reports)
  - duplicating selected records
- The Sort Specification worksheet is used in this chapter.

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In the review exercises in Chapter 3, you marked a number of the variables as being the result of math calculations. In this chapter, you'll learn how to do math instructions, which are used to insert a math calculation into a shell document.

For example, the system can do the following calculation:

Annual Interest = Principal Amount x Interest Rate

You may not know, as you create the shell document, what numbers will be used in the math calculation. However, you can use variable names to represent the numbers. In the calculation shown, the number represented by the variable "principal amount" will be multiplied by an "interest rate" to produce an "annual interest". When the document is merged with a file, the system uses actual numbers to calculate the answer.

The three parts in a math calculation are marked in Figure 8-1 and are discussed below.

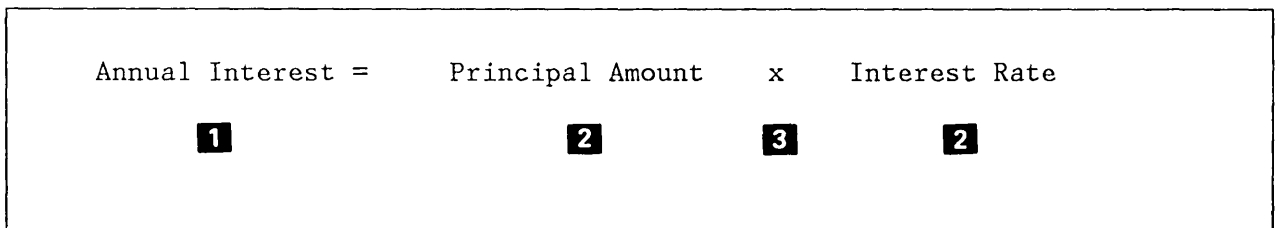


Figure 8-1. Sample Math Calculation

- 1** The answer to each calculation is represented by a **variable name for answer**, which we'll call an **answer variable**.
- 2** The numbers actually used in the calculation are called the **first number** and **second number**. The first number and the second number may each represent one of three types of numbers:
  - a. A **field name** for a math field in the file that will be merged with the shell document. In this case, Principal Amount may be a math field in a file. As each record is merged with the shell document that contains the math calculation, the number in the Principal Amount field in that file

is used in calculating the answer to the calculation.

- b. An **answer variable** representing the answer to a previous computation. For example, the Annual Interest could be used as a number in another math calculation, such as

$$\text{Balance} = \text{Annual Interest} + \text{Principal Amount.}$$

- c. A **constant number**. If a constant number is used, it must meet the same requirements as a number typed in a math field in a file. If a number, such as Interest Rate, will be the same in all calculations, it should be assigned as a constant number.

- 3** The **calculation sign** simply tells the system what type of math calculation to perform. There are four calculation signs:

+ (add)

- (subtract)

\* (multiply)

/ (divide)

Only one calculation sign can be used in each math calculation.

Most math calculations resemble the one we just described. Each calculation has an answer variable, two numbers, and a calculation sign. However, another type of math calculation can be written. If you want to assign a number to a variable name, you can simply create a calculation that contains an answer variable and the first number, such as:

$$\text{Rate} = .075 \quad (\text{for } 7.5\%)$$

## HOW TO COMPLETE THE MATH INSTRUCTIONS WORKSHEET

Math instructions can be used with some of the worksheets that you'll be using, such as the Report Design Worksheet (discussed in Chapter 11). To fill out the Math Instructions Worksheet, you need to indicate the:

- variable name for answer
- first number

- calculation sign
- second number

You'll learn more about math calculations in the following sections. A completed Math Instructions Worksheet is shown with each example.

### Using More Than One Math Calculation

The answer variable in a math calculation can be printed when the shell document is merged with a file and it also can be used as a number in another math calculation. For example, to calculate an employee bonus that equals 1% of the current salary for each year of service, you need to do a series of calculations. The Math Instructions Worksheet for this set of calculations is shown in Figure 8-2.

MATH INSTRUCTIONS					
REF. NO.*	VARIABLE NAME FOR ANSWER**		FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1	<i>years service</i>	=	<i>81</i>	-	<i>Hire yr</i>
M2	<i>percent</i>	=	<i>years service</i>	*	<i>.01</i>
M3	<i>bonus</i>	=	<i>percent</i>	*	<i>Salary</i>
M4		=			
M5		=			
M6		=			
M7		=			
M8		=			
M9		=			

Figure 8-2. Sample Math Instructions Worksheet for Bonus Calculation

1. Since there is no file information that specifically contains the number of years the employee has been with the company, we'll have to calculate the years of service for each employee. To do this we'll subtract the year the employee was hired from the current year.
2. Next, to determine the bonus percentage, we'll multiply the years of service by .01 (1%).
3. Finally, we'll multiply the employee's salary by the bonus percentage.

Notice that the method of calculating the bonus is exactly the same as it would be if you were doing it by hand or with a calculator. You could also use an alternative calculation method in which you calculate the years of service as we just did, multiply the employee's salary by .01 (1%), then multiply that number times the years of service. Either method will give you the same answer.

There is no specific limit on the number of math calculations that can be used in a shell document, but you can use only 20 variable names for answers. In some cases, like one shown in Figure 8-3 in which the answer variable "total" is reused, the same answer variable may be reused in several calculations.

SUMMARY OF EMPLOYEE BONUSES BY DEPARTMENT

Accounting

Employee Name	Salary	Years	Bonus
Velasco	\$16,783.00	7	\$1,174.81
Norton	\$18,378.00	13	\$2,389.14
Steiniger	\$20,298.00	6	\$1,217.88
Fisher	\$20,387.00	3	\$611.61
Morgan	\$22,839.00	18	\$4,111.02
Clark	\$22,918.00	8	\$1,833.44
Smith	\$24,893.00	16	\$3,982.88
Madison	\$25,298.00	22	\$5,565.56
Wilson	\$36,278.00	14	\$5,078.92

Total Department Bonuses: \$25,965.26

Administration

Employee Name	Salary	Years	Bonus
Burns	\$10,500.00	1	\$105.00
Perry	\$11,456.00	2	\$229.12
Kelly	\$11,892.00	8	\$951.36
Boswell	\$12,827.00	17	\$2,180.59
Rogers	\$13,495.00	16	\$2,159.20
Tweedden	\$14,284.00	8	\$1,142.72
Garcia	\$14,893.00	9	\$1,340.37
Lambert	\$18,394.00	26	\$4,782.44
Kramer	\$36,283.00	17	\$6,168.11

Total Department Bonuses: \$19,058.91

Engineering

Employee  
Boyle  
Swanson  
Preston  
Lee  
Davidso  
Acker  
Forrest  
Hunt  
Crawfor  
Total D

```

#Page Heading#
SUMMARY OF EMPLOYEE BONUSES BY DEPARTMENT

#Group Heading,Department#
#total = 0#
#Department#

Employee Name      Salary      Years      Bonus

#Record Detail#
#years_service = 81 - Hire_Yr#
#percent = years_service * .01#
#bonus = percent * Salary#
#total = total + bonus#
#Last_Name# #Salary,1# #years_service,2# #bonus,1#
#Group Summary,Department#

Total Department Bonuses: #total,1#
    
```

Figure 8-3. Reusing the Answer Variable in a Math Calculation



## PLACING MATH CALCULATIONS IN A SHELL DOCUMENT

The math calculations are not printed when the shell document is merged with a file. The results of the calculations are stored in answer variables, and the answer variables can be inserted into the shell document text and printed. The math calculations do print if you are just printing a copy of the shell document, so that you can proofread them as a part of the shell document.

For repetitive letters, you should usually type the math calculations at the top of the shell document before you type the text. In this way, the calculations are grouped together making it easier for you to check them.

Figure 8-4 shows the shell document for a letter to an employee announcing the bonus calculated in Figure 8-2.

/years\_service = 81 - Hire\_Yr/  
/percent = years\_service \* .01/  
/bonus = percent \* Salary/

December 15, 1981

¶Title¶ ¶First\_Name¶ ¶MI¶ ¶Last\_Name¶/If Not Empty\_Subtitle/, ¶Subtitle¶/End If/  
¶Street\_Address¶  
¶City¶, ¶State¶ ¶Zip\_Code¶

Dear ¶Title¶ ¶Last\_Name¶:

This past year has been a banner year for us, and we would like to thank you for your help in making it that way. I'm pleased to announce that the Board of Directors has voted to give each employee a bonus of 1% of his or her salary for each year of service.

Since you have been with us for ¶years\_service,¶ years, your bonus is \$¶bonus,¶. This amount will be added to your next paycheck.

Again, I'd like to thank you for your help and congratulate you on a fine year.

Sincerely,

Dan P. Andrews  
President

December 15, 1981

Mrs. Lorna A. Boyle  
122 North 10th Street  
Dallas, TX 71283

Dear Mrs. Boyle:

This past year has been a banner year for us, and we would like to thank you for your help in making it that way. I'm pleased to announce that the Board of Directors has voted to give each employee a bonus of 1% of his or her salary for each year of service.

Since you have been with us for 6 years, your bonus is \$1,019.88. This amount will be added to your next paycheck.

Again, I'd like to thank you for your help and congratulate you on a fine year.

Sincerely,

Dan P. Andrews  
President

Figure 8-4. Sample Repetitive Letter With Math Calculations

In reports, the placement of the math calculations depends on what part of the information in the report is being used for the math calculations. Figure 8-3 is an example of a report containing math calculations. In Chapter 11. Reports, we'll talk more about the parts of the report and the placement of math calculations in a report.

### Using An Answer Variable to Create a Running Total

In reports and repetitive letters, the numbers in an answer variable are replaced each time a calculation (or set of calculations) for a record is performed; otherwise, the results would be cumulative. When the bonus for employees is calculated, for example, the bonus is calculated using the information in each employee's record. The numbers in the answer variables for one employee are replaced by new numbers as the system calculates the bonus for the next employee.

If you want to calculate the total results of a series of math calculations, you need to create a **running total**. A running total is an answer variable used to accumulate the results of a series of math calculations. Figure 8-5 shows the format of a running total and how it could be used to calculate the total amount of bonuses paid in our previous example to employees.

Running Total = Running Total + Answer Variable Being Accumulated

MATH INSTRUCTIONS					
REF. NO.*	VARIABLE NAME FOR ANSWER**		FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1	<i>total</i>	=	<i>0</i>		
M2	<i>years service</i>	=	<i>81</i>	-	<i>Hire yr.</i>
M3	<i>percent</i>	=	<i>years service</i>	*	<i>.01</i>
M4	<i>bonus</i>	=	<i>percent</i>	*	<i>salary</i>
M5	<i>total</i>	=	<i>total</i>	+	<i>bonus</i>
M6		=			
M7		=			
M8		=			

Figure 8-5. Sample Math Instructions Worksheet With a Running Total

Notice that after each calculation, the number in the answer variable "bonus" is added to the answer variable "total." Then the bonus for the next employee is calculated. That number replaces the previous number in the answer variable "bonus". After all the bonuses have been calculated, the answer variable "total" contains the total amount of all bonuses paid.

You can set up a calculation that figures a running total in a report. For example, in Figure 8-3 as each bonus is calculated, it is added to a total to be printed at the end of the group. (In a report, there are groups of records. Chapter 11 contains a complete explanation of report groups.)

There must be a math instruction to set the running total to zero at beginning of each group; otherwise, the running total would reflect the total of all the bonuses calculated up to that point and would become a report total, not a group total.

However, if you are calculating a running total for the entire report, there must be a math instruction to set the answer variable for the running total to zero at the beginning of the report. (See Chapter 11 for more explanation.)

## WHERE CAN YOU USE MATH CALCULATIONS?

You can use math calculations in repetitive letters and reports. You **cannot** use math calculation in a multi-column list like the ones shown in Chapter 11.

## REVIEW QUESTIONS

On the following page are copies of the Math Instructions worksheets and math problems. Using the field names listed on the File Design Worksheet shown below, fill in a set of Math Instructions for each math problem.

### FILE DESIGN WORKSHEET

FIELD NAME	FIELD TYPE*	NUMBER OF CHARACTERS**	COMMENTS
<i>Customer Name</i>	<i>char</i>	<i>22</i>	<i>company name</i>
<i>Address</i>	<i>"</i>	<i>25</i>	
<i>City</i>	<i>"</i>	<i>15</i>	
<i>St</i>	<i>"</i>	<i>2</i>	<i>state - use abbreviation</i>
<i>Title</i>	<i>"</i>	<i>4</i>	<i>title of contact person</i>
<i>First Name</i>	<i>"</i>	<i>10</i>	
<i>MI</i>	<i>"</i>	<i>2</i>	<i>include punctuation</i>
<i>Last Name</i>	<i>"</i>	<i>15</i>	
<i>Subtitle</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Contact Mo</i>	<i>math</i>	<i>2</i>	<i>month of last contact</i>
<i>Contact Day</i>	<i>"</i>	<i>2</i>	<i>day of last contact</i>
<i>Contact Yr</i>	<i>"</i>	<i>2</i>	
<i>Order</i>	<i>"</i>	<i>6</i>	<i>amount of sale no decimal point</i>
<i>Sales Rep</i>	<i>char</i>	<i>15</i>	<i>last name only</i>
<i>Rep Title</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Ind</i>	<i>"</i>	<i>4</i>	<i>use code</i>

\*character field      \*\* 1-80 characters  
 math field            1-17 characters  
 text field             1-500 characters

- Each sales representative is given a 10% commission on sales. Calculate the commission to be paid for each order.

MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**		FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1		=			
M2		=			
M3		=			
M4		=			
M5		=			
M6		=			

- The company's profit is the difference after the 10% commission is deducted from the order amount. Calculate the profit on each order.

MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**		FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1		=			
M2		=			
M3		=			
M4		=			
M5		=			
M6		=			

- Finally, calculate the company's total profits from all orders. (Hint: This requires a running total.)

MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**		FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1		=			
M2		=			
M3		=			
M4		=			
M5		=			
M6		=			

This page intentionally left blank.

# REVIEW ANSWERS

1.

## MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**		FIRST NUMBER***	+ - * -	SECOND NUMBER****
M1	<i>commission</i>	=	<i>order</i>	<i>*</i>	<i>.10</i>
M2		=			
M3		=			
M4		=			
M5		=			

2.

## MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**		FIRST NUMBER***	+ - * -	SECOND NUMBER****
M1	<i>commission</i>	=	<i>order</i>	<i>*</i>	<i>.10</i>
M2	<i>profit</i>	=	<i>order</i>	<i>-</i>	<i>commission</i>
M3		=			
M4		=			
M5		=			

3.

## MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**		FIRST NUMBER***	+ - * -	SECOND NUMBER****
M1	<i>total profit</i>	=	<i>0</i>		
M2	<i>commission</i>	=	<i>order</i>	<i>*</i>	<i>.10</i>
M3	<i>profit</i>	=	<i>order</i>	<i>-</i>	<i>commission</i>
M4	<i>total profit</i>	=	<i>total profit</i>	<i>+</i>	<i>profit</i>
M5		=			

The running total, Total Profit, is necessary to accumulate the amount of profit calculated on each



order. Remember, the answer variable, Profit, is reset to zero for each order.

