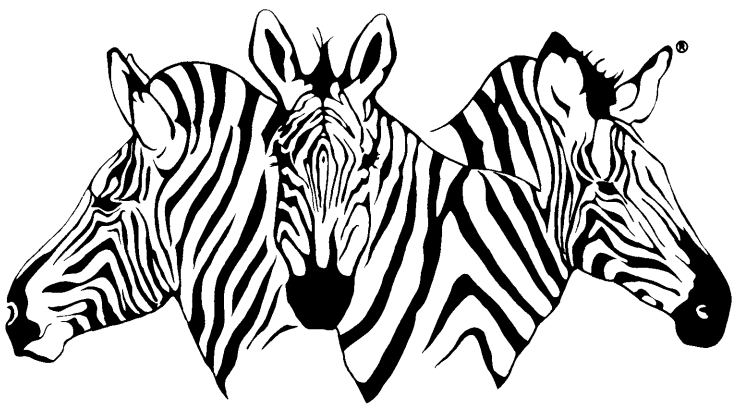
ACCU-PLOT
operator guide
ZEBRA/PICK
graphics system

88A00758A04



ZEBRA® BY GA

RECORD OF REVISIONS

Title: ACCU-PLOT Operator Guide ZEBRA/PICK Graphics System

Document No. 88A00758A04

Date	Revision Record
May 83	Original Issue
Sep 83	Revision B
Apr 84	Revision A03
Feb 85	Revision A04 - Change Package (85A00515A01)

ACCU-PLOT
operator guide
ZEBRA/PICK
graphics system

88A00758A04

1045 South East Street P.O. Box 4883
Anaheim, California 92803
(714)778-4800 (800)854-6234
TWX 910-591-1695 TELEX 685-513

RECORD OF REVISIONS

Title: ACCU-PLOT Operator Guide ZEBRA/PICK Graphics System

Document No. 88A00758A04

Date	Revision Record
May 83	Original Issue
Sep 83	Revision B
Apr 84	Revision A03
Feb 85	Revision A04 - Change Package (85A00515A01)

FOREWORD

ACCU-PLOT is a graphics program which, as an extension to the PICK Operating System, allows you to create business charts within minutes. It may be used for marketing studies, sales analyses, and financial planning by anyone familiar with the PICK System.

To create a business chart using ACCU-PLOT, you simply enter an inquiry statement using one of the ACCU-PLOT verbs. ACCU-PLOT inquiry statements follow the same format as ACCESS LIST or SORT statements.

Using one of four ACCU-PLOT verbs, it is possible to graphically represent almost any information contained in your data base. You can create x-y plots (line charts, bar charts, and scatter diagrams), and also pie charts. And you can produce these business charts using the standard PICK ACCESS processor without having to learn a complicated instruction set. These four verbs and a basic understanding of ACCESS are all you need to create meaningful business charts from your data base.

The ACCU-PLOT Graphics System is equipped with three generic device driver modules. This allows ACCU-PLOT to interface with a number of different output devices. Two device drivers interface with dot-matrix printers and the other interfaces with pen plotters and graphic CRTs. With these three modules, ACCU-PLOT is able to interface with almost any device which has graphics capabilities.

All you need to use the ACCU-PLOT Graphics System on your PICK System is an output device capable of producing graphics and an understanding of your data base file structure and how to retrieve the information stored in your data base via the PICK ACCESS language.

This manual is in four sections. Section 1 discusses the PICK ACCESS language and file structure. It also compares the LIST and SORT verbs and teaches you to create an inquiry statement by taking you through the steps to create your first charts.

Section 2 explains various techniques for using ACCU-PLOT and discusses inquiry language modifiers and plot captions. Examples are presented throughout this section.

Section 3 gives the options available with the ACCU-PLOT Graphics System. One portion of this section deals with x-y (rectangular) charts and another with pie charts. Several examples are included with each portion of the section to explain the various options.

Section 4 is the reference portion of the manual and covers conversions, limitations, multiple value attributes, error conditions, the BASIC interface, and user customization.

Other ZEBRA documentation available to the user from General Automation:

Document No.	Title
88A00751A	Overview of the PICK Operating System
88A00757A	PICK Operator Guide
88A00759A	COMPU-SHEET Operator Guide
88A00760A	Quick Guide for the PICK Operating System
88A00774A	PICK Utilities Guide
88A00776A	PICK ACCESS Reference Manual
88A00777A	PICK SPOOLER Reference Manual
88A00778A	PICK BASIC Reference Manual
88A00779A	PICK EDITOR Reference Manual
88A00780A	PICK PROC Reference Manual
88A00781A	PICK RUNOFF Reference Manual
88A00782A	Introduction to PICK TCL and FILE STRUCTURE
88A00783A	PICK JET Word Processor Guide

TABLE OF CONTENTS

LIST OF APPENDIXES

starting out 1

1.1 ACCESS INQUIRY LANGUAGE

The PICK ACCESS processor lets you retrieve information from your data base. This is done by issuing ACCESS commands which tell the system where the inforormation is, what the information is, and how the information should be presented. ACCESS commands will be referred to in this manual as "inquiry statements."

The format and syntax used in forming inquiry statements is as follows:

verb {DICT} file-name {item-list} {selection-criteria} {sort-keys} {output-specifications} {print-limiters} {modifiers} {(options)}

A verb describes the function to be performed, and must always be the first word in an inquiry statement. The two verbs that are most often used for information retrieval are LIST and SORT. The LIST verb lists and the SORT verb sorts and then lists information contained in the files of your data base.

The second word of an inquiry statement is always a file-name (or DICT file-name) and tells the system where to find the information to retrieve. Only one verb and one file-name may be used in a single inquiry statement. The examples in this manual will use four sample files; they are: 1) SALES, 2) COSTS, 3) EXPENSES, and 4) FUNCTIONS

The simplest inquiry statement consists of a verb and a file-name. For example:

```
>LIST SALES
```

This produces an unsorted listing of all the items contained in the file SALES.

The verbs LIST and SORT are used to produce reports (i.e., sales, expense, profit and loss, receivables, etc.). ACCU-PLOT is designed to translate the information contained in these reports into easily read business charts.

The ACCU-PLOT graphics system uses two verbs. PLOT and SPLOT are used for x-y charts, and PIE and SPIE for pie charts. PLOT and PIE correspond to the ACCESS LIST verb and SPLOT and SPIE to the ACCESS SORT verb. As a general rule, when data can be retrieved from a file in columnar format using either LIST or SORT, then that data can also be plotted using one of the corresponding ACCU-PLOT verbs.

1.2 PICK FILE STRUCTURE

To produce charts using the ACCU-PLOT verbs, it is necessary to understand the PICK file structure. A standard PICK file consists of a dictionary section and a data section. The dictionary section of a file contains items which define the file structure and point to the data section of the file. Items in the dictionary define variable length fields, called attributes, which are found within the data section of the file. Each attribute-definition item in the dictionary is defined by the following:

0 (ATTRIBUTE NAME) - The item-id of the definition item in the dictionary

1 D/CODE - Attribute definition type (either A, S or X)

2 A/AMC - The attribute number of the data which the dictionary defines

3 S/NAME - Name (used instead of line 0 for the attribute heading

4 STRUCT - Used to define controlling and dependent relationships

7 V/CONV - Conversion codes

8 V/CORR - Correlative codes

9 V/TYP - Defines left or right justification

10 V/MAX - Defines column width

The example on the following page shows some of the items contained in the dictionary of the sample file, SALES.

```
>LIST DICT SALES A/AMC D/CODE S/NAME V/CONV V/CORR V/TYP V/MAX

SALES..... A/AMC CD S/NAME..... CONVERSIONS CORRELATIVES TP MAX

1               0 A  DATE          D                      L  12
2               1 A  AMOUNT        MD2,                   R  12
3               2 A  PROFIT        MD2,                   R  12
DATE            0 A                D2/                    R  10
MONTH           0 A                                D       L  10
                                                   G1 2
YEAR            0 A                                D       R  4
                                                   G2 1
SALES.AMOUNT    1 A  SALES         MD2,                   R  10
                     AMOUNT
GROSS.PROFIT    2 A  GROSS         MD2,                   R  10
                     PROFIT

8 ITEMS LISTED
```

The items in the dictionary of a file are used in an inquiry statement to retrieve data from the file.

1.3 COMPARISON BETWEEN LIST AND SORT

Data on PICK files is stored in random order. Therefore, you normally use the verb SORT to produce an organized listing from a data file.

Sometimes it is convenient to create a temporary, sorted list of the data from a file by using the verb SSELECT. This sorted list may then be saved and reaccessed using the SAVE-LIST and GET-LIST verbs (see the ACCESS Reference Manual). The verb LIST would then be used to produce a listing from the presorted data.

In general, to produce an ordered listing from a data file, use the verb SORT, and from a presorted list, the verb LIST.

This manual will show how ACCU-PLOT can be used to create business charts from data files on yu PICK system. Therefore, the use of the verbs SORT and SPLOT and SPIE will be emphasized. Note, however, that PLOT and PIE can be used against a presorted list in the same way as the verb LIST.

1.4 CREATING A SALES REPORT USING SORT

For example, suppose you want to make a sales activity report for the month of January. First, you choose the verb SORT in order to produce an organized report from the SALES file. Second, you specify sort-keys to tell the system how to sort the data. For the sales report, you sort the data BY DATE to present the data in chronological order. So far the inquiry statement is:

```
>SORT SALES BY DATE ...
```

Now you want to look at all the sales that were made in the month of January. To list only these sales, you will need a clause in the inquiry statement to specify the selection-criteria. The clause looks like this: WITH DATE GE "01/01/83" AND LE "01/31/83."

So far the inquiry statement is:

```
>SORT SALES BY DATE WITH DATE GE "01/01/83"
 AND LE "01/31/83" ...
```

Now you wish to specify which items, or attributes, in the file you want to list for this period of time (e.g., DATE and SALES.AMOUNT). You now enter these two attributes for your output-specifications. The first attribute specified will be in the leftmost column of the listing while the second attribute will be in the second column of the listing. (NOTE: Unless ID-SUPP is also specified, the leftmost column will be for the item-id with the next two columns representing the first and second attributes.) The inquiry statement is now:

```
>SORT SALES BY DATE WITH DATE GE "01/01/83"
 AND LE "01/31/83" DATE SALES.AMOUNT ...
```

Finally, you want to tell the system whether to present this data on the screen or on the printer. If you want to see the information on the screen, simply hit return and the data will be sent to the CRT. However, if you want to send this listing to the printer, include the LPTR modifier in the inquiry statement, or use the (P) option.

The final inquiry statement is:

```
>SORT SALES BY DATE WITH DATE GE "01/01/83"
 AND LE "01/31/83" DATE SALES.AMOUNT LPTR
```

This statement will create the listing shown on the following page. In this listing there are two columns of data which correspond to 1) DATE, and 2) SALES.AMOUNT for each date on which a sale was made. Dates on which no sales were made are not listed because no items exist with these dates. NOTE: A column for the item-id is present on the listing, but will be ignored by an ACCU-PLOT statement.