You could also have calculated the company's total profits using the series of calculations shown below. The results are the same. This method is more complicated and requires two sets of running totals. It does, however, give you more specific information. From this method you can identify not only the company's total profits, but also the total sales orders and total commissions paid.

MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	=	FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1	<i>total order</i>	=	<i>0</i>		
M2	<i>total Commission</i>	=	<i>0</i>		
M3	<i>total order</i>	=	<i>total order</i>	<i>+</i>	<i>order</i>
M4	<i>commission</i>	=	<i>order</i>	<i>*</i>	<i>.10</i>
M5	<i>total Commission</i>	=	<i>total commission</i>	<i>+</i>	<i>commission</i>
M6	<i>profit</i>	=	<i>total order</i>	<i>-</i>	<i>total commission</i>
M7		=			

## CHAPTER SUMMARY

- Each math equation can have four parts:
  1. a variable name for answer (answer variable)
  2. a first number
  3. a calculation sign
  4. a second number
- The first number and second number can be:
  - a field name
  - an answer variable from a previous math calculation
  - a constant number
- You can have up to 20 answer variables in a repetitive letter or report. Since an answer variable can be reused, you could have more than 20 calculations.
- Place math calculations at the top of a repetitive letter.
- Place math calculations at the point where they are to be used in a report.
- Math calculations can be used in repetitive letters and reports. They cannot be used in multi-column lists.
- The Math Instructions section of a worksheet is used in this Chapter.

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## Storing Math Formats And File Setups

This chapter contains information about:

- storing math formats that determine how a number is printed
- storing setups that contain such information as selection criteria and sort fields for frequently used documents

### USING MATH FORMATS

When you print a number you need to be able to print that number in the correct format. When printing a number from a field that represents dollars, for example, you want the number to print with a \$ in front of it. If an answer variable represents years with the company, there should be no \$ in front of it and no fractional numbers (such as "9.534 years of service"). The stored math formats are used to format numbers, whether the number is a field entry from the file or an answer variable.

There are five math formats, numbered 0-4, on your IBM Displaywriter. You create Formats 1-4 to match your file use. Each format can be different. (Format 0 is a system format that you cannot change. It is explained later in this chapter.)

Figure 9-1 shows a sample Math Formats Worksheet for Formats 1-4. The choices are explained in the following section.

### What Are the Math Formats Choices?

Each of the following items describes the choices on the Math Formats Worksheet. For each item, you'll find:

- an explanation of the item,
- a list of the choices, and
- the system default (what the system assumes if you don't specify anything). They are different for each format and are indicated by the shaded areas on the Math Formats Worksheet.

If you choose to use a choice other than the system default, circle your new choice on the Math Formats

MATH FORMATS WORKSHEET

ITEM	FORMAT 1	FORMAT 2	FORMAT 3	FORMAT 4
Character for Decimal	period comma colon	period comma colon	period comma colon	period comma colon
Character for Thousands Separator	period comma req. space none	period comma req. space none	period comma req. space none	period comma req. space none
Number of Characters to Right of Decimal	0-15 2 _	0-15 2 _	0-15 0 _	0-15 1 _
Rounding Rule	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none

Text (any eight characters)

Preceding Positive Number or Zero	no text	\$	no text	no text
Following Positive Number or Zero	no text	no text	no text	no text
Preceding Negative Number	- (minus)	-\$	- (minus)	- (minus)
Following Negative Number	no text	no text	no text	no text

Your Notes

Example of This Format*	25.00	\$25.00	25	25.0
This Format Used For	money**	money	years	GPA***

\*Example uses the positive number 25

\*\*Add \$ in text

\*\*\*Grade Point Average

Figure 9-1. Sample Math Formats Worksheet

Worksheet (or write in your choice for number of characters to the right of the decimal point)

Refer to Figure 9-1 as you read this section for the complete list of choices.

1. What character is used as a decimal point (the character used in a fractional number, such as 7.25).

The choices are a period, a comma, or a colon.

2. What character is used as a thousands separator (the character used to break 100000 into 100,000, for example).

The choices are a period, a comma, a space, or none (no separation between thousands).

3. How many numbers are allowed to the right of the decimal point. For example, if the answer to an math calculation is 44.787, should it be printed as 44, 44.7, 44.78, or 44.787?

The choice is any number of digits from 0 (no decimal point is printed) to 15 digits to the right of the decimal point.

4. How a fractional number should be rounded if there are more characters to the right of the decimal point than you want. For example, should 9.445 be round down to 9.44 or up to 9.45?

The rounding choices:

- 1-4 down, 5-9 up
- 1-5 down, 6-9 up
- 1-9 down
- 1-9 up
- do not round the number (stop after the permitted number of characters).

5. Whether text that you specify is to be printed automatically:

- a. in front of a positive number or zero. For example, should a \$ or + print before each positive number or zero?

The choices are any eight characters or print nothing.

- b. after a positive number or zero. For example, should a ) or the word CREDIT print after each positive number or zero?

The choices are any eight characters or print nothing.

- c. before a negative number. For example, should a -\$ or - print before each negative number?

The choices are any eight characters or print nothing.

- d. after a negative number. For example, should a ) or the word DEBIT print after each negative number?

The choices are any eight characters or print nothing.

### When Is Each Math Formats Used?

When a number is printed, either from a math field or as a result of an math calculation, it is formatted according to the math format specified with the variable name. In Figure 9-2 the same number is printed using each of the four math formats shown in Figure 9-1. Notice how the number is formatted differently.

The number that follows the variable name is the number of the Math Formats to be used when the variable is printed. For example, VSalary,2V means the variable "Salary" is to be printed using Math Format 2. If there is no number following the variable name, Format 0 is used and the number prints as it was keyed.

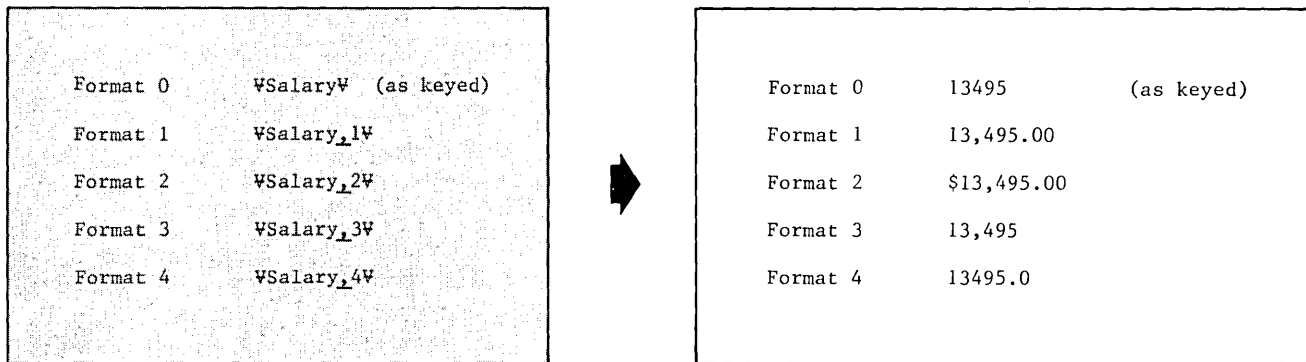


Figure 9-2. Number Formatted Using Different Math Formats

If no math format is specified, the default format depends on the origin of the number. If the number is a

field entry from the file, the system defaults to Format 0 which prints the number exactly as it was typed in the file. If the number is an answer variable, the system defaults to Format 1, unless you have specified another format as the active default format.

## Completing the Math Formats Worksheet

Use the Math Formats Worksheet in Appendix A to create the four math formats that you will be using. These format can be changed later if necessary.

## USING STORED FILE SETUPS

If you have repetitive letters or reports, such as monthly salary reports, that are done regularly, you can keep your worksheets or remake the decisions about sorting and selecting each month. However, it can be more convenient to store this information in a stored file setup.

File setups can be stored for:

- record selection
- sorting records
- outputting a file (either printing it or storing it to diskette)
- merging a file with text
- duplicating selected records

## How Stored File Setups Are Organized

A file setup stores the choices that you made in various frames or menus. The frame displayed at the time you stored the setup determines which frame(s) is (are) stored. The frame displayed at the time you recall the setup for use determines which frames are recalled. The chart in Figure 9-3 shows the relationship between the frame on the display and the frames that are stored or recalled.



FRAME ON THE DISPLAY	FRAMES STORED OR RECALLED
Record Selection	Record Selection
Sort	Sort
Output File	Record Selection Sort Output File
Merge File/Text	Record Selection Sort Merge File/Text
Duplicate Selected Records	Record Selection Sort Duplicate Selected Records

Figure 9-3. File Setup Organization

There are three higher level frames: Output File, Merge File/Text, and Duplicate Selected Records. When a setup is stored in a higher level frame, the sort and selection frames are also stored. When you recall a stored file setup and you have one of the higher level frames displayed, all the frames listed for that higher level frame in Figure 9-3 are recalled.

When a setup is stored while one of the two lower level frames (Record Selection and Sort) is displayed, only that frame is stored.

When you are in a higher level frame and recall a setup stored in a different higher level frame, only the low level frames are recalled. As an example, when you are in an Output File frame and you recall a setup that was originally stored in Merge File/Text, only the Record Selection and Sort frames are recalled. The higher level frame, Merge File/Text, is not recalled.

### Advantages of Using Stored File Setups

Using stored setups has two advantages:

1. It is convenient to store your selection criteria and sort fields for the applications you use regularly, so that you don't have to recreate the setup each time.

2. It is helpful to store your setups when you are initially creating and testing your files and shell documents. If a problem occurs, you can recall the stored setup and verify that the information was entered correctly.

## REVIEW QUESTIONS

Fill in the Math Formats Worksheet on the next page so that numbers will print in the following formats:

Format 1. 25

Format 2. CR + 75.99      or      DB - 75.99

Format 3. 83.283927

Format 4. \$2.34      or      -\$2.34

MATH FORMATS WORKSHEET

ITEM	FORMAT 1	FORMAT 2	FORMAT 3	FORMAT 4
Character for Decimal	period comma colon	period comma colon	period comma colon	period comma colon
Character for Thousands Separator	period comma req. space none	period comma req. space none	period comma req. space none	period comma req. space none
Number of Characters to Right of Decimal	0-15 2	0-15 2	0-15 0	0-15 1
Rounding Rule	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none

Text (any eight characters)

Preceding Positive Number or Zero	no text	\$	no text	no text
Following Positive Number or Zero	no text	no text	no text	no text
Preceding Negative Number	- (minus)	-\$	- (minus)	- (minus)
Following Negative Number	no text	no text	no text	no text

Your Notes

Example of This Format*	25.00	\$25.00	25	25.0
This Format Used For	money**	money	years	GPA***

\*Example uses the positive number 25

\*\*Add \$ in text

\*\*\*Grade Point Average

REVIEW ANSWERS

MATH FORMATS WORKSHEET

ITEM	FORMAT 1	FORMAT 2	FORMAT 3	FORMAT 4
Character for Decimal	period * comma colon	period comma colon	period comma colon	period comma colon
Character for Thousands Separator	period * comma req. space none	period * comma req. space none	period * comma req. space none	period * comma req. space none
Number of Characters to Right of Decimal	0-15 2 0	0-15 * 2 ..	0-15 0 6	0-15 1 2
Rounding Rule	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ * none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ * none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ * none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ * none

Text (any eight characters)

Preceding Positive Number or Zero	* no text	CR + \$	* no text	# no text
Following Positive Number or Zero	no text *	no text *	no text *	no text *
Preceding Negative Number	-(minus) *	DB - -\$	-(minus) *	-\$ -(minus)
Following Negative Number	no text *	no text *	no text *	no text *

Your Notes

Example of This Format*	25.00	\$25.00	25	25.0
This Format Used For	money**	money	years	GPA***

\*Example uses the positive number 25

\*\*Add \$ in text

\*\*\*Grade Point Average

**Note:** An asterisk marks those items whose choice does not affect the format shown. For example, the choice of rounding rule does not affect how the examples were formatted. In those cases, we simply used the system default.

## CHAPTER SUMMARY

- Math formats are used to format information from math fields and answer variables.
- The math format allows the following choices:
  - the character for a decimal point
  - the character for a thousands separator
  - number of digits to the right of the decimal point
  - the rounding rule for fractional numbers
  - eight characters of text to precede and eight characters of text to follow a positive number or zero
  - eight characters of text to precede and eight characters of text to follow a negative number
- If no math format is specified, file entries are printed as they appear in the file. Answer variables print according to machine defaults.
- The Math Formats Worksheet is used in this chapter.
- Stored file setups are used to store the choices made in certain frames.
- The frames that can be stored are:
  - record selection
  - sort
  - output file
  - merge file/text
  - duplicate selected records

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Repetitive letters are form letters that are personalized by including information from the file. (Although the term "repetitive letters" is used, any document containing constant text into which variables are inserted is handled the same way. Documents such as wills and standard contracts are included in this category.)

Repetitive letters are produced by merging records from a file with a shell document. One output document will be produced for each record. (If you need to print letters that contain information from more than one record, see Chapter 12, "Reports That Look Like Letters.")

### CREATING THE SHELL DOCUMENT

The shell document is a text document. All formatting information is included in it. The constant text, the text that is the same in every letter, is typed just as though the shell document was a regular letter. At each point in the shell document where variable information is to be inserted, the operator uses a Variable key to tell the system that the information is variable.

The variable information can be:

- information from a field in the file, specified by using the field name or number
- an answer variable from a math calculation, specified by using the answer variable name

If the information is a number from a math field or an answer variable, the math format is specified along with the field name or answer variable. Remember the Math Format is identified by the number following the variable.

Figure 10-1 shows a sample shell for a repetitive letter. Notice the following items:

- 1** Math calculations appear at the top of the letter. These print when the shell document is printed so that they can be proofread, but they will not print when the shell is merged with a file.
- 2** The answer variables from the math calculations will be printed in the letter. The number following the answer variable name is the Math Format number.



**3** The entry from a field can be printed. Again, if the field is a math field, the number following it is Math Format number.

**4** Conditional text can be printed. Notice that for the first name of the spouse to be printed in the conditional text, it must be included as a variable in the conditional text as well as being used as the conditional text field.

**1** /service\_years = 81 - Hire\_Yr/  
/insurance = .15 \* Salary/

November 1, 1981

VTitleV VFirst\_NameV VMiV VLast\_NameV/If Not Empty\_Subtitle/, VSubtitleV/End If/  
VStreet\_AddressV  
VCityV, VStateV VZip\_CodeV

Dear VTitleV VLast\_NameV:

As you may know, we've always tried to reward loyalty and service from our employees. The latest step in that direction is our new life insurance plan. For those employees who have been with us for more than 10 years, we are providing a life insurance plan that equals 15% of his or her annual salary. There is absolutely no cost to the employee.

**2** Our records show that you have been with us for Vservice\_years,3V years and that your annual salary is \$VSalary,1V. ~~This means that your life insurance policy will pay \$Vinsurance,1V~~ in the unfortunate event of your death. **3**

**4** /If Not Empty, FN\_Spouse/At present, we are listing your spouse, VFN\_SpouseV VLast\_NameV, as your beneficiary. Please let us know if this is not satisfactory. You are, of course, free to choose someone else as your beneficiary. /End If/ /If Empty, FN\_Spouse/At present, we have not designated a beneficiary for you. Please let us know as soon as possible who your beneficiary will be. /End If/

If you have any questions, please call the Personnel office. They will be happy to assist you in any way possible.

Sincerely,

Dan P. Andrews  
President

November 1, 1981

Mr. Brian K. Rogers  
345 West 6th Street  
Dallas, TX 71098

Dear Mr. Rogers:

As you may know, we've always tried to reward loyalty and service from our employees. The latest step in that direction is our new life insurance plan. For those employees who have been with us for more than 10 years, we are providing a life insurance plan that equals 15% of his or her annual salary. There is absolutely no cost to the employee.

Our records show that you have been with us for 16 years and that your annual salary is \$13,495.00. This means that your life insurance policy will pay \$2,024.25 in the unfortunate event of your death.

At present, we are listing your spouse, Jane Rogers, as your beneficiary. Please let us know if this is not satisfactory. You are, of course, free to choose someone else as your beneficiary.

If you have any questions, please call the Personnel office. They will be happy to assist you in any way possible.

Sincerely,

Dan P. Andrews  
President

Figure 10-1. Sample Shell and Repetitive Letter

When the shell document is merged with the file, the system collects and inserts the variable information into the shell document to produce the final document. Remember, the system **cannot** print part of a field. All the information in a field named in a shell document is printed in the output document.

As the system inserts the variable information into the shell document, it checks whether the variable information fits in the space occupied by the variable information entry in the shell document. If it won't, then the system adjusts the the text in the shell document so that the variable information fits without running off the page.

You can tell the system not to adjust the lines, but then the output document may not print properly. However, the system should not be allowed to adjust lines if forms are being filled in, since printing the information on a form requires exact placement.

## ADDITIONAL FUNCTIONS YOU CAN USE WITH REPETITIVE LETTERS

You can use some of the functions already discussed with repetitive letters. You can use:

- conditional text instructions
- select records for merging
- sort records to print your output in a certain order
- math instructions

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## REVIEW QUESTIONS

You are to send a short letter to all Arizona customers notifying them that they will receive a rebate equal to 1% of their order. Indicate the amount of each order and rebate. If there is no name in the contact field, have the salutation read "Gentlemen".

Use the conditional text section, the Record Selection Specifications worksheet, and the Math Instructions worksheet below. Then write the letter on the next page. Indicate the variables by use a V and the instructions by using a /.

1. If \_\_\_\_\_
2. is \_\_\_\_\_ (empty/not empty)
3. print \_\_\_\_\_

### RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA

### MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**		FIRST NUMBER***	+ - * -	SECOND NUMBER****
M1		=			
M2		=			
M3		=			
M4		=			
M5		=			
M6		=			

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# REVIEW ANSWERS

1. If Contact
2. is empty
3. print "Gentlemen"

## RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	ST	= AZ

## MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**		FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1	<i>rebate</i>	=	<i>Order</i>	<i>*</i>	<i>.01</i>
M2		=			
M3		=			
M4		=			
M5		=			

~~/rebate = Order \* .01/~~

December 15, 1981

¶Title¶ ¶First\_Name¶ ¶MI¶ ¶Last\_Name¶/If Not Empty,Subtitle/, ¶Subtitle¶/End If/  
¶Customer\_Name¶  
¶Address¶  
¶City¶, ¶ST¶ ¶Zip¶

Dear /If Not Empty\_Last\_Name/¶Title¶ ¶Last\_Name¶/End If//If Empty\_Last\_Name/Gentlemen/End If/:

We would like to let you know how much we value your business. To do this, we would like to send a rebate of 1% of your total order placed with us. Since your order in 1981 totaled ¶Order\_2¶, the rebate we are sending your amounts to ¶rebate\_2¶.

If there is anything that we can do for you, please let your representative, ¶Rep\_Title¶ ¶Sales\_Rep¶, know.

Sincerely,

Dan P. Andrews  
President

Your business letter may be slightly different. Be sure, however, that you included and marked all the variable information.



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## CHAPTER SUMMARY

- A repetitive letter produces one output document per record.
- Variables inserted into the shell document can be:
  - field names or numbers
  - answer variables
- If the variable information inserted is longer than the space occupied by the variable name in the shell document, it is adjusted to fit within the letter margins.
- Additional functions that can be used with repetitive letters are:
  - conditional text instructions
  - select records for merging
  - sort records to print your output in a certain order
  - math calculations

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A report is a list of information with a format that groups the information into meaningful units. Reports are produced by merging a shell document with a file. The output document produced contains the information from all the selected records in the file.

### WHAT DOES A REPORT LOOK LIKE?

A report has six possible parts. These parts are shown in Figure 11-1 and explained in detail in "Building a Report" in the following section.

- 1** The **report preface** contains text and instructions to be printed once at the beginning of the report. The report preface may be simply a heading or it may be several pages in length.
- 2** The **page heading** is used to specify text to be printed after the report preface and at the top of each subsequent page up to the report summary. A page heading is similar to the header used with regular text, but it can be viewed on the display with the other parts of the report.
- 3** A **record group definition** is used to define a group of record. It can contain text to be printed at the beginning of each group of records. You can use up to three record group definitions in a report.
- 4** **Record detail** causes the information from each selected record to print. The operator can specify detail in a report, then use the field names to indicate that the information from those fields is to be printed. The record detail can also contain previously defined answer variables and constant text.

If detail is not specified, the system creates the report without printing information from individual records.

- 5** A **record group summary** specifies text or extra spacing to be printed at the end of each group of records. You can use up to three group summaries in a report.
- 6** A **report summary** contains the text and instructions to be printed only at the end of the report. The

REPORT DESIGN WORKSHEET

<b>1</b>	Report Preface <i>This report is designed to give the reader an understanding of the relationship of department, sex and salary in two departments: Accounting and Administration. Managers salaries are excluded.</i>
<b>2</b>	Page Heading <i>EEO Report: Sex and Salary</i>
<b>3</b>	Record Group Definition 1 <u>Department</u> (Field Name) Headings <i>+ Department +</i> <i>Name Salary</i>
	Record Group Definition 2 _____ (Field Name) Headings _____
	Record Group Definition 3 _____ (Field Name) Headings _____
<b>4</b>	Record Detail (what should print from each record) <i>+ First Name + MI + Last Name + Salary +</i>
<b>5</b>	Record Group Summary 3 _____ (Field Name)
	Record Group Summary 2 _____ (Field Name)
	Record Group Summary 1 <u>Department</u> (Field Name) <i>(SM1)</i> <i>average department salary: + average +</i>
<b>6</b>	Report Summary <i>(SM2)</i> <i>Overall average salary: + overall +</i>

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.

Figure 11-1 (Part 1 of 2). Sample Report With Report Parts Identified

**1** This report is designed to give the reader an understanding of the relationship of department, sex, and salary in two departments: Accounting and Administration. Managers' salaries are excluded.

**2** EEO Report: Sex and Salary

Accounting

<b>3</b>	<u>Name</u>	<u>Salary</u>
	Marilyn L. Velasco	\$16,783.00
	Carol A. Fisher	\$20,387.00
	Helen K. Morgan	\$22,839.00
<b>4</b>	Roger T. Norton	\$18,378.00
	David Y. Clark	\$22,918.00
	George J. Steiniger	\$20,298.00
	Walter M. Smith	\$24,893.00
	Maxwell A. Madison	\$25,298.00

**5** Average Department Salary: \$21,474.25

Administration

<b>3</b>	<u>Name</u>	<u>Salary</u>
	Sue R. Burns	\$10,500.00
	Laverne W. Kelly	\$11,892.00
	Dorothy P. Boswell	\$12,827.00
<b>4</b>	Tracy S. Perry	\$11,456.00
	Nancy W. Tweeden	\$14,284.00
	Brian K. Rogers	\$13,495.00
	Ralph R. Garcia	\$14,893.00
	Stanley R. Lambert	\$18,394.00

**5** Average Department Salary: \$13,467.63

**6** Overall Average Salary: \$17,470.94

Figure 11-1 (Part 2 of 2). Sample Report With Report Parts Identified

report summary may contain an ending line or several pages of text.

## HOW TO COMPLETE THE REPORT DESIGN WORKSHEET

The Report Design Worksheet is used to organize the information necessary to create a report. A sample Report Design Worksheet is shown in Figure 11-1. Notice that it is divided into the same six parts as a report. You need to indicate which report parts and which group definition fields are to be used.

When you fill out a Report Design Worksheet, you must use Sort Specifications. You can also use:

- Record Selection Specifications to indicate what selection criteria to use
- Math Instructions to indicate what math calculations to use

In this chapter you'll learn how to design a report and how to fill out the Report Design Worksheet. There are sample Report Design Worksheets and shell documents shown with most of the examples in this chapter.

## BUILDING A REPORT

The purpose of a report is to present information in a readable, useful format. A report does this by listing and grouping information.

The easiest way to understand how a report works is to watch one being built. We'll create a report from the personnel file that contains information about the sex of employees and salaries.

### Sorting the Records

You already know that you can sort the records so that they print in a specific order. We'll start by listing all the records in the file in order, first by sex then by salary. Figure 11-2 shows the sorted list.

Notice that the list could be divided in half, with females first then males. This list would be more readable if we identified each of the halves of the list. It would then be clearer that within the two halves of the list, the records are in order by salary.

Sue Burns	F	\$10,500.00	Administration
Mavis Nelson	F	\$10,987.00	Personnel
Tracy Perry	F	\$11,456.00	Administration
Laverne Kelly	F	\$11,892.00	Administration
Lisa Schultz	F	\$12,384.00	Planning
Dorothy Boswell	F	\$12,827.00	Administration
Karen Benson	F	\$12,932.00	Personnel
Nancy Tweeden	F	\$14,284.00	Administration
Marilyn Velasco	F	\$16,783.00	Accounting
Lorna Boyle	F	\$16,998.00	Engineering
Diane Preston	F	\$18,909.00	Engineering
Theresa Black	F	\$18,938.00	Personnel
Peggy Anderson	F	\$20,283.00	Personnel
Gloria Young	F	\$20,289.00	Planning
Cynthia Lee	F	\$20,294.00	Engineering
Carol Fisher	F	\$20,387.00	Accounting
Debbie Goodman	F	\$22,098.00	Marketing
Helen Morgan	F	\$22,839.00	Accounting
Jean Davidson	F	\$23,890.00	Engineering
Trisha Park	F	\$24,445.00	Planning
Lorna Chapman	F	\$25,482.00	Marketing
Barbara White	F	\$25,677.00	Planning
Cecelia Kahn	F	\$25,849.00	Marketing
Rachel Forrest	F	\$27,978.00	Engineering
Sherry Perkins	F	\$29,082.00	Marketing
Thomas Jackson	M	\$12,938.00	Personnel
James Ostrom	M	\$13,283.00	Planning
Robert Lopez	M	\$13,389.00	Personnel
Brian Rogers	M	\$13,495.00	Administration
Ralph Garcia	M	\$14,893.00	Administration
Simon Carrigan	M	\$16,589.00	Personnel
Jeff Martin	M	\$17,583.00	Planning
Roger Norton	M	\$18,378.00	Accounting
Stanley Lambert	M	\$18,394.00	Administration
Simon Swanson	M	\$18,890.00	Engineering
Frank Wilson	M	\$20,283.00	Planning
George Steiniger	M	\$20,298.00	Accounting
David Clark	M	\$22,918.00	Accounting
Walter Smith	M	\$24,893.00	Accounting
Maxwell Madison	M	\$25,298.00	Accounting
Walter Smith	M	\$25,829.00	Personnel
Gerald Ostrom	M	\$25,998.00	Marketing
Jack White	M	\$27,892.00	Marketing
Michael Acker	M	\$27,898.00	Engineering
Roger Knight	M	\$28,382.00	Marketing
Victor Fisher	M	\$31,839.00	Marketing
Richard Bradley	M	\$32,893.00	Planning
Allen Hunt	M	\$32,938.00	Engineering

Figure 11-2. Records Sorted by Sex and Salary



## Using a Record Group Definition and a Group Summary

A record group definition in a report allows us to divide the sorted list into meaningful parts by defining a group of records. A **group** is a set of records that all have the same value in a specified field. In our example, the specified field is Sex.

Once a group is defined, we can add a group heading to be printed before each group and a record group summary be printed after each group. In Figure 11-3, we have added a ( 1 ) group heading and ( 2 ) a record group summary.

### How A Record Group Definition Can Be Used

A record group definition has several functions:

- It defines a group.
- It can contain a group heading to be printed at the beginning of every group.
- It can contain math calculations.
- It must be used if a group summary is used.

A record group definition's primary function is to define a group. For each record group definition, up to the limit of three per report, you must specify a field. By definition, the value in the record group definition field must be the same for every record in a group. (Remember, a group is composed of the records that have the same value in the record group definition field.)

If you want to define a record group definition, fill in the name of the defining field in the blank following "Record Group Definition 1" on the Report Design Worksheet.

A group heading can contain text, variable names, and math calculations. The text and variable information are printed at the beginning of every group to provide headings for the groups of information.

If you want the information in the field used to define the group to print, the field name can be included as a variable in the record detail. However, since the information is the same for every record in the group (that's how the group is defined), you may prefer to have that information print only once for each group. To avoid printing this value with every record in a group, you can use the field name as a variable in the group heading. The value in this field is then printed only once at the

beginning of the group. In our example, the group definition field is Sex, so the values F and M were each only printed once.

If you are using a running total that is to be calculated based on the information in a group, use a math instruction to make your answer variable for the running total equal to zero. The math calculations, of course, are not printed. See Figure 8-3 in Chapter 8 for an example of a math calculation used in a record group definition.

All text and variables to be printed as the group heading and math calculations, such as setting the answer variable for a running total equal to zero, should be written following "Group Heading" for Record Group Definition 1 on the Report Design Worksheet. You can save space by using the Ref. No. from the Math Instructions Worksheet to indicate where the math calculations will be typed, rather than writing in the complete calculation.

#### How Record Group Summaries Can Be Used

A record group summary can contain text, extra spacing, variables names such as a field name or an answer variable, and math calculations. A record group summary can also contain a page end code to force each group of records to print on a separate page. In Figure 11-3 the record group summary contains a carrier return, a line of asterisks, and another carrier return.

If you are calculating a running total for a group, you can print the total for the group in the summary by using the answer variable in the record group summary. (Remember, through, that the actual math calculation is done in the record group definition.)

A record group summary can contain math calculations. In addition to the math instructions that you are already familiar with, you can also use summary math instructions. These instructions are explained in the following section.

**Note:** You must use a record group definition in order to have a group summary. The system cannot put information at the end of a group if the group hasn't been defined.