LISTING FOR ACCU-PLOT FIGURES 1-1 & 1-2

SALES.....	DATE.....	SALES..... AMOUNT
5482	01/03/83	7,412.06
5483	01/04/83	2,368.71
5484	01/05/83	6,004.82
5485	01/06/83	3,119.12
5486	01/07/83	7,888.24
5489	01/10/83	5,635.10
5490	01/11/83	7,745.57
5491	01/12/83	6,723.10
5492	01/13/83	10,872.25
5493	01/14/83	13,539.85
5496	01/17/83	19,641.34
5497	01/18/83	5,217.31
5498	01/19/83	8,924.19
5499	01/20/83	5,491.84
5500	01/21/83	4,448.21
5503	01/24/83	13,534.40
5504	01/25/83	6,151.16
5505	01/26/83	11,138.07
5506	01/27/83	8,120.43
5507	01/28/83	7,409.58
5510	01/31/83	16,711.81

1.5 BASIC RECTANGULAR (X-Y) CHART - JANUARY SALES ACTIVITY

Before using ACCU-PLOT to create a chart showing January sales activity, some basic concepts for constructing business charts are given.

Rectangular charts have one x-axis and at least one y-axis. The x-axis is always the controlling attribute for the chart and lends direction and perspective to the information charted. Units of time, product names/numbers, company divisions, expense descriptions, etc. are usually put on the x-axis.

The y-axis represents dependent attributes which are related to the controlling (x-axis) attribute. Amounts, percentages, number of days, number of sales, etc. are usually put on the y-axis.

To produce a rectangular business chart, you need a controlling attribute for the x-axis and at least one related dependent attribute for the y-axis.

The controlling (x-axis) attribute from the SALES file used in the previous example is DATE. The dependent (y-axis) attribute is SALES.AMOUNT.

You are now ready to construct an inquiry statement that will produce a chart showing the January sales activity. Note that from now on, rectangular chart commands will be called PLOT or SPLOT statements.

Since the data in the SALES file is unsorted, use the verb SPLOT to produce this graph. Sort the file by the controlling attribute, DATE, to give proper perspective for the chart.

Up to this point the SPLOT statement is:

```
>SPLOT SALES BY DATE WITH DATE GE "01/01/83"
 AND LE "01/31/83" ...
```

Now you need to specify the attributes you wish to be output. The first attribute is the controlling attribute and will be plotted as the x-axis. In this example, the controlling (x-axis) attribute is DATE. NOTE: There may be only <u>one</u> controlling (x-axis) attribute for a single chart.

The second attribute specified for output is the dependent attribute and will be plotted as the y-axis. In this example, the dependent (y-axis) attribute is SALES.AMOUNT.

Finally, you need to specify LPTR or (P) to signify that the chart output should be sent to the printer.

Shown below is the complete SPLOT statement used to create the January sales chart on the following page. Below the statement are the option prompts issued by ACCU-PLOT after the SPLOT statement has been entered into the system.

```
>SPLOT SALES BY DATE WITH DATE GE "01/01/83"
 AND LE "01/31/83" DATE SALES.AMOUNT LPTR

     DEVICE:

     OPTIONAL SIZE IN INCHES (WIDTH,DEPTH,[R]):

     ---------- X AXIS OPTION CODES ----------

          F - SCALE FACTORS
          L - LITERAL VALUE
          R - REVERSE AXIS DIRECTION
          T - TEXT VALUE

     0 DATE.....................OPTIONS:

     ---------- Y AXIS OPTION CODES ----------

          A - ACCUMULATE
          B - BAR FORMAT
          C - SUPPRESS CONNECTING LINE
          F - SCALE FACTORS
          G - GROUP WITH PREVIOUS ATTRIBUTE
          H - STACK BAR WITH PREVIOUS ATTRIBUTE
          R - REVERSE AXIS DIRECTION
          S - SUPPRESS SYMBOL/SHADING
          V - PRINT VALUE
          Z - DRAW ZERO LINE

     1 SALES.AMOUNT.................OPTIONS:
```

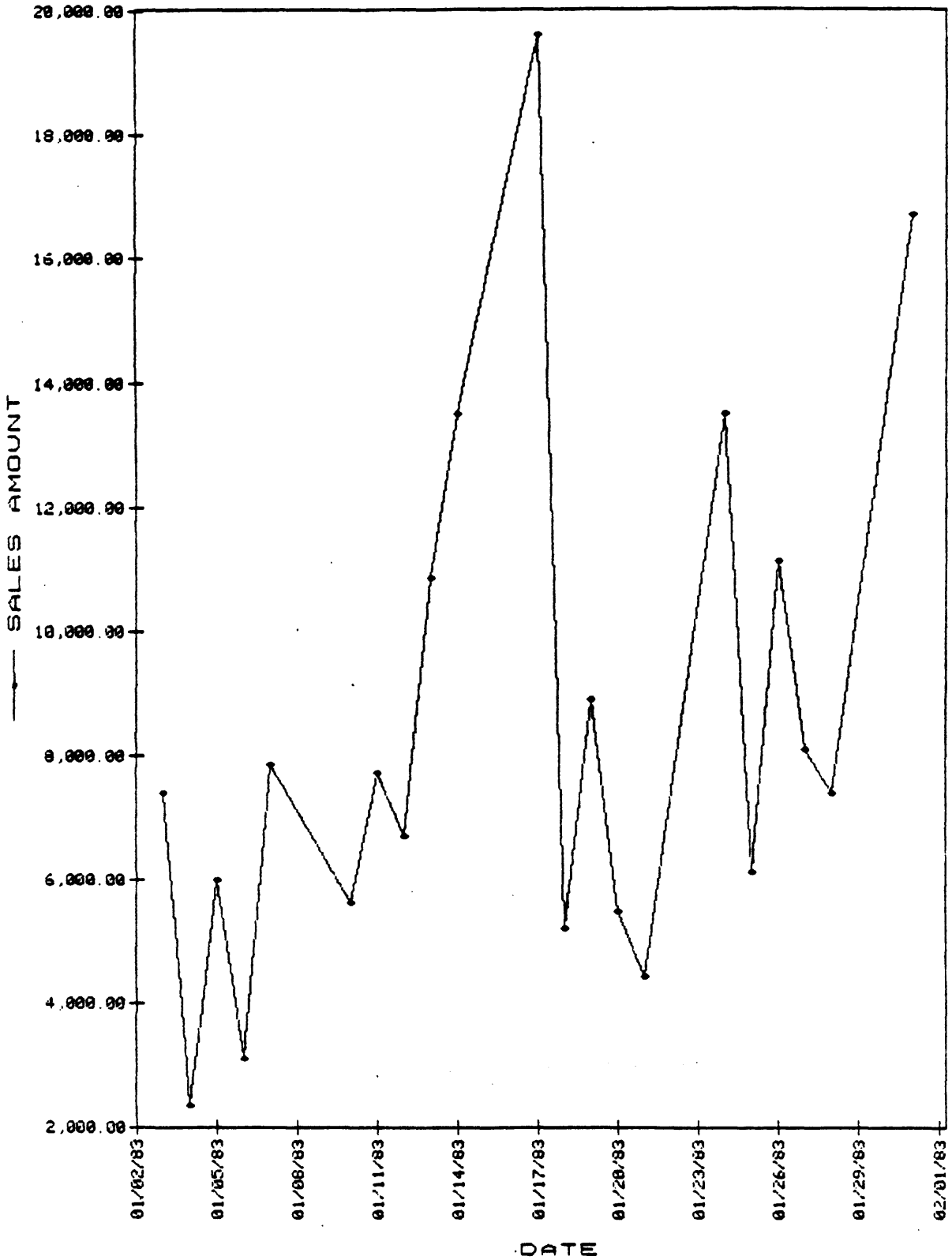


Figure 1-1. Basic Rectangular (X-Y) Sales Chart

1.6 BASIC PIE CHART - JANUARY SALES ACTIVITY

The concepts governing pie charts are slightly different from those associated with x-y charts. First, only two attributes may be presented on a single pie chart (ACCU-PLOT will generate separate pie charts for each dependent (y-axis) attribute specified in a PIE or SPIE statement). Second, the relationship between the attributes of a pie chart takes on a new meaning.

The first attribute specified for output in a PIE or SPIE statement will be considered the controlling attribute and the second attribute specified for output will be the dependent attribute for the chart. This is the same as for a rectangular chart. However, in a pie chart the controlling attribute will divide the pie into segments and describe the segments. The dependent attribute will relate each of these segments as a proportion based on the total value of the pie chart. The pie's total value is determined as the sum of the individual segment values. Normally, you use one of the following for the pie chart controlling attribute: units of time, divisions, descriptions, territories, products, etc. Amounts, numbers or percentages are used for the pie chart dependent attribute.

The outside of the pie chart (segment descriptions - controlling attribute) corresponds to the x-axis of a rectangular chart and the pie itself (segment value - dependent attribute) corresponds to the y-axis of a rectangular chart.

In the January Sales Activity example, the controlling attribute is DATE and the dependent attribute is SALES.AMOUNT. The controlling attribute, DATE, will divide the pie into segments and each date will describe a segment of the chart. The dependent attribute, SALES.AMOUNT, will represent the pie itself, and each SALES.AMOUNT will be the proportioned value of the segment corresponding to a particular DATE. The value of the entire pie is the sum of all amounts found for the month of January.

In other words, there is one segment for each DATE on which a sale was made in January and the SALES.AMOUNT of that sale is shown as a percentage of the total sales made in the month of January.

Two ACCU-PLOT verbs are used to produce pie charts. Since the example uses an unsorted data file, you need to use the verb SPIE to sort the data by the controlling attribute, DATE. The output attributes are DATE (controlling) and SALES.AMOUNT (dependent). A LPTR modifier should be included to send the chart output to the printer.

Shown below is the SPIE statement used to create the chart on the next page and also the prompts given by ACCU-PLOT after the SPIE statement has been entered into the system.

```
>SPIE SALES BY DATE WITH DATE GE "01/01/83"
 AND LE "01/31/83" DATE SALES.AMOUNT LPTR

     DEVICE:

     OPTIONAL DIAMETER (INCHES,[R]):

     ---------- PIE CHART DIRECTION -----------

          R - REVERSE ROTATION (COUNTER-CLOCKWISE)

     0 DATE.....................OPTIONS:

     ---------- PIE CHART OPTION CODES ----------

          C - SPECIFY CUTOFF PERCENTAGE
          P - SUPPRESS PERCENTAGE PRINTING
          Q - FORCE PERCENTAGE PRINTING
          V - PRINT SEGMENT VALUES
          X - EXPLODE SEGMENTS

     1 SALES.AMOUNT.................OPTIONS:
```