#### Summary Math Instructions

Summary math instructions allow you to automatically do some of the most common math calculations for groups of records. Within a record group summary or a report

F	Name	Salary
	Sue R. Burns	\$10,500.00
	Mavis Y. Nelson	\$10,987.00
	Tracy S. Perry	\$11,456.00
	Laverne W. Kelly	\$11,892.00
	Lisa G. Schultz	\$12,384.00
	Dorothy P. Boswell	\$12,827.00
	Karen J. Benson	\$12,932.00
	Nancy W. Tweeden	\$14,284.00
	Marilyn L. Velasco	\$16,783.00
	Lorna A. Boyle	\$16,998.00
	Diane K. Preston	\$18,909.00
	Theresa H. Black	\$18,938.00
	Peggy L. Anderson	\$20,283.00
	Gloria F. Young	\$20,289.00
	Cynthia R. Lee	\$20,294.00
	Carol A. Fisher	\$20,387.00
	Debbie S. Goodman	\$22,098.00
	Helen K. Morgan	\$22,839.00
	Jean T. Davidson	\$23,890.00
	Trisha J. Park	\$24,445.00
	Lorna J. Chapman	\$25,482.00
	Barbara N. White	\$25,677.00
	Cecelia B. Kahn	\$25,849.00
	Rachel L. Forrest	\$27,978.00
	Sherry J. Perkins	\$29,082.00

\*\*\*\*\*

M	Name	Salary
	Thomas W. Jackson	\$12,938.00
	James R. Ostrom	\$13,283.00
	Robert M. Lopez	\$13,389.00
	Brian K. Rogers	\$13,495.00
	Ralph R. Garcia	\$14,893.00
	Simon E. Carrigan	\$16,589.00
	Jeff D. Martin	\$17,583.00
	Roger T. Norton	\$18,378.00
	Stanley R. Lambert	\$18,394.00
	Simon E. Swanson	\$18,890.00
	Frank P. Wilson	\$20,283.00
	George J. Steiniger	\$20,298.00
	David Y. Clark	\$22,918.00
	Walter M. Smith	\$24,893.00
	Maxwell A. Madison	\$25,298.00
	Walter A. Smith	\$25,829.00
	Gerald S. Ostrom	\$25,998.00
	Jack E. White	\$27,892.00
	Michael F. Acker	\$27,898.00
	Roger H. Knight	\$28,382.00
	Victor P. Fisher	\$31,839.00
	Richard J. Bradley	\$32,893.00
	Allen K. Hunt	\$32,938.00

\*\*\*\*\*

Figure 11-3 (Part 1 of 2). Report With A Group Heading and A Group Summary



summary, a summary math instruction can be used to calculate:

- the total of the values in a math field
- the highest value found in a math field
- the lowest value found in a math field
- the average of the values in a math field
- the number of records within a group or within the report

Since calculating these values requires several math instructions, it can be easier to use summary math instructions. For example, calculating the average of a group of records would normally require three math calculations to:

- count the number of records
- add the values in the fields
- divide the total of the values by the number of records

Only one summary math instruction is required, however, to calculate the average of a group of records.

Each summary math instruction contains a variable name for answer, a field name, and type of calculation. (Remember that summary math can only be used with values in a field.) The answer to a summary math calculation is stored in an answer variable. The answer variable can be printed as variable information, and it can be used as a number in a math calculation. Figure 11-4 shows the same report as Figure 11-3 but, instead of a row of asterisks, the record group summary contains a summary math instruction to average the Salary field for each group.

A summary math instruction uses the values from all the selected records in a group (if placed in a record group summary) or in the report (if placed in the report summary). You can use both summary math instructions (for calculations involving values in a field) and math instructions in the same group summary or report summary. You can use up to 20 variable names for answers in a report.

All text and variables to be printed in the record group summary, and math calculations to be done in the record group summary should be written after "Record Group Summary 1" on the Report Design Worksheet. You can save space by using the Ref. No. from the Math Instructions

Worksheet to indicate where the math instructions will be typed, rather than writing in the complete calculation.

SUMMARY MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	OPERATION*****	FIELD TO BE COMPUTED**
SM1	<i>average</i>	<i>average</i>	<i>Salary</i>
SM2			
SM3			
SM4			
SM5			
SM6			
SM7			

\*\*\*\*\*Operations are Count, Average, Total, High, Low

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	<i>Sex</i>	<u>LOW TO HIGH</u> / HIGH TO LOW
FIELD TO BE SORTED SECOND		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED THIRD		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

Figure 11-4 (Part 1 of 3). Report With a Summary Math Instruction in the Record Group Summary

F

<u>Name</u>	<u>Salary</u>
Sue R. Burns	\$10,500.00
Mavis Y. Nelson	\$10,987.00
Tracy S. Perry	\$11,456.00
Laverne W. Kelly	\$11,892.00
Lisa G. Schultz	\$12,384.00
Dorothy P. Boswell	\$12,827.00
Karen J. Benson	\$12,932.00
Nancy W. Tweeder	\$14,284.00
Marilyn L. Velasco	\$16,783.00
Lorna A. Boyle	\$16,998.00
Diane K. Preston	\$18,909.00
Theresa H. Black	\$18,938.00
Peggy L. Anderson	\$20,283.00
Gloria F. Young	\$20,289.00
Cynthia R. Lee	\$20,294.00
Carol A. Fisher	\$20,387.00
Debbie S. Goodman	\$22,098.00
Helen K. Morgan	\$22,839.00
Jean T. Davidson	\$23,890.00
Trisha J. Park	\$24,445.00
Lorna J. Chapman	\$25,482.00
Barbara N. White	\$25,677.00
Cecelia B. Kahn	\$25,849.00
Rachel L. Forrest	\$27,978.00
Sherry J. Perkins	\$29,082.00

Average Salary: \$19,099.32

M

<u>Name</u>	<u>Salary</u>
Thomas W. Jackson	\$12,938.00
James R. Ostrom	\$13,283.00
Robert M. Lopez	\$13,389.00
Brian K. Rogers	\$13,495.00
Ralph R. Garcia	\$14,893.00
Simon F. Carrigan	\$16,589.00
Jeff D. Martin	\$17,583.00
Roger T. Norton	\$18,378.00
Stanley R. Lambert	\$18,394.00
Simon E. Swanson	\$18,890.00
Frank P. Wilson	\$20,283.00
George J. Steiniger	\$20,298.00
David Y. Clark	\$22,918.00
Walter M. Smith	\$24,893.00
Maxwell A. Madison	\$25,298.00
Walter A. Smith	\$25,829.00
Gerald S. Ostrom	\$25,998.00
Jack E. White	\$27,892.00
Michael F. Acker	\$27,898.00
Roger H. Knight	\$28,382.00
Victor P. Fisher	\$31,839.00
Richard J. Bradley	\$32,893.00
Allen K. Hunt	\$32,938.00

Average Salary: \$21,964.83

Figure 11-4 (Part 2 of 3). Report With a Summary Math Instruction in the Record Group Summary

REPORT DESIGN WORKSHEET

Report Preface _____
Page Heading _____
Record Group Definition 1 <u>Sex</u> (Field Name) Headings <u>+ Sex +</u> <u>name</u> <u>Salary</u>
Record Group Definition 2 _____ (Field Name) Headings _____
Record Group Definition 3 _____ (Field Name) Headings <u>+ First name + + MI + + Last name + + Salary +</u>
Record Detail (what should print from each record) _____ _____
Record Group Summary 3 _____ (Field Name)
Record Group Summary 2 _____ (Field Name)
Record Group Summary 1 <u>Sex</u> (Field Name) <u>(SMI)</u> <u>Average Salary: + average +</u>
Report Summary _____

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.

Figure 11-4 (Part 3 of 3). Report With a Summary Math Instruction in the Record Group Summary



## Using Page Headings and Report Summaries

Figure 11-5 shows the report from Figure 11-4 with two additional report parts. Page headings ( 1 ) and a report summary ( 2 ) have been added to make the report even more readable.

### How A Page Heading Is Used

A page heading contains text that is printed following the report preface and at the top of every page, up to the report summary. It can be a report title or column headings, and it can print on more than one line. A page heading can not, however, contain variable information or math calculations.

Write in the information that you want in the page heading on the lines following "Page Heading" on the Report Design Worksheet.

### How A Report Summary Is Used

A report summary prints at the end of a report. It can contain text, variable information, and math calculations. If a summary math instruction is used in the report summary, it uses values from every record in the report. A report summary can be several pages in length.

Write in the information to be used in the report summary on the lines following "Report Summary" on the Report Design Worksheet.

EEO Report: Salary and Sex

<u>Name</u>	<u>Salary</u>
Sue R. Burns	\$10,500.00
Mavis Y. Nelson	\$10,987.00
Tracy S. Perry	\$11,456.00
Laverne W. Kelly	\$11,892.00
Lisa G. Schultz	\$12,384.00
Dorothy P. Boswell	\$12,827.00
Karen J. Benson	\$12,932.00
Nancy W. Tweeden	\$14,284.00
Marilyn L. Velasco	\$16,783.00
Lorna A. Boyle	\$16,998.00
Diane K. Preston	\$18,909.00
Theresa H. Black	\$18,938.00
Peggy L. Anderson	\$20,283.00
Gloria F. Young	\$20,289.00
Cynthia R. Lee	\$20,294.00
Carol A. Fisher	\$20,387.00
Debbie S. Goodman	\$22,098.00
Helen K. Morgan	\$22,839.00
Jean T. Davidson	\$23,890.00
Trisha J. Park	\$24,445.00
Lorna J. Chapman	\$25,482.00
Barbara N. White	\$25,677.00
Cecelia B. Kahn	\$25,849.00
Rachel L. Forrest	\$27,978.00
Sherry J. Perkins	\$29,082.00
Average Salary:	\$19,099.32

<u>Name</u>	<u>Salary</u>
Thomas W. Jackson	\$12,938.00
James R. Ostrom	\$13,283.00
Robert M. Lopez	\$13,389.00
Brian K. Rogers	\$13,495.00
Ralph R. Garcia	\$14,893.00
Simon E. Carrigan	\$16,589.00
Jeff D.	
Roger T.	
Stanley	
Simon E.	
Frank P.	
George	
David Y.	
Walter P.	
Maxwell	
Walter	
Gerald	
Jack E.	
Michael	

EEO Report: Salary and Sex

Roger H. Knight	\$28,382.00
Victor P. Fisher	\$31,839.00
Richard J. Bradley	\$32,893.00
Allen K. Hunt	\$32,938.00
Average Salary:	\$21,964.83

Summary

Average Company Salary: \$20,472.38

Figure 11-5 (Part 1 of 3). Report With A Page Heading And A Report Summary

REPORT DESIGN WORKSHEET

Report Preface
Page Heading <i>EEO Report: Sex and Salary</i>
Record Group Definition 1 <u>Sex</u> (Field Name) Headings <u>Name</u> <u>Salary</u>
Record Group Definition 2 _____ (Field Name) Headings
Record Group Definition 3 _____ (Field Name) Headings
Record Detail (what should print from each record) <i>* First name * * MI * * Last name *      * Salary *</i>
Record Group Summary 3 _____ (Field Name)
Record Group Summary 2 _____ (Field Name)
Record Group Summary 1 <u>Sex</u> (Field Name) <u>(SM1)</u> <i>Average Salary: * average *</i>
Report Summary <u>(SM2) Summary</u> <i>Average Company Salary: * overall *</i>

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.

Figure 11-5 (Part 2 of 3). Report With A Page Heading And A Report Summary

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	<i>Sex</i>	<u>LOW TO HIGH</u> / HIGH TO LOW
FIELD TO BE SORTED SECOND		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED THIRD		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

SUMMARY MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	OPERATION*****	FIELD TO BE COMPUTED**
SM1	<i>average</i>	<i>average</i>	<i>Salary</i>
SM2	<i>overall</i>	<i>average</i>	<i>Salary</i>
SM3			
SM4			
SM5			
SM6			
SM7			

\*\*\*\*\*Operations are Count, Average, Total, High, Low

Figure 11-5 (Part 3 of 3). Report With A Page Heading And A Report Summary

## Using A Report Preface

Figure 11-6 shows the same report as Figure 11-5, but a report preface has been added. A report preface can contain text, variable information, and math calculations. It is printed only once, at the beginning of the report, and can be several pages long.

If you want to use a running total that includes values from the entire report, use a math calculation in the report preface that makes your answer variable for the running total equal to zero.

**Note:** Anything typed in the shell document before a report instruction appears on the display, but is not printed. If you have any information that you want printed at beginning of a report, it must be included in the report preface.

In Figure 11-6, we used the report preface to provide the reader with some additional information about the report. If you want to use a report preface, write it on the lines following "Report Preface" on the Report Design Worksheet.

This report is designed to give the reader an understanding of the relationship of department, sex, and salary in two departments: Accounting and Administration. Managers' salaries are not included.

EEO Report: Sex and Salary

Accounting

<u>Name</u>	<u>Salary</u>
Marilyn L. Velasco	\$16,783.00
Carol A. Fisher	\$20,387.00
Helen K. Morgan	\$22,839.00

Average Department Salary: \$20,003.00

Accounting

<u>Name</u>	<u>Salary</u>
Roger T. Norton	\$18,378.00
George J. Steiniger	\$20,298.00
David Y. Clark	\$22,918.00
Walter M. Smith	\$24,893.00
Maxwell A. Madison	\$25,298.00

Average Department Salary: \$22,357.00

Administration

<u>Name</u>	<u>Salary</u>
Sue R. Burns	\$10,500.00
Tracy S. Perry	\$11,456.00
Laverne W. Kelly	\$11,892.00
Dorothy P. Boswell	\$12,827.00
Nancy W. Tweeden	\$14,284.00

Average Department Salary: \$12,191.80

Administration

<u>Name</u>	<u>Salary</u>
Brian K. Rogers	\$13,495.00
Ralph R. Garcia	\$14,893.00
Stanley R. Lambert	\$18,394.00

Average Department Salary: \$15,594.00

Overall Average Salary: \$17,470.94

Figure 11-6 (Part 1 of 3). Report With Report Preface

REPORT DESIGN WORKSHEET

Report Preface	<i>This report is designed to give the reader an understanding of the relationship of Department, sex, and salary in two departments: Accounting and Administration. Managers salaries are not included.</i>	
Page Heading	<i>EEO Report: Sex and Salary</i>	
Record Group Definition 1	<i>Department</i>	(Field Name)
Headings	<i>+ Department +</i>	
Record Group Definition 2	<i>Sex</i>	(Field Name)
Headings	<i>Name</i>	<i>Salary</i>
Record Group Definition 3		(Field Name)
Headings		
Record Detail (what should print from each record)		
	<i>+ First Name + MI + Last Name + Salary +</i>	
Record Group Summary 3		(Field Name)
Record Group Summary 2	<i>Sex</i>	(Field Name)
	<i>SMI Average Department Salary: + average +</i>	
Record Group Summary 1	<i>Department</i>	(Field Name)
Report Summary	<i>SM2</i>	
	<i>Overall Average Salary: + overall +</i>	

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.

Figure 11-6 (Part 2 of 3). Report With Report Preface

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	<i>Job Level</i>	<i>≠ Manager</i>

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	<i>Department</i>	<u>LOW TO HIGH</u> / HIGH TO LOW
FIELD TO BE SORTED SECOND	<i>Sex</i>	<u>LOW TO HIGH</u> / HIGH TO LOW
FIELD TO BE SORTED THIRD	<i>Salary</i>	<u>LOW TO HIGH</u> / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

SUMMARY MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	OPERATION*****	FIELD TO BE COMPUTED**
SM1	<i>average</i>	<i>average</i>	<i>Salary</i>
SM2	<i>overall</i>	<i>average</i>	<i>Salary</i>
SM3			
SM4			
SM5			

Figure 11-6 (Part 3 of 3). Report With Report Preface



## Using Record Detail

So far, we've been printing record detail, the information from every record in each group. However, at times, you may want only summary information about a group and not the record detail. Reports, such as the one in Figure 11-7, can be printed with headings and summaries without any record detail.

To answer the many questions we've received, we've prepared the following report which gives a summary of salaries. This list is divided by sex.

Managers' salaries are not included.

EEO Report: Salary and Sex

F

Average Salary: \$19,099.32  
Highest Salary: \$29,082.00  
Lowest Salary: \$10,500.00

M

Average Salary: \$21,964.83  
Highest Salary: \$32,938.00  
Lowest Salary: \$12,938.00

Average Company Salary: \$20,472.38  
Highest Company Salary: \$32,938.00  
Lowest Company Salary: \$10,500.00

Figure 11-7 (Part 1 of 3). Report Printed Without Detail

REPORT DESIGN WORKSHEET

Report Preface *To answer the many questions we've received, we've prepared the following report which gives a summary of salaries. This list is divided by sex. # Managers salaries are not included.*

Page Heading *EEO Report: Salary + Sex*

Record Group Definition 1 Sex (Field Name)  
Headings *+ Sex +*

Record Group Definition 2 \_\_\_\_\_ (Field Name)  
Headings \_\_\_\_\_

Record Group Definition 3 \_\_\_\_\_ (Field Name)  
Headings \_\_\_\_\_

Record Detail (what should print from each record)  
\_\_\_\_\_  
\_\_\_\_\_

Record Group Summary 3 \_\_\_\_\_ (Field Name)

Record Group Summary 2 \_\_\_\_\_ (Field Name)

Record Group Summary 1 Sex (Field Name) **(SM1)** **(SM2)** **(SM3)**  
*Average Salary: + average +*  
*Highest Salary: + high +*  
*Lowest Salary: + low +*

Report Summary **(SM4)** **(SM5)** **(SM6)**  
*Average Company Salary: + average +*  
*Highest Company Salary: + high +*  
*Lowest Company Salary: + low +*

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.

Figure 11-7 (Part 2 of 3). Report Printed Without Detail

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Job Level	≠ Manager

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	Sex	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED SECOND		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED THIRD		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

SUMMARY MATH INSTRUCTIONS

REF. NO. #	VARIABLE NAME FOR ANSWER**	OPERATION****	FIELD TO BE COMPUTED**
SM1	average	average	Salary
SM2	high	high	Salary
SM3	low	low	Salary
SM4	coverage	average	Salary
SM5	co high	high	Salary
SM6	colow	low	Salary
SM7			

\*\*\*\*Operations are Count, Average, Total, High, Low

Figure 11-7 (Part 3 of 3). Report Printed Without Detail

## Reports With More Than One Group Definition

So far, you've learned how to use report instructions to make a report more readable. However, a report should also make the file information more usable. You may need to create a report that divides the file information into smaller, more defined groups. You can do this by using up to three group definitions.

Using multiple record group definitions is similar to sorting the file on more than one field:

1. The records are divided into groups according to the first group definition (Record Group Definition 1).
2. Then the records within each group are divided into subgroups according to the second record group definition (Record Group Definition 2).
3. Finally, each subgroup is divided according to the third record group definition (Record Group Definition 3).

Figure 11-8 shows the records in a report format with Department as the first record group definition field and Sex as the second record group definition field.

EEO Report: Salary and Sex

Accounting

<u>F</u>	<u>Name</u>	<u>Salary</u>
	Marilyn L. Velasco	\$16,783.00
	Carol A. Fisher	\$20,387.00
	Helen K. Morgan	\$22,839.00

Average Salary: \$20,003.00

<u>M</u>	<u>Name</u>	<u>Salary</u>
	Roger T. Norton	\$18,378.00
	George J. Steiniger	\$20,298.00
	David Y. Clark	\$22,918.00
	Walter M. Smith	\$24,893.00
	Maxwell A. Madison	\$25,298.00

Average Salary: \$22,357.00

Average Department Salary: \$21,474.25

Administration

<u>F</u>	<u>Name</u>	<u>Salary</u>
	Sue R. Burns	\$10,500.00
	Tracy S. Perry	\$11,456.00
	Laverne W. Kelly	\$11,892.00
	Dorothy P. Boswell	\$12,827.00
	Nancy W. Tweeden	\$14,284.00

Average Salary: \$12,191.80

<u>M</u>	<u>Name</u>	<u>Salary</u>
	Brian K. Rogers	\$13,495.00
	Ralph R. Garcia	\$14,893.00
	Stanley R. Lambert	\$18,394.00

Average Salary: \$15,594.00

Average Department Salary: \$13,467.63

Figure 11-8 (Part 1 of 3). Report With Two Group Definition Fields--Department and Sex

REPORT DESIGN WORKSHEET

Report Preface
Page Heading <i>EEO Report: Salary and Sex</i>
Record Group Definition 1 <i>Department</i> (Field Name) Headings <i>+ Department +</i>
Record Group Definition 2 <i>Sex</i> (Field Name) Headings <i>+ Sex + Name Salary</i>
Record Group Definition 3 _____ (Field Name) Headings _____
Record Detail (what should print from each record) <i>+ First Name + MI + Last Name + Salary +</i>
Record Group Summary 3 _____ (Field Name)
Record Group Summary 2 <i>Sex</i> (Field Name) <i>(SM1) average salary: + average +</i>
Record Group Summary 1 <i>Department</i> (Field Name) <i>(SM2) average department salary: + dept average +</i>
Report Summary

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.

Figure 11-8 (Part 2 of 3). Report With Two Group Definition Fields--Department and Sex

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Job Level	≠ Manager
1	Department	= Administration   = Accounting

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	Department	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED SECOND	Sex	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED THIRD	Salary	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

SUMMARY MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	OPERATION*****	FIELD TO BE COMPUTED***
SM1	Average	Average	Salary
SM2	dept average	Average	Salary
SM3			
SM4			
SM5			
SM6			
SM7			

\*\*\*\*\*Operations are Count, Average, Total, High, Low

Figure 11-8 (Part 3 of 3). Report With Two Group Definition Fields--Department and Sex



Figure 11-9 shows the same information as Figure 11-8, but the group definition fields have been reversed so that Sex is the first record group definition field and Department is the second record group definition field.

Notice that the information in the record group summaries becomes more usable as you use more record group definition fields, because each record group summary describes a smaller, more specific group of records.

EEO Report: Salary by Sex and Department

Administration

<u>Name</u>	<u>Salary</u>
Brian K. Rogers	\$13,495.00
Ralph R. Garcia	\$14,893.00
Stanley R. Lambert	\$18,394.00
Average Department Salary (M): \$15,594.00	

Average Salary: \$19,820.88

EEO Report: Salary by Sex and Department

F

Accounting

<u>Name</u>	<u>Salary</u>
Marilyn L. Velasco	\$16,783.00
Carol A. Fisher	\$20,387.00
Helen K. Morgan	\$22,839.00
Average Department Salary (F): \$20,003.00	

Administration

<u>Name</u>	<u>Salary</u>
Sue R. Burns	\$10,500.00
Tracy S. Perry	\$11,456.00
Laverne W. Kelly	\$11,892.00
Dorothy P. Boswell	\$12,827.00
Nancy W. Tweeden	\$14,284.00
Average Department Salary (F): \$12,191.80	

Average Salary: \$15,121.00

M

Accounting

<u>Name</u>	<u>Salary</u>
Roger T. Norton	\$18,378.00
George J. Steiniger	\$20,298.00
David Y. Clark	\$22,918.00
Walter M. Smith	\$24,893.00
Maxwell A. Madison	\$25,298.00
Average Department Salary (M): \$22,357.00	

Figure 11-9 (Part 1 of 3). Report With Two Group Definition Fields--Sex and Department

REPORT DESIGN WORKSHEET

Report Preface
Page Heading <i>EEO Report: Salary by Sex and Department</i>
Record Group Definition 1 <i>Sex</i> (Field Name) Headings <i>+ Sex +</i>
Record Group Definition 2 <i>Department</i> (Field Name) Headings <i>+ Department +</i>
<i>Name</i> <i>Salary</i>
Record Group Definition 3 _____ (Field Name) Headings _____
Record Detail (what should print from each record) <i>+ First Name ++ MI ++ Last Name + + Salary +</i>
Record Group Summary 3 _____ (Field Name)
Record Group Summary 2 <i>Department</i> (Field Name) <i>SM1</i>
<i>Average Department Salary (+ Sex +): + average +</i>
Record Group Summary 1 <i>Sex</i> (Field Name) <i>SM2</i>
<i>Average Salary: + total average +</i>
Report Summary _____

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.

Figure 11-9 (Part 2 of 3). Report With Two Group Definition Fields--Sex and Department

RECORD SELECTION SPECIFICATIONS

SELECTION LINE	FIELD	SELECTION CRITERIA
1	Department	= Accounting 1 = Administration
1	Job Level	≠ Manager

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	Sex	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED SECOND	Department	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED THIRD	Salary	LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

SUMMARY MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	OPERATION*****	FIELD TO BE COMPUTED**
SM1	Average	Average	Salary
SM2	Total Average	Average	Salary
SM3			
SM4			
SM5			
SM6			
SM7			

\*\*\*\*\*Operations are Count, Average, Total, High, Low

Figure 11-9 (Part 3 of 3). Report With Two Group Definition Fields--Sex and Department

## ADDITIONAL FUNCTIONS YOU CAN USE WITH REPORTS

You can use some of the functions already discussed with reports. Remember that you must sort the records in order to do a report. The first sort fields should be the same as the record group definition fields.

You can also use:

- select records for merging
- conditional text instructions
- math instructions

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## REVIEW QUESTIONS

On the following page are sample reports. Using the information from the File Design Worksheet shown below, fill in Report Design Worksheets to produce the sample reports.

FILE DESIGN WORKSHEET

FIELD NAME	FIELD TYPE*	NUMBER OF CHARACTERS**	COMMENTS
<i>Customer Name</i>	<i>char</i>	<i>22</i>	<i>company name</i>
<i>Address</i>	<i>"</i>	<i>25</i>	
<i>City</i>	<i>"</i>	<i>15</i>	
<i>St</i>	<i>"</i>	<i>2</i>	<i>state - use abbreviation</i>
<i>Title</i>	<i>"</i>	<i>4</i>	<i>title of contact person</i>
<i>First Name</i>	<i>"</i>	<i>10</i>	
<i>MI</i>	<i>"</i>	<i>2</i>	<i>include punctuation</i>
<i>Last Name</i>	<i>"</i>	<i>15</i>	
<i>Subtitle</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Contact Mo</i>	<i>math</i>	<i>2</i>	<i>month of last contact</i>
<i>Contact Day</i>	<i>"</i>	<i>2</i>	<i>day of last contact</i>
<i>Contact Yr</i>	<i>"</i>	<i>2</i>	
<i>Order</i>	<i>"</i>	<i>6</i>	<i>amount of sale. no decimal point</i>
<i>Sales Rep</i>	<i>char</i>	<i>15</i>	<i>last name only</i>
<i>Rep Title</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Ind</i>	<i>"</i>	<i>4</i>	<i>use code</i>

\*character field      \*\* 1-80 characters  
 math field            1-17 characters  
 text field             1-500 characters

# Report 1

## CUSTOMER LIST

<u>Customer</u>	<u>Contact</u>	<u>Amount</u>	<u>Representative</u>
Cactus Hardware	Mr. Manual Shull	\$18,900.00	Ortiz
City College	Mr. Robert Ries	\$67,300.00	Jones
City Services	Ms. Suzanne Strayer	\$89,900.00	Curtis
Clinical Supply	Mr. Donald Higgins	\$17,450.00	Jones
Community College	Ms. Sharon Smith	\$235,980.00	Ortiz
Dareco Supply Co.	Mr. Donald Smith	\$10,500.00	Jones
Farmers Association	Mr. John Gaus	\$200,550.00	Hull
Farrington Co.	Mr. Timothy Sainz	\$42,500.00	Jones
Global Industries	Ms. Patricia Ross	\$28,000.00	Hull
Hospital Supply Co.	Ms. Donna Ikeda	\$51,790.00	Ortiz
Johnson Manufacturing	Mr. Samuel Smith	\$125,890.00	Hull
Mayan Construction	Ms. Betty Smith	\$110,700.00	Ortiz
Ranchers Inc.	Ms. Brenda Hebert	\$130,890.00	Hull
Rural Implements	Ms. Judy Exline	\$26,000.00	Hull
State Pipe Co.	Mr. Keith Cronin	\$60,000.00	Curtis
State University	Ms. Pamela Ramage	\$54,900.00	Ortiz
Thompson Construction	Ms. Betsy McKane	\$64,350.00	Jones
Tool Setting Co.	Ms. Leslie Garland	\$32,780.00	Jones
Universal Industry	Mr. Thomas Boyd	\$19,975.00	Curtis
Wrench Inc.	Mr. Robert Arino	\$32,000.00	Curtis

TOTAL: \$1,420,355.00



Report 1

REPORT DESIGN WORKSHEET

Report Preface _____
Page Heading _____
Record Group Definition 1 _____ (Field Name) Headings _____
Record Group Definition 2 _____ (Field Name) Headings _____
Record Group Definition 3 _____ (Field Name) Headings _____
Record Detail (what should print from each record)
Record Group Summary 3 _____ (Field Name)
Record Group Summary 2 _____ (Field Name)
Record Group Summary 1 _____ (Field Name)
Report Summary _____

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.



# Report 1

## MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	=	FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1		=			
M2		=			
M3		=			
M4		=			
M5		=			
M6		=			
M7		=			
M8		=			
M9		=			
M10		=			
M11		=			

\*Enter Ref. No. on Report Design Worksheet at point of calculation

\*\*Maximum of 16 characters

\*\*\*Field name, constant number, or variable name for answer of previous Math Instruction

## SUMMARY MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	OPERATION****	FIELD TO BE COMPUTED**
SM1			
SM2			
SM3			
SM4			
SM5			
SM6			
SM7			

\*\*\*\*Operations are Count, Average, Total, High, Low

## Report 2

### REVENUE ANALYSIS BY INDUSTRY

YEAR-TO-DATE 1981

<u>INDUSTRY</u>	<u>CUSTOMER</u>	<u>AMOUNT</u>	<u>TOTAL</u>
Bld	Mayan Construction	\$110,700.00	
	Thompson Construction	\$64,350.00	
			\$175,050.00
Ed	City College	\$67,300.00	
	Community College	\$235,980.00	
	State University	\$54,900.00	
			\$358,180.00
Frm	Farmers Association	\$200,550.00	
	Ranchers Inc.	\$130,890.00	
	Rural Implements	\$26,000.00	
			\$357,440.00
Med	Clinical Supply	\$17,450.00	
	Dareco Supply Co.	\$10,500.00	
	Hospital Supply Co.	\$51,790.00	
			\$79,740.00
Mfg	Cactus Hardware	\$18,900.00	
	City Services	\$89,900.00	
	Farrington Co.	\$42,500.00	
	Global Industries	\$28,000.00	
	Johnson Manufacturing	\$125,890.00	
	State Pipe Co.	\$60,000.00	
	Tool Setting Co.	\$32,780.00	
	Universal Industry	\$19,975.00	
	Wrench Inc.	\$32,000.00	
			\$449,945.00
YEAR-TO-DATE TOTAL		\$1,420,355.00	
LARGEST AMOUNT		\$235,980.00	
AVERAGE AMOUNT		\$71,017.75	
NUMBER OF CUSTOMERS		20	

Report 2

REPORT DESIGN WORKSHEET

Report Preface _____
_____
_____
Page Heading _____
_____
Record Group Definition 1 _____ (Field Name)
Headings _____
_____
Record Group Definition 2 _____ (Field Name)
Headings _____
_____
Record Group Definition 3 _____ (Field Name)
Headings _____
_____
Record Detail (what should print from each record)
_____
_____
_____
Record Group Summary 3 _____ (Field Name)
_____
_____
Record Group Summary 2 _____ (Field Name)
_____
_____
Record Group Summary 1 _____ (Field Name)
_____
_____
Report Summary _____
_____
_____

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.