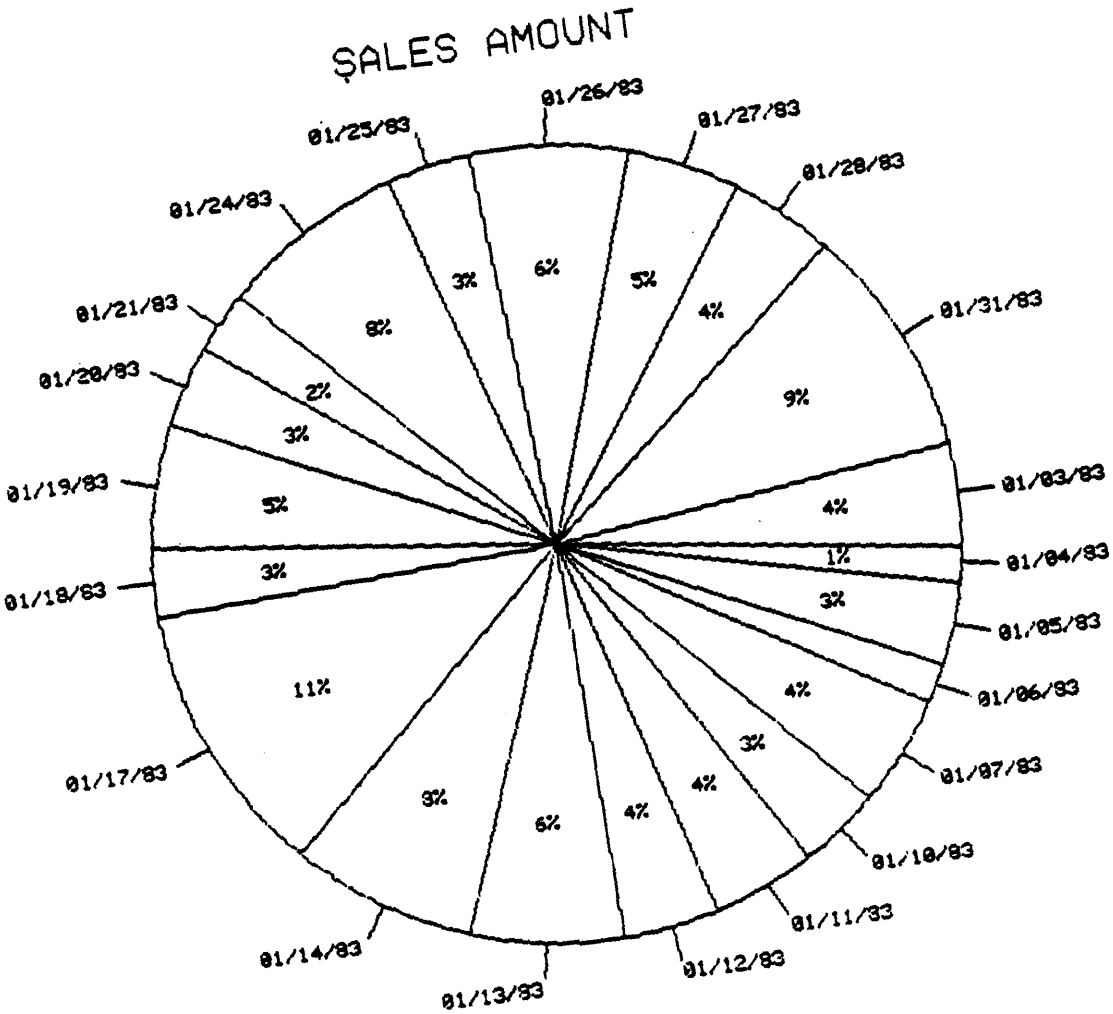


Figure 1-2. Basic Pie Sales Chart

1.7 DEFAULT CHART CHARACTERISTICS

ACCU-PLOT will use the default chart characteristics when no options are selected.

1. Rectangular (x-y) charts using PLOT or SPLOT (see Figure 1-1).

   - Chart size is determined by the current TERM statement set for the printer*.
   - Automatic scaling for both the x and the y axes. Scale is based on the minimum and maximum values found in the data.
   - Point-to-point line chart is the default format.
   - The x-axis will have its scale and label plotted along the bottom of the page. (The x-axis corresponds to the first plottable attribute specified for output and is the controlling attribute.)
   - The first y-axis will have its scale and label plotted along the left-hand side of the page. (The first y-axis corresponds to the second plottable attribute specified for output and is a dependent attribute.)
   - Each additional y-axis (dependent attribute) will have a separate scale and label which will be plotted along the right-hand side of the page.

2. Pie charts using PIE or SPIE (see Figure 1-2).

   - Chart diameter is based on the current TERM statement set for the printer* and the area needed for segment labeling.
   - Percentages are printed within segments that are large enough to contain the percentage.
   - Automatic calculation of pie rotation to determine the best fit on the page.
   - Automatic calculation of the optimum cutoff percentage. Smaller segments will be grouped into an "other" segment.

*NOTE: Some devices, such as pen-plotters and graphics CRTs, do not use the TERM setting for determining chart size. Chart size is implied by the device itself (plotter bed area, screen size).

1.8 AN EXAMPLE OF A MULTIPLE Y-AXIS RECTANGULAR CHART

The ACCU-PLOT graphics system will handle any number of attributes for the y-axis without restriction; therefore, more than one dependent (y-axis) attribute may be specified for output in a PLOT or SPLOT statement. Each of these attributes will be plotted against the single controlling (x-axis) attribute.