## Report 2

### MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	=	FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1		=			
M2		=			
M3		=			
M4		=			
M5		=			
M6		=			
M7		=			
M8		=			
M9		=			
M10		=			
M11		=			

\*Enter Ref. No. on Report Design Worksheet at point of calculation

\*\*Maximum of 16 characters

\*\*\*Field name, constant number, or variable name for answer of  
previous Math Instruction

### SUMMARY MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	OPERATION****	FIELD TO BE COMPUTED**
SM1			
SM2			
SM3			
SM4			
SM5			
SM6			
SM7			

\*\*\*\*Operations are Count, Average, Total, High, Low

### Report 3

#### REVENUE ANALYSIS BY STATE

<u>STATE</u>	<u>INDUSTRY</u>	<u>REP</u>	<u>REP TOTAL</u>	<u>INDUSTRY TOTAL</u>	
AZ	Ed	Jones	\$67,300.00	\$122,200.00	
		Ortiz	\$54,900.00		
	Frm	Hull	\$156,890.00	\$156,890.00	
		Med	Jones	\$27,950.00	\$27,950.00
	Mfg	Curtis	\$92,000.00	\$278,670.00	
		Hull	\$153,890.00		
		Jones	\$32,780.00		
			STATE TOTAL	\$585,710.00	
	CA	Bld	Jones	\$64,350.00	\$175,050.00
			Ortiz	\$110,700.00	
Ed		Ortiz	\$235,980.00	\$235,980.00	
		Frm	Hull	\$200,550.00	\$200,550.00
Med			Ortiz	\$51,790.00	\$51,790.00
		Mfg	Curtis	\$109,875.00	\$171,275.00
Jones			\$42,500.00		
Ortiz			\$18,900.00		
			STATE TOTAL	\$834,645.00	

-----  
REPORT SUMMARY

NUMBER OF CUSTOMERS	20
YEAR-TO-DATE TOTAL	\$1,420,355.00



Report 3

REPORT DESIGN WORKSHEET

Report Preface _____ _____ _____
Page Heading _____ _____
Record Group Definition 1 _____ (Field Name) Headings _____ _____
Record Group Definition 2 _____ (Field Name) Headings _____ _____
Record Group Definition 3 _____ (Field Name) Headings _____ _____
Record Detail (what should print from each record) _____ _____ _____
Record Group Summary 3 _____ (Field Name) _____ _____
Record Group Summary 2 _____ (Field Name) _____ _____
Record Group Summary 1 _____ (Field Name) _____ _____
Report Summary _____ _____ _____

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.



## Report 3

### MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	=	FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1		=			
M2		=			
M3		=			
M4		=			
M5		=			
M6		=			
M7		=			
M8		=			
M9		=			
M10		=			
M11		=			

\*Enter Ref. No. on Report Design Worksheet at point of calculation

\*\*Maximum of 16 characters

\*\*\*Field name, constant number, or variable name for answer of  
previous Math Instruction

### SUMMARY MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	OPERATION*****	FIELD TO BE COMPUTED**
SM1			
SM2			
SM3			
SM4			
SM5			
SM6			
SM7			

\*\*\*\*\*Operations are Count, Average, Total, High, Low

REVIEW ANSWERS

Report 1

REPORT DESIGN WORKSHEET

Report Preface _____
Page Heading <u>Customer List</u>
<u>Customer</u> <u>Contact</u> <u>Amount</u> <u>Representative</u>
Record Group Definition 1 _____ (Field Name)
Headings _____
Record Group Definition 2 _____ (Field Name)
Headings _____
Record Group Definition 3 _____ (Field Name)
Headings _____
Record Detail (what should print from each record)
<u>+ Customer Name +</u> <u>+ Title +</u> <u>+ First Name +</u> <u>+ Last Name +</u> <u>+ if subtitle not empty, + Subtitle +</u> <u>+ order +</u> <u>+ Sales Rep +</u>
Record Group Summary 3 _____ (Field Name)
Record Group Summary 2 _____ (Field Name)
Record Group Summary 1 _____ (Field Name)
Report Summary <u>SMI</u> <u>Total: + total +</u>

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.



# Report 1

## MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	=	FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1		=			
M2		=			
M3		=			
M4		=			
M5		=			
M6		=			
M7		=			
M8		=			
M9		=			
M10		=			
M11		=			

\*Enter Ref. No. on Report Design Worksheet at point of calculation

\*\*Maximum of 16 characters

\*\*\*Field name, constant number, or variable name for answer of previous Math Instruction

## SUMMARY MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	OPERATION****	FIELD TO BE COMPUTED**
SM1	<i>total</i>	<i>Total</i>	<i>Order</i>
SM2			
SM3			
SM4			
SM5			
SM6			
SM7			

\*\*\*\*Operations are Count, Average, Total, High, Low

## Report 2

### REPORT DESIGN WORKSHEET

Report Preface	<u>Revenue Analysis by Industry</u>		
	<u>Year-to-Date 1981</u>		
Page Heading	<u>Industry</u>	<u>Customer</u>	<u>Amount</u>
			<u>Total</u>
Record Group Definition 1	<u>Ind</u>	(Field Name)	
Headings	<u>+ Ind +</u>		
Record Group Definition 2	_____	(Field Name)	
Headings	_____		
Record Group Definition 3	_____	(Field Name)	
Headings	_____		
Record Detail (what should print from each record)	<u>+ Customer Name +</u>		
	<u>+ Order +</u>		
Record Group Summary 3	_____	(Field Name)	
Record Group Summary 2	_____	(Field Name)	
Record Group Summary 1	<u>Ind</u>	(Field Name)	
	<u>(SM1)</u>	<u>+ total +</u>	
Report Summary	<u>(SM2)</u>	<u>(SM3)</u>	<u>(SM4)</u>
	<u>(SM5)</u>	<u>+ overall total +</u>	
	<u>Largest Amount + high + Average Amount + Average +</u>		
	<u>Number of Customers + Count +</u>		

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.





## Report 2

### MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	=	FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1		=			
M2		=			
M3		=			
M4		=			
M5		=			
M6		=			
M7		=			
M8		=			
M9		=			
M10		=			
M11		=			

\*Enter Ref. No. on Report Design Worksheet at point of calculation

\*\*Maximum of 16 characters

\*\*\*Field name, constant number, or variable name for answer of previous Math Instruction

### SUMMARY MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	OPERATION*****	FIELD TO BE COMPUTED**
SM1	<i>total</i>	<i>Total</i>	<i>Order</i>
SM2	<i>overall total</i>	<i>Total</i>	<i>Order</i>
SM3	<i>high</i>	<i>High</i>	<i>Order</i>
SM4	<i>Average</i>	<i>Average</i>	<i>Order</i>
SM5	<i>count</i>	<i>Count</i>	<i>Customer Name</i>
SM6			
SM7			

\*\*\*\*\*Operations are Count, Average, Total, High, Low

# Report 3

## REPORT DESIGN WORKSHEET

Report Preface \_\_\_\_\_

Revenue Analysis by State

Page Heading  
State    Industry    Rep    Rep Total    Industry Total

Record Group Definition 1 ST (Field Name)  
 Headings + ST +

Record Group Definition 2 Ind (Field Name)  
 Headings + Ind +

Record Group Definition 3 Sales Rep (Field Name)  
 Headings \_\_\_\_\_

Record Detail (what should print from each record)  
 \_\_\_\_\_  
 \_\_\_\_\_

Record Group Summary 3 Sales Rep (Field Name)  
SM1 + Sales Rep + + Rep Total +

Record Group Summary 2 Ind (Field Name)  
SM2 + ind total +

Record Group Summary 1 ST (Field Name)  
SM3 state total: + state total +

Report Summary SM4 SM5  
Report Summary  
Number of Customers    + number +  
Year-to-Date Total    + Report total +

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.



### Report 3

#### MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	=	FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1		=			
M2		=			
M3		=			
M4		=			
M5		=			
M6		=			
M7		=			
M8		=			
M9		=			
M10		=			
M11		=			

\*Enter Ref. No. on Report Design Worksheet at point of calculation

\*\*Maximum of 16 characters

\*\*\*Field name, constant number, or variable name for answer of previous Math Instruction

#### SUMMARY MATH INSTRUCTIONS

REF. NO.**	VARIABLE NAME FOR ANSWER**	OPERATION****	FIELD TO BE COMPUTED**
SM1	<i>rep total</i>	<i>Total</i>	<i>Order</i>
SM2	<i>ind total</i>	<i>Total</i>	<i>Order</i>
SM3	<i>state total</i>	<i>Total</i>	<i>Order</i>
SM4	<i>report total</i>	<i>Total</i>	<i>Order</i>
SM5	<i>number</i>	<i>Count</i>	<i>Customer Name</i>
SM6			
SM7			

\*\*\*\*Operations are Count, Average, Total, High, Low

This page intentionally left blank.

## CHAPTER SUMMARY

- A report can have up to six parts:
  1. a report preface prints once at the beginning of the report
  2. a page heading print after the report preface and at the top of each subsequent page in the report, up to the beginning of the report summary
  3. record group definitions
    - define the groupings (does not print)
    - can contain group headings and math calculations
    - must be used if a record group summary is used
  4. record detail prints information from each record
  5. a record group summary prints at the end of each group
  6. a report summary prints at the end of the report
- A report is a list sorted and grouped into meaningful units. It must:
  - have record group definition fields that define the groups
  - be sorted so that the first sort fields are the same as the record group definition fields
- A report can have up to three record group definition fields.
- A report can have both math calculations and summary math instructions. Summary math instructions calculate:
  - the total of a math field
  - the highest number in a math field
  - the lowest number in a math field
  - the average of a math field
  - the number of records in a group or report
- Additional functions that can be used with reports are:
  - select records for merging

- conditional text instructions
- math instructions
- The Report Design Worksheet is used in this chapter.

## Reports That Look Like Letters

If you want to create a letter and use information from more than one record in that letter, you must create a report. A report can be made to look like a letter by typing:

- the first part of the letter as a group heading in the record group definition
- the information from the records as detail
- the closing part of the letter as a record group summary

(Each group summary must end with a required page end code so that each new group of records begins on a new page.)

The IBM Displaywriter System Work Station Procedures Guide — Reportpack contains additional information about creating reports that look like letters.

Figure 12-1 shows a report that looks like a letter. The report parts are marked.



~~/Group Heading, Supervisor/~~  
August 3, 1982

To: ~~WSupervisorV~~

From: George Alexander

Re: Overdue Appraisals

As you know, each employee should be appraised at least once a year by his or her manager. The following is a list of employees whose appraisals are overdue.

Name Date of Last Appraisal

~~/Record Detail/~~

~~VFirst\_NameV WMIW VLast\_NameV VApp\_DateV~~

~~/Group Summary, Supervisor/~~

Please handle these meetings as soon as possible. Notify the Personnel Department of the employee's name, appraisal level, and appraisal date.



August 3, 1982

To: Barbara Wilson

From: George Alexander

Re: Overdue Appraisals

As you know, each employee should be appraised at least once a year by his or her manager. The following is a list of employees whose appraisals are overdue.

Name Date of Last Appraisal

Roger T. Norton	79/12/30
Helen K. Morgan	80/07/24
Carol A. Fisher	80/10/15
Marilyn L. Velasco	80/10/30
Maxwell A. Madison	80/11/28
George J. Steiniger	80/12/15
Walter M. Smith	81/01/15
David Y. Clark	81/02/05

Please handle these meetings as soon as possible. Notify the Personnel Department of the employee's name, appraisal level, and appraisal date.

*Record group definition*  
*Record detail*  
*Record group Summary*

Figure 12-1 (Part 1 of 2). Report Designed to Look Like a Letter

REPORT DESIGN WORKSHEET

Report Preface _____
Page Heading _____
Record Group Definition 1 <u>Supervisor</u> (Field Name)
Headings <u>August 3, 1982</u> . . . .
<u>Name</u> _____ <u>Date of Last Appraisal</u> _____
Record Group Definition 2 _____ (Field Name)
Headings _____
Record Group Definition 3 _____ (Field Name)
Headings _____
Record Detail (what should print from each record)
<u>+ First name + + MI + + Last Name + + App Date +</u>
Record Group Summary 3 _____ (Field Name)
Record Group Summary 2 _____ (Field Name)
Record Group Summary 1 <u>Supervisor</u> (Field Name)
<u>Please handle these meetings as soon as possible . . . and appraisal date.</u>
Report Summary _____

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.

Figure 12-1 (Part 2 of 2). Report Designed to Look Like a Letter

## REVIEW QUESTION

Using the information from the File Design Worksheet below, complete the Report Design Worksheet on the following page so that a report that looks like a letter is sent to every sales representative listing his or her customers and orders.

FILE DESIGN WORKSHEET

FIELD NAME	FIELD TYPE*	NUMBER OF CHARACTERS**	COMMENTS
<i>Customer Name</i>	<i>char</i>	<i>22</i>	<i>company name</i>
<i>Address</i>	<i>"</i>	<i>25</i>	
<i>City</i>	<i>"</i>	<i>15</i>	
<i>St</i>	<i>"</i>	<i>2</i>	<i>state - use abbreviation</i>
<i>Title</i>	<i>"</i>	<i>4</i>	<i>title of contact person</i>
<i>First Name</i>	<i>"</i>	<i>10</i>	
<i>MI</i>	<i>"</i>	<i>2</i>	<i>include punctuation</i>
<i>Last Name</i>	<i>"</i>	<i>15</i>	
<i>Subtitle</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Contact Mo</i>	<i>math</i>	<i>2</i>	<i>month of last contact</i>
<i>Contact Day</i>	<i>"</i>	<i>2</i>	<i>day of last contact</i>
<i>Contact Yr</i>	<i>"</i>	<i>2</i>	
<i>Order</i>	<i>"</i>	<i>6</i>	<i>amount of sale no decimal point</i>
<i>Sales Rep</i>	<i>char</i>	<i>15</i>	<i>last name only</i>
<i>Rep Title</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Ind</i>	<i>"</i>	<i>4</i>	<i>use code</i>

\*character field      \*\* 1-80 characters  
 math field            1-17 characters  
 text field             1-500 characters

## REPORT DESIGN WORKSHEET

Report Preface _____
Page Heading _____
Record Group Definition 1 _____ (Field Name)
Headings _____
Record Group Definition 2 _____ (Field Name)
Headings _____
Record Group Definition 3 _____ (Field Name)
Headings _____
Record Detail (what should print from each record)
Record Group Summary 3 _____ (Field Name)
Record Group Summary 2 _____ (Field Name)
Record Group Summary 1 _____ (Field Name)
Report Summary _____

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.