For example, to add another dependent attribute, GROSS.PROFIT, to the January sales activity chart, the SPLOT statement is:

```
>SPLOT SALES BY DATE WITH DATE GE "01/01/83" AND LE
 "01/31/83" DATE SALES.AMOUNT GROSS.PROFIT LPTR
```

The chart created by this SPLOT statement can be seen in Figure 1-3. Notice that SALES.AMOUNT is labeled and scaled along the left-hand side of the page, while GROSS.PROFIT is labeled and scaled along the right-hand side of the page. Scaling for the two attributes is independent.

Ways to group these attributes for common scaling will be discussed in Section 3.3, "Options for Rectangular Charts."

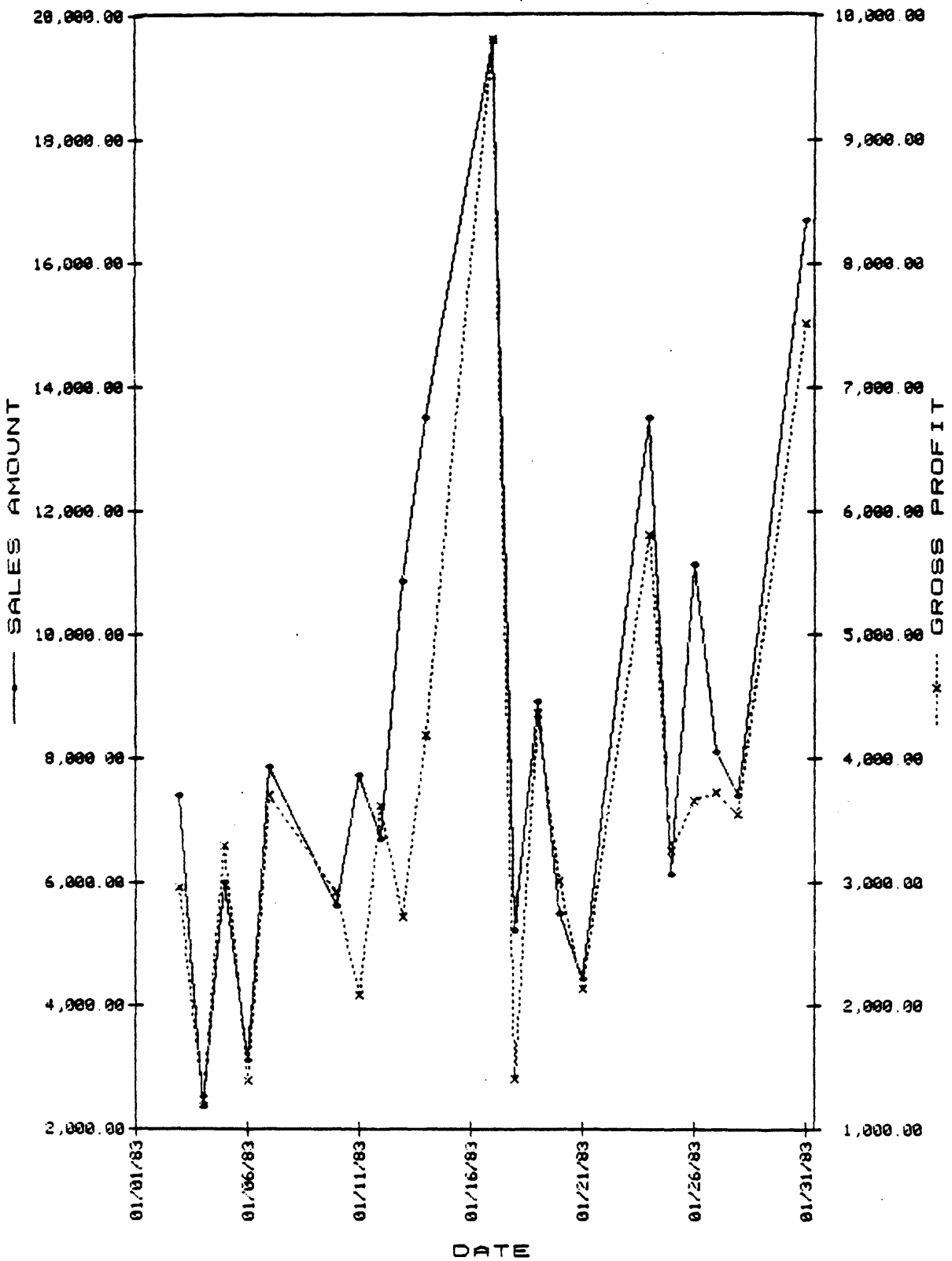


Figure 1-3. Multiple Y-Axis Rectangular Chart

access inquiry language techniques 2

2.1 USES OF THE BREAK-ON, DET-SUPP AND TOTAL MODIFIERS

The BREAK-ON modifier allows you to create multiple graphs from a single PLOT (or SPLOT) statement. ACCU-PLOT uses the BREAK-ON modifier to distinguish between attributes whose data is used for graph captions and attributes whose data is actually plotted. Attributes which are treated as "caption" values do not need to have a BREAK-ON modifier associated with them. All attributes specified for output up to and including the last attribute with a BREAK-ON modifier are considered "caption" attributes. The data for these attributes will be used in forming a caption for the graph. Data from the plottable attributes is stored in a table until a BREAK occurs (or the last item is retrieved) and then the actual graph is constructed and printed. In other words, for each occurrence of the BREAK value, a separate graph will be constructed and printed.