To: Ms. Jones

From: James Johnson, Sales Manager

Re: 1981 Sales

As we come to the closing quarter of the year, I'd like to give you a clear picture of your sales in 1981. The following is a list of your customer and their orders.

Dareco Supply Co.	\$10,500.00
Farrington Co.	\$42,500.00
Tool Setting Co.	\$32,780.00
City College	\$67,300.00
Thompson Construction	\$64,350.00
Clinical Supply	\$17,450.00

If you have any questions, please call me.

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## CHAPTER SUMMARY

- To create a letter that uses information from more than one record, you must do it as a report.



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A list is a type of report which has fields from all selected records merged with a shell document to produce one output document.

### SINGLE COLUMN FILE LISTS

To print a list that has a single set of columns, such as the one in Figure 13-1, you print it as a report using only the page heading and record detail instructions. Because this is simply a report, it can have math instructions.

A single column file list is created by using a Report Design Worksheet. This is the same worksheet that you used in Chapter 11.

<u>Name</u>	<u>Extension</u>
Wilson, Frank P.	1839
Young,	

<u>Name</u>	<u>Extension</u>
Acker, Michael F.	3849
Anderson, Peggy L.	4579
Benson, Karen J.	4567
Black, Theresa H.	8493
Boswell, Dorothy P.	3728
Boyle, Lorna A.	2736
Bradley, Richard J.	2734
Burns, Sue R.	2938
Carrigan, Simon E.	3879
Chapman, Lorna J.	8293
Clark, David Y.	8293
Crawford, Ronald G.	5736
Davidson, Jean T.	6483
Fisher, Carol A.	5647
Fisher, Victor P.	7874
Forrest, Rachel L.	4958
Garcia, Ralph R.	3684
Goodman, Debbie S.	6789
Hunt, Allen K.	8394
Jackson, Thomas W.	2837
Kahn, Cecelia B.	2838
Kelly, Laverne W.	2839
Knight, Roger H.	9087
Kramer, Roger P.	2273
Lambert, Stanley R.	5483
Lee, Cynthia R.	2837
Lopez, Robert M.	3782
Madison, Maxwell A.	3956
Martin, Jeff D.	3856
Morgan, Helen K.	2583
Nelson, Mavis Y.	8293
Nelson, Patricia H.	5434
Norton, Roger T.	2837
Ostrom, Gerald S.	1726
Ostrom, James R.	3847
Park, Trisha J.	3948
Perkins, Sherry J.	3553
Perry, Tracy S.	2839
Preston, Diane K.	3894
Rogers, Brian K.	7462
Schultz, Lisa G.	5839
Shaw, Pauline F.	5840
Smith, Walter A.	5938
Smith, Walter M.	3874
Steiniger, George J.	8379
Swanson, Simon E.	5849
Tweeden, Nancy W.	8293
Velasco, Marilyn L.	4958
Velasco, Michael L.	2748
White, Barbara N.	5394
White, Jack E.	3868
Wilson, Barbara J.	2647

Figure 13-1. Single Column List

## MULTI-COLUMN FILE LISTS

A multi-column file list can be printed with two to eight sets of columns of information with headings at the top of each set of columns. The list shown in Figure 13-2 has two sets of columns.

A Multi-Column File List Worksheet is used to design a multi-column list. On the worksheet, you need to indicate the:

- number of sets of columns
- width of each set of columns
- headings
- fields to be used

You'll learn more in this chapter about how to set up multi-column file lists.

<u>Name</u>	<u>Extension</u>	<u>Name</u>	<u>Extension</u>
Acker, Michael F.	3849	Nelson, Patricia H.	5434
Anderson, Peggy L.	4579	Norton, Roger T.	2837
Benson, Karen J.	4567	Ostrom, Gerald S.	1726
Black, Theresa H.	8493	Ostrom, James R.	3847
Boswell, Dorothy P.	3728	Park, Trisha J.	3948
Boyle, Lorna A.	2736	Perkins, Sherry J.	3553
Bradley, Richard J.	2734	Perry, Tracy S.	2839
Burns, Sue R.	2938	Preston, Diane K.	3894
Carrigan, Simon E.	3879	Rogers, Brian K.	7462
Chapman, Lorna J.	8293	Schultz, Lisa G.	5839
Clark, David Y.	8293	Shaw, Pauline F.	5840
Crawford, Ronald G.	5736	Smith, Walter A.	5938
Davidson, Jean T.	6483	Smith, Walter M.	3874
Fisher, Carol A.	5647	Steiniger, George J.	8379
Fisher, Victor P.	7874	Swanson, Simon E.	5849
Forrest, Rachel L.	4958	Tweeden, Nancy W.	8293
Garcia, Ralph R.	3684	Velasco, Marilyn L.	4958
Goodman, Debbie S.	6789	Velasco, Michael L.	2748
Hunt, Allen K.	8394	White, Barbara N.	5394
Jackson, Thomas W.	2837	White, Jack E.	3868
Kahn, Cecelia B.	2838	Wilson, Barbara J.	2647
Kelly, Laverne W.	2839	Wilson, Frank P.	1839
Knight, Roger H.	9087	Young, Gloria F.	3847
Kramer, Roger P.	2273		
Lambert, Stanley R.	5483		
Lee, Cynthia R.	2837		
Lopez, Robert M.	3782		
Madison, Maxwell A.	3956		
Martin, Jeff D.	3856		
Morgan, Helen K.	2583		
Nelson, Mavis Y.	8293		

Figure 13-2 (Part 1 of 2). Sample Multi-Column File Name and Address List

MULTI-COLUMN FILE LIST WORKSHEET

1. Number of Sets of Columns (2-8) [2] 2
2. Column Width of Each Set (3-284) [40] 40
3. Column Headings

Name                      Extension

---



---

4. Field Names

/

+Last Name+, +First Name+ +MI+ +Extension+

---



---



---



---

Note: Numbers in parentheses following each item are range of choices. The number in brackets following each item is the system default.

You can also use the following worksheets with this worksheet:

- Record Selection Specifications
- Sort Specifications

SORT SPECIFICATIONS

	FIELD NAME	KIND OF SORT
FIELD TO BE SORTED FIRST	<i>Last Name</i>	<u>LOW TO HIGH</u> / HIGH TO LOW
FIELD TO BE SORTED SECOND	<i>First Name</i>	<u>LOW TO HIGH</u> / HIGH TO LOW
FIELD TO BE SORTED THIRD	<i>MI</i>	<u>LOW TO HIGH</u> / HIGH TO LOW
FIELD TO BE SORTED FOURTH		LOW TO HIGH / HIGH TO LOW
FIELD TO BE SORTED FIFTH		LOW TO HIGH / HIGH TO LOW

Figure 13-2 (Part 2 of 2). Sample Multi-Column File Name and Address List

## Determining Column Width

To create a multi-column file list, you need to determine the number of sets of columns you want and the width of each set of columns. The width of a set of columns is the total amount of space necessary to print the fields from one record plus the amount of white space you want between set of columns. Figure 13-3 shows what we mean by the width of a set of columns (we'll call it column width).

To determine how wide a set of columns should be, add:

1. the maximum field length for each field that will be printed
2. the amount of space you want between the fields
3. the amount of space you want between the sets of columns

**Note:** You specify the column width for only one set of columns because the system automatically repeats that information for the other columns.

<u>Name</u>	<u>Extension</u>	<u>Name</u>	<u>Extension</u>
Acker, Michael F.	3849	Nelson, Patricia H.	5434
Anderson, Peggy L.	4579	Norton, Roger T.	2837
Benson, Karen J.	4567	Ostrom, Gerald S.	1726
Black, Theresa H.	8493	Ostrom, James R.	3847
Boswell, Dorothy P.	3728	Park, Trisha J.	3948
Boyle, Lorna A.	2736	Perkins, Sherry J.	3553
Bradley, Richard J.	2734	Perry, Tracy S.	2839
Burns, Sue R.	2938	Preston, Diane K.	3894
Carrigan, Simon E.	3879	Rogers, Brian K.	7462
Chapman, Lorna J.	8293	Schultz, Lisa G.	5839
Clark, David Y.	8293	Shaw, Pauline F.	5840
Crawford, Ronald G.	5736	Smith, Walter A.	5938
Davidson, Jean T.	6483	Smith, Walter M.	3874
Fisher, Carol A.	5647	Steiniger, George J.	8379
Fisher, Victor P.	7874	Swanson, Simon E.	5849
Forrest, Rachel L.	4958	Tweedden, Nancy W.	8293
Garcia, Ralph R.	3684	Velasco, Marilyn L.	4958
Goodman, Debbie S.	6789	Velasco, Michael L.	2748
Hunt, Allen K.	8394	White, Barbara N.	5394
Jackson, Thomas W.	2837	White, Jack E.	3868
Kahn, Cecelia B.	2838	Wilson, Barbara J.	2647
Kelly, Laverne W.	2839	Wilson, Frank P.	1839
Knight, Roger H.	9087	Young, Gloria F.	3847
Kramer, Roger P.	2273		
Lambert, Stanley R.	5483		
Lee, Cynthia R.	2837		
Lopez, Robert M.	3782		
Madison, Maxwell A.	3956		
Martin, Jeff D.	3856		
Morgan, Helen K.	2583		
Nelson, Mavis Y.	8293		

*Column 1  
width*
*Column 2  
width*

Figure 13-3. Multi-Column File List With Column Width Marked



## ADDITIONAL FUNCTIONS YOU CAN USE WITH LISTS

You can use any function with a single column file list that you would use with a report. See the "Additional Functions" in Chapter 11.

You can use several of the functions already discussed with multi-column file lists. You can:

- sort the records
- select the records
- use conditional text instructions

Any conditional text used in a multi-column file list must be no longer than one line.

You cannot use math calculations or text fields in a multi-column file list.

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REVIEW QUESTION

Using the file information from the File Design Worksheet shown below, fill out the Multi-Column List Worksheet on the next page so that a three-column customer name and address list is printed. There are no column headings.

FILE DESIGN WORKSHEET

FIELD NAME	FIELD TYPE*	NUMBER OF CHARACTERS**	COMMENTS
<i>Customer Name</i>	<i>char</i>	<i>22</i>	<i>company name</i>
<i>Address</i>	<i>"</i>	<i>25</i>	
<i>City</i>	<i>"</i>	<i>15</i>	
<i>St</i>	<i>"</i>	<i>2</i>	<i>state - use abbreviation</i>
<i>Title</i>	<i>"</i>	<i>4</i>	<i>title of contact person</i>
<i>First Name</i>	<i>"</i>	<i>10</i>	
<i>MI</i>	<i>"</i>	<i>2</i>	<i>include punctuation</i>
<i>Last Name</i>	<i>"</i>	<i>15</i>	
<i>Subtitle</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Contact Mo</i>	<i>math</i>	<i>2</i>	<i>month of last contact</i>
<i>Contact Day</i>	<i>"</i>	<i>2</i>	<i>day of last contact</i>
<i>Contact Yr</i>	<i>"</i>	<i>2</i>	
<i>Order</i>	<i>"</i>	<i>6</i>	<i>amount of sale no decimal point</i>
<i>Sales Rep</i>	<i>char</i>	<i>15</i>	<i>last name only</i>
<i>Rep Title</i>	<i>"</i>	<i>4</i>	<i>include punctuation</i>
<i>Ind</i>	<i>"</i>	<i>4</i>	<i>use code</i>

\*character field      \*\* 1-80 characters  
 math field            1-17 characters  
 text field             1-500 characters

MULTI-COLUMN FILE LIST WORKSHEET

1. Number of Sets of Columns (2-8) [2] \_\_\_\_\_

2. Column Width of Each Set (3-284) [40] \_\_\_\_\_

3. Column Headings

---

---

---

4. Field Names

---

---

---

---

---

---

**Note:** Numbers in parentheses following each item are range of choices. The number in brackets following each item is the system default.

You can also use the following worksheets with this worksheet:

- Record Selection Specifications
- Sort Specifications

# REVIEW ANSWERS

## MULTI-COLUMN FILE LIST WORKSHEET

1. Number of Sets of Columns (2-8) [2] 3
2. Column Width of Each Set (3-284) [40] 40 (depends on paper size)
3. Column Headings

— none —

---

---

---

4. Field Names

+ Title + + First Name + + MI + + Last Name + + if  
subtitle is not empty, + Subtitle + +  
+ Customer Name +  
+ Address +  
+ City +, + ST + + Zip +

---

---

Note: Numbers in parentheses following each item are range of choices. The number in brackets following each item is the system default.

You can also use the following worksheets with this worksheet:

- Record Selection Specifications
- Sort Specifications

## CHAPTER SUMMARY

- A single column file list is done as a report.
- A multi-column file list can have two to eight sets of columns with headings.
- Column width is calculated by adding:
  - the field widths
  - the space between the fields
  - the space between the columns
- Additional functions that can be used with multi-column lists include:
  - sorting records
  - selecting records
  - using conditional text (no longer than one line)

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## Evaluating And Correcting File Problems

Once you have read this guide, you can begin to design and use your own files. Not everything may work right the first time. This chapter is designed to help you identify and correct any problems.

### DO A DESIGN CHECK FIRST

To test your file design, create a small file of approximately 20 representative records. Then, create all the shell documents that you will use and merge these with the 20-record file. Often this procedure will help you identify any design problems before you expend a lot of time and effort creating a large file.

### HOW YOU CAN DETERMINE THE CAUSE OF A PROBLEM

If you have problems, go through the following procedure.

1. Is the file designed correctly? Are the field types correct? Did you include all the necessary fields? Are there any of the problem fields identified in Chapter 3? If the file was designed correctly, go to the next area.
2. Look at the shell document you created. Are there any error messages? If there are, the IBM Displaywriter System Prompts and Messages Guide — Textpack 4/Reportpack indicates when a message might occur and actions you can take. In addition, if you specify that the system continue processing the job even if it finds an error (Cancel on Error = No), the error message will print at the point where the error occurred.
3. Review the worksheets and determine whether you filled them out correctly.
4. Finally, review what was typed to assure yourself that the worksheets were correctly transferred to the IBM Displaywriter. Stored setups are particularly helpful here because you can check exactly what was typed.

After you've checked all the potential problem areas, rerun the application. If problems still exist, call your IBM Marketing Support Representative.



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## Blank Worksheets

This appendix contains blank worksheets for your use. Make copies, as you need them, to use as you design your files and your output documents.



## MATH FORMATS WORKSHEET

ITEM	FORMAT 1	FORMAT 2	FORMAT 3	FORMAT 4
Character for Decimal	period comma colon	period comma colon	period comma colon	period comma colon
Character for Thousands Separator	period comma req. space none	period comma req. space none	period comma req. space none	period comma req. space none
Number of Characters to Right of Decimal	0-15 2	0-15 2	0-15 0	0-15 1
Rounding Rule	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none	1-4↓, 5-9↑ 1-5↓, 6-9↑ 1-9↓ 1-9↑ none

Text (any eight characters)

Preceding Positive Number or Zero	no text	\$	no text	no text
Following Positive Number or Zero	no text	no text	no text	no text
Preceding Negative Number	- (minus)	-\$	- (minus)	- (minus)
Following Negative Number	no text	no text	no text	no text

Your Notes

Example of This Format*	25.00	\$25.00	25	25.0
This Format Used For	money**	money	years	GPA***

\*Example uses the positive number 25

\*\*Add \$ in text

\*\*\*Grade Point Average

### MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**		FIRST NUMBER***	+ - * -	SECOND NUMBER***
M1		=			
M2		=			
M3		=			
M4		=			
M5		=			
M6		=			
M7		=			
M8		=			
M9		=			
M10		=			
M11		=			

\*Enter Ref. No. on Report Design Worksheet at point of calculation

\*\*Maximum of 16 characters

\*\*\*Field name, constant number, or variable name for answer of previous Math Instruction

### SUMMARY MATH INSTRUCTIONS

REF. NO.*	VARIABLE NAME FOR ANSWER**	OPERATION***	FIELD TO BE COMPUTED**
SM1			
SM2			
SM3			
SM4			
SM5			
SM6			
SM7			

\*\*\*\*Operations are Count, Average, Total, High, Low

## MULTI-COLUMN FILE LIST WORKSHEET

1. Number of Sets of Columns (2-8) [2] \_\_\_\_\_
2. Column Width of Each Set (3-284) [40] \_\_\_\_\_
3. Column Headings

---

---

---

4. Field Names

---

---

---

---

---

---

---

**Note:** Numbers in parentheses following each item are range of choices. The number in brackets following each item is the system default.

You can also use the following worksheets with this worksheet:

- Record Selection Specifications
- Sort Specifications

## REPORT DESIGN WORKSHEET

Report Preface _____
Page Heading _____
Record Group Definition 1 _____ (Field Name)
Headings _____
Record Group Definition 2 _____ (Field Name)
Headings _____
Record Group Definition 3 _____ (Field Name)
Headings _____
Record Detail (what should print from each record)
Record Group Summary 3 _____ (Field Name)
Record Group Summary 2 _____ (Field Name)
Record Group Summary 1 _____ (Field Name)
Report Summary _____

You can use the following worksheets with the Report Design Worksheet: Record Selection Specifications, Sort Specifications, Math Instructions, and Summary Math Instructions.





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## Character Sort Chart

The sort chart on the following page shows the sorting order that the system uses. It is arranged from low-to-high, so that a space would also be the first character and a three superscript would be the last. A high-to-low sort would be done in the opposite order.

A space (SP), a syllable hyphen (SHY), and an apostrophe (') are ignored during a sort.

**Note:** Upper and lower case alphabetic characters are sorted as though they were the same character. For example, if you were to sort "abadaba" and "Abadaba," abadaba would sort first if the record containing it were added to the file before the record containing Abadaba. Otherwise, the capitalized version would be placed before the lower case version.

Character	Title	Character	Title
RSP	Required Space	f or F	
[	Opening Bracket	g or G	
.	Period	h or H	
<	Less Than	i or I	
(	Open Parenthesis	k or K	
+	Plus	l or L	
:	Exclamation Mark	m or M	
&	Ampersand	n or N	
]	Closing Bracket	o or O	
\$	Dollar	p or P	
*	Asterisk	q or Q	
)	Close Parenthesis	r or R	
;	Semicolon	s or S	
-	Minus/Hyphen	t or T	
/	Slash/Division	u or U	
	Vertical Line	v or V	
,	Comma	w or W	
%	Percent	x or X	
_	Underscore	y or Y	
>	Greater Than	z or Z	
?	Question Mark	NSP	Numeric Space
:	Colon	0	Zero
#	Number Sign	1	One
@	At Sign	2	Two
=	Equal	3	Three
"	Quotation Mark	4	Four
±	Plus/Minus	5	Five
°	Degree	6	Six
¢	Cent Sign	7	Seven
¼	One Quarter	8	Eight
½	One Half	9	Nine
¾	Three Quarters	2	Two Superscript
=	Double Underscore	3	Three Superscript
a or A			
b or B			
c or C			
d or D			
e or E			

## Converting Text Into Records

### CONVERSION RULES

You must provide some conversion information for the system before converting the text. This information can be divided into four parts.

1. You must specify at least one **record separator** character that marks the end of each record (a required carrier return, for example), and you can specify two different record separator characters.

When the system finds a record separator character while it is reading text during a conversion process, it ends the record at that point and begins a new record.

Unless you specify otherwise, the system assumes that any required carrier return is a record separator character.

2. You must specify at least one **field separator** character that marks the end of each field (such as a tab), and you can specify two different field separator characters.

The system reads the text until it finds a field separator. Then it places all the information up to that point in the first field of the record after the Displaywriter Record ID. The system continues reading the text until it finds another field separator character. It places all the text located between the end of the first field and the field separator in the second field, and so on, until the system finds another record separator character.

There are two additional considerations in specifying the field separators:

- a. The two characters that you use for field separators cannot be used within a field, because the system reads them as field separators and assumes that they mark the end of that field.
- b. Neither of the two characters used for the field separators can be the same as either of the two characters used for record separators.

Unless you specify otherwise, the system assumes that the two field separators are a tab and an index return. (Those are the field separators on an IBM Office System 6.)

3. You can specify a **comment begin** character. The comment begin character marks the beginning of information to be treated as a comment and not to be converted as a file field. If, for example, you are converting a table that was typed as text, you want the entries in the table to be converted into file fields. However, you do not want the table headings to be a part of the file. To prevent this, you would indicate that the table headings are a comment.

The comment begin character must always be at the beginning of a document or following a record separator. The system reads all information as a comment from the comment begin character up to, and including, one of the following characters:

- carrier return
- required carrier return
- index return
- zero index return
- page end
- required page end
- line format change
- return to master line format

Immediately following the comment text, either a new comment may begin (if another comment begin character is found) or the first field is started. If a comment begin character is anywhere other than at the beginning of the text in the source document or immediately following a record separator character, the system treats it as a regular character.

Unless you specify otherwise, the system assumes that the comment begin character is a required space.

4. You can specify whether the **first field** in each source record is to be used in the Displaywriter file. For records developed on the IBM Office System 6, for example, the first field is a Record ID field. Because the Displaywriter assigns its own Record IDs, the Record ID from the original file is not needed.

## CONVERSION CONSIDERATIONS

The text must meet certain requirements before it can be converted into a file. The characters that will be used for separating the text into fields and records must be consistent. If your field separators are tabs and index returns, for example, each field in the text must be separated by them and no other character.

### Common Conversion Problems

Look at the text to determine if there are any characters that violate the file's field descriptions. These two problems are common:

1. An word underline character can only be placed in a text field. It cannot be used in a math or character field.
2. Only numbers, a decimal point, and a plus or minus sign can be used in a math field. If the number text has a \$ or commas separating the thousands, they must be deleted before conversion.

Notice how the text information is arranged. If you convert the **named-variable list** in Figure C-1, the title, first name, and last name are placed in one field. The city, state, and zip code are also placed in one field. You may want to edit the text before converting it if it doesn't match your file design.

In addition, other considerations related to specific types of text documents are discussed in the following section.

## Converting Name-variable Lists

If the text is a named-variable list, such as the one in Figure C-1, the same variables must appear in every list, and each variable must always be in the same order. During the conversion process, the system ignores the variable names and simply reads the variable values into the records in the same order that the values appear in the list.

If variables are missing from a list or are not always in the same order, the records will not convert properly.

```
Wtodays_dateWAugust 18, 1981
WnameWMrs. Renee Taylor
Winside_addressW1876 Salem Avenue
Austin, Texas 78734
Wcredit_limitW1,000.00
WsignatureWP. A. Payne
```



```
Rec ID  date _____  name _____
inside address
credit limit  signature _____

1      August 18, 1981  Mrs. Renee Taylor
1876 Salem Avenue
Austin, Texas 78734
1000.00      P. A. Payne
```

Figure C-1. Named-variable List and File Entries

## Converting Switch-code Lists

If the text is a **switch-code list** such as the one in Figure C-2, each group of values that is to be a record must end with a unique control character that does not appear elsewhere in the group of variables. You may have to edit the list before conversion and add a control character, such as a carrier return, to mark the end of each record.

```
August 18, 1981Mrs. Renee Taylor 1876 Salem Avenue
Austin Texas 7873411,000.00P. A. PayneAugust 18, 1981Mr. Douglas
Kyle1200 Blair Road
Austin, Texas 7877Mr. Kyle750.00P. A. PayneAugust 20, 1981Mrs. K. S.
Meyers1980 Lonsdale CircleSt. Louis, Texas 78759Mrs. Meyers2,000.00L. R.
Penny
```



```
Rec ID  date           name
inside address
credit limit  signature

1      August 18, 1981  Mrs. Renee Taylor
1876 Salem Avenue
Austin, Texas 78734
1000.00      P. A. Payne
```

Figure C-2. Switch Code List and File Entries



## Converting Text Tables

If the text is a **table**, such as the one in Figure C-3, the entries on each line must be separated by a tab so that each entry is in a separate field. Each line must be ended by the same character, such as a carrier return or required carrier return, if each line is to be a record.

<u>Current</u>	<u>1980</u>	<u>1979</u>	<u>1978</u>
695,441	719,343	653,948	602,344
200,756	453,971	163,487	154,773
150,442	512,111	131,162	129,761
879,881	398,356	723,325	482,609



<u>Rec ID</u>	<u>Current</u>	<u>For 1980</u>	<u>For 1979</u>	<u>For 1978</u>
1	695441	719343	653948	602344
2	200756	453971	163487	154773
3	150442	512111	131162	129761
4	879881	398356	732325	482609

Note: Commas were deleted prior to conversion and the table heads were dropped during the conversion. The field names were assigned when the file description was created.

Figure C-3. Text Table Converted to File Entries

## Converting the Text to a File

Once the text in the source document is ready, you can convert it into a file. To convert a document, you must have a source document, a destination file with field descriptions, and an error document.

The error document stores any text that could not be successfully converted from the source document into the destination file. You can look at the information in the error document after completing the conversion process

and correct any problems. After the problems are corrected, you can convert the text from the error document into a file.

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The following terms are defined as they are used in this book. For other items, refer to the IBM Data Processing Glossary, GC20-1699. All terms marked with an asterisk (\*) are from the American National Dictionary for Information Processing.

IBM is grateful to the American National Standards Institute (ANSI) for permission to reprint its definitions from the American National Dictionary for Information Processing (Copyright (c) 1975 by the American National Standards Institute, Inc.), which was prepared by Subcommittee X3K5 on Terminology and Glossary of American National Standards Committee X3.

**/:** A symbol marking the beginning and end of an instruction, such as a math instruction, in a shell document.

**∇:** A symbol marking the beginning and end of a variable in a shell document. If the variable is followed by a number, the number is the number of the math format to be used.

**carrier return:** The function of moving the printer element to the left margin of the next line.

**character:** A letter, digit, or other symbol used as part of the organization, control, or representation of data.

**character field:** A type of file field that can contain either alphabetic or numeric characters.

**complete record:** A record with all fields filled in.

**conditional text:** Text that is printed based on the existence or non-existence of an entry in a field.

**control character:** A non-printing, word processing character, such as a tab or carrier return, used to format text.

**count:** The function of counting the number of records meeting a set of selection criteria.

**default:** A value, attribute, or option that is preassigned and assumed by a system when no other has been specified by the operator.

**delete:** The function of erasing a record or records.

**destination file:** During the duplication of a file, it is the file that records are copied to.

**diskette:** A thin, flexible, magnetic disk and its semirigid, protective jacket, in which the diskette is permanently enclosed. It provides reusable storage of documents that can be used and updated.

**document:** A collection of one or more lines of text that can be named and stored as a separate entity.

**duplicate:** To copy information from a location, leaving the information at that location unchanged, and to move the copy to another location.

**field:** One piece of information in a record; for example, the first name of a person. A record is made up of fields.

**field name:** An operator-assigned name for a field in a file.

**field type:** A definition of a field based on the type of characters that can be typed into the field. Can be character, math, or text.

**file:** A collection of related information. For example, a personnel file may consist of the information found in personnel folders.

**format:** A set of specific conditions that determine the final position of text on a page.

**function keys:** Special keys that do not produce characters for printing when they are used, but allow the operator to give instructions to the system for additional functions.

**group:** A subdivision of records within a report. All records in a group must have the same value in a specified field.

**header:** Constant text formatted to be in the top margin of one or more pages.

**highlight:** The process of emphasizing an area on the display by brightening the area and reversing the color of any characters within the area.

**include instruction:** An instruction used in a text field to retrieve and print text typed in a text document when the field is printed.

**index:** On a diskette, a list of document names and comments. A diskette index can be viewed or printed.

**licensed program:** Software program which remains the property of the manufacturer, for which customers pay a license fee.

**key field:** In a file containing both complete and partial records, it is a

field used in both types of records to link them during output.

**math field:** A type of field that can contain only numbers, a decimal point, and a plus or minus sign.

**math instruction:** A type of instruction used to perform math calculations during output.

**maximum field length:** The system-defined limit on the number of character that can be typed into each field type.

**menu:** Choices listed on the display that can be selected by an operator.

**merge file/report:** The ability to combine fields from all selected output records with a shell document to produce one output document.

**merge file/text:** The ability to merge file information into a shell document; may be either merge file/report or merge record/text.

**merge record/text:** The ability to combine fields from a single record with a shell document to produce one output document per record.

**message:** A message issued by the system because of a condition that requires an operator response.

**pagination:** The process of adjusting text to fit within margins and/or page boundaries.

**prompt:** Information that appears on the display to alert the operator to a specific condition or action needed.

**record:** A collection of related data or words, that make up one entry in a file. For example, a record can contain all the information about one person, one project, or one department.

**repetitive letter:** A personalized form letter created by merging a record with a shell document. When the shell document is merged with the file, one letter is produced for each selected record.

**report:** A type of file output that compiles information from all selected records into one final document. It is created by merging a file with a shell document.

**revision:** The process of changing the text and/or format of a document.

**running total:** Use of an answer variable to compile the total of the answers to a math calculation performed on a series of records.

**scale line:** A line on the display showing margins, tabs, and character positions.

**segment:** To move the display image horizontally to bring into view information that is to the left or right of the display's boundaries.

**select:** The ability to choose only certain records based on field values.

**shell document:** A standardized document containing codes that allow file information to be merged with the shell to produce final documents.

**sort:** The ability to arrange records sequentially according to field values.

**source file:** During the duplication of a file, it is the file that the records are being copied from.

**subtitle:** A secondary or explanatory title that follows a name, such as Jr. or III.

**text field:** A type of field that can contain alphabetic and numeric characters, as well as formatting control characters.

**title:** A descriptive name that precedes a persons's name, such as Mr. or Miss.

**variable:** Information (such as name, date, time) that can be inserted within a standardized document.



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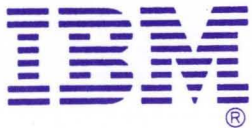
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