When using BREAK-ON in an inquiry statement, several options may be specified. The options "'VL'" should always be used for an attribute modified by a BREAK-ON in a PLOT statement. The 'V' option will cause the default *** caption to be replaced with the current BREAK value at the time of the BREAK. The 'L' option will suppress the printing of extra blank lines prior to plotting the chart. Please notice that the "'VL'" options are specified for all attributes modified by BREAK-ON in this section.

The DET-SUPP modifier also takes on a special meaning when used in a PLOT statement. When DET-SUPP is specified, a BREAK-ON must also be specified (if not, only one line of output will be generated, which is not sufficient to construct a graph). In this case, the last attribute modified by BREAK-ON will be treated as a plottable attribute and will be the controlling attribute for the chart. In a PLOT statement specifying both DET-SUPP and BREAK-ON, the TOTAL connective should be used to modify the dependent (y-axis) attribute(s). Otherwise, only the last item retrieved between BREAK occurrences will be used as the data value for each BREAK. For example, if there are five data values for a dependent attribute between BREAKs and the attribute is not modified by TOTAL, then only the fifth data value will be used as the value for each BREAK occurrence. The first four data values will be ignored. Therefore, to take into account all data values between BREAK occurrences, modify the dependent attribute(s) with TOTAL.

2.1.1 SINGLE LEVEL BREAK-ON

2.1.1.1 Modified Attribute as a "Caption" Value

When using BREAK-ON to modify an attribute in a PLOT statement, a separate graph will be generated for each occurrence of the BREAK. Each graph will have a "caption" labeled according to the current BREAK value.

For example, to produce a report showing the first-quarter sales activity, the selection-criteria will need to reflect sales made from January to March, or: GE "01/01/83" AND LE "03/31/83". You will also need to include a third attribute, MONTH, and modify it with a BREAK-ON. Below is the inquiry statement which will produce a detailed first-quarter sales activity report broken down by month. This listing is provided on the following two pages.

```
>SORT SALES BY DATE WITH DATE GE "01/01/83" AND LE
 "03/31/83" BREAK-ON MONTH DATE SALES.AMOUNT LPTR
```

This listing contains detailed data from the file SALES covering a three-month period of time. By modifying the attribute MONTH with a BREAK-ON, the data is separated into individual sections for each month.

To represent this report graphically using ACCU-PLOT, substitute the ACCU-PLOT verb SPLOT for SORT. Use the "'VL'" options for the modified attribute, MONTH. The SPLOT statement is:

```
>SPLOT SALES BY DATE WITH DATE GE "01/01/83" AND LE
 "03/31/83" BREAK-ON MONTH "'VL'" DATE SALES.AMOUNT LPTR
```

In this example, DATE will still be the controlling (x-axis) attribute because the attribute MONTH, which precedes DATE, is modified by a BREAK-ON. ACCU-PLOT will treat the attribute DATE as a plottable attribute and the attribute MONTH as a "caption" attribute. This will result in the generation of a separate graph for each BREAK occurrence for the attribute MONTH. The three graphs will be labeled according to the current BREAK value; one for January, one for February, and one for March (see Figure 2-1).

ACCU-PLOT LISTING FOR FIGURE 2-1

SALES.....	MONTH.....	DATE.....	SALES..... AMOUNT
5482	JAN 1983	01/03/83	7,412,06
5483	JAN 1983	01/04/83	2,368.71
5484	JAN 1983	01/05/83	6,004.82
5485	JAN 1983	01/06/83	3,119.12
5486	JAN 1983	01/07/83	7,888,24
5489	JAN 1983	01/10/83	5,635.10
5490	JAN 1983	01/11/83	7,745.57
5491	JAN 1983	01/12/83	6,723.10
5492	JAN 1983	01/13/83	10,872.25
5493	JAN 1983	01/14/83	13,539.85
5496	JAN 1983	01/17/83	19,641.34
5497	JAN 1983	01/18/83	5,217.31
5498	JAN 1983	01/19/83	8,924.19
5499	JAN 1983	01/20/83	5,491.84
5500	JAN 1983	01/21/83	4,448.21
5503	JAN 1983	01/24/83	13,534.40
5504	JAN 1983	01/25/83	6,151.16
5505	JAN 1983	01/26/83	11,138.07
5506	JAN 1983	01/27/83	8,120.43
5507	JAN 1983	01/28/83	7,409,58
5510	JAN 1983	01/31/83	16,711.81
	***		
5511	FEB 1983	02/01/83	2,723.86
5512	FEB 1983	02/02/83	4,379.15
5513	FEB 1983	02/03/83	6,348.72
5514	FEB 1983	02/04/83	5,645.85
5517	FEB 1983	02/07/83	9,501.68
5518	FEB 1983	02/08/83	9,423.32
5519	FEB 1983	02/09/83	3,331.45
5520	FEB 1983	02/10/83	7,841.23
5521	FEB 1983	02/11/83	14,328.41
5524	FEB 1983	02/14/83	6,759.94
5525	FEB 1983	02/15/83	6,142.13
5526	FEB 1983	02/16/83	8,469.52
5527	FEB 1983	02/17/83	12,498.73
5528	FEB 1983	02/18/83	15,197.03
5531	FEB 1983	02/21/83	11,987.67
5532	FEB 1983	02/22/83	5,811.43
5533	FEB 1983	02/23/83	7,351.67
5534	FEB 1983	02/24/83	4,859.55
5535	FEB 1983	02/25/83	6,449.80
5538	FEB 1983	02/28/83	18,455.57
	***		

ACCU-PLOT LISTING FOR FIGURE 2-1 (Continued)

SALES.....	MONTH.....	DATE.....	SALES..... AMOUNT
5539	MAR 1983	03/01/83	5,712.71
5540	MAR 1983	03/02/83	5,501.22
5541	MAR 1983	03/03/83	3,659.08
5542	MAR 1983	03/04/83	10,390.17
5545	MAR 1983	03/07/83	7,883.97
5546	MAR 1983	03/08/83	3,502.75
5547	MAR 1983	03/09/83	5,379.05
5548	MAR 1983	03/10/83	9,362.29
5549	MAR 1983	03/11/83	10,565.18
5552	MAR 1983	03/14/83	20,932.77
5553	MAR 1983	03/15/83	6,296.95
5554	MAR 1983	03/16/83	9,753.78
5555	MAR 1983	03/17/83	7,602.25
5556	MAR 1983	03/18/83	11,567.49
5559	MAR 1983	03/21/83	10,889.59
5560	MAR 1983	03/22/83	2,506.62
5561	MAR 1983	03/23/83	2,931.33
5562	MAR 1983	03/24/83	9,050.48
5563	MAR 1983	03/25/83	11,567.04
5566	MAR 1983	03/28/83	13,328.91
5567	MAR 1983	03/29/83	3,221.85
5568	MAR 1983	03/30/83	10,230.67
5569	MAR 1983	03/31/83	7,863.50
	***		

***

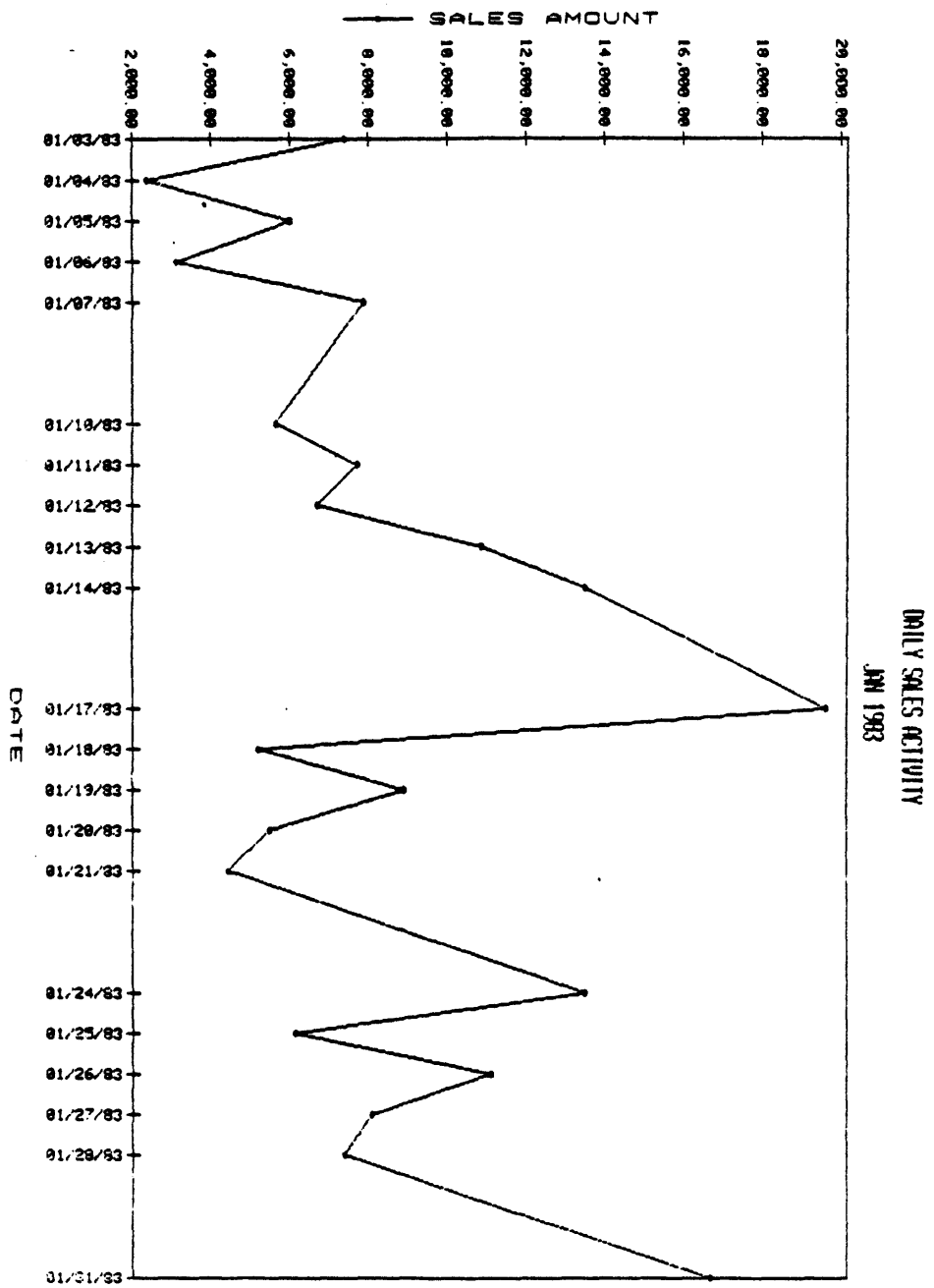


Figure 2-1. BREAK-ON Attribute as Caption Value (Sheet 1 of 3)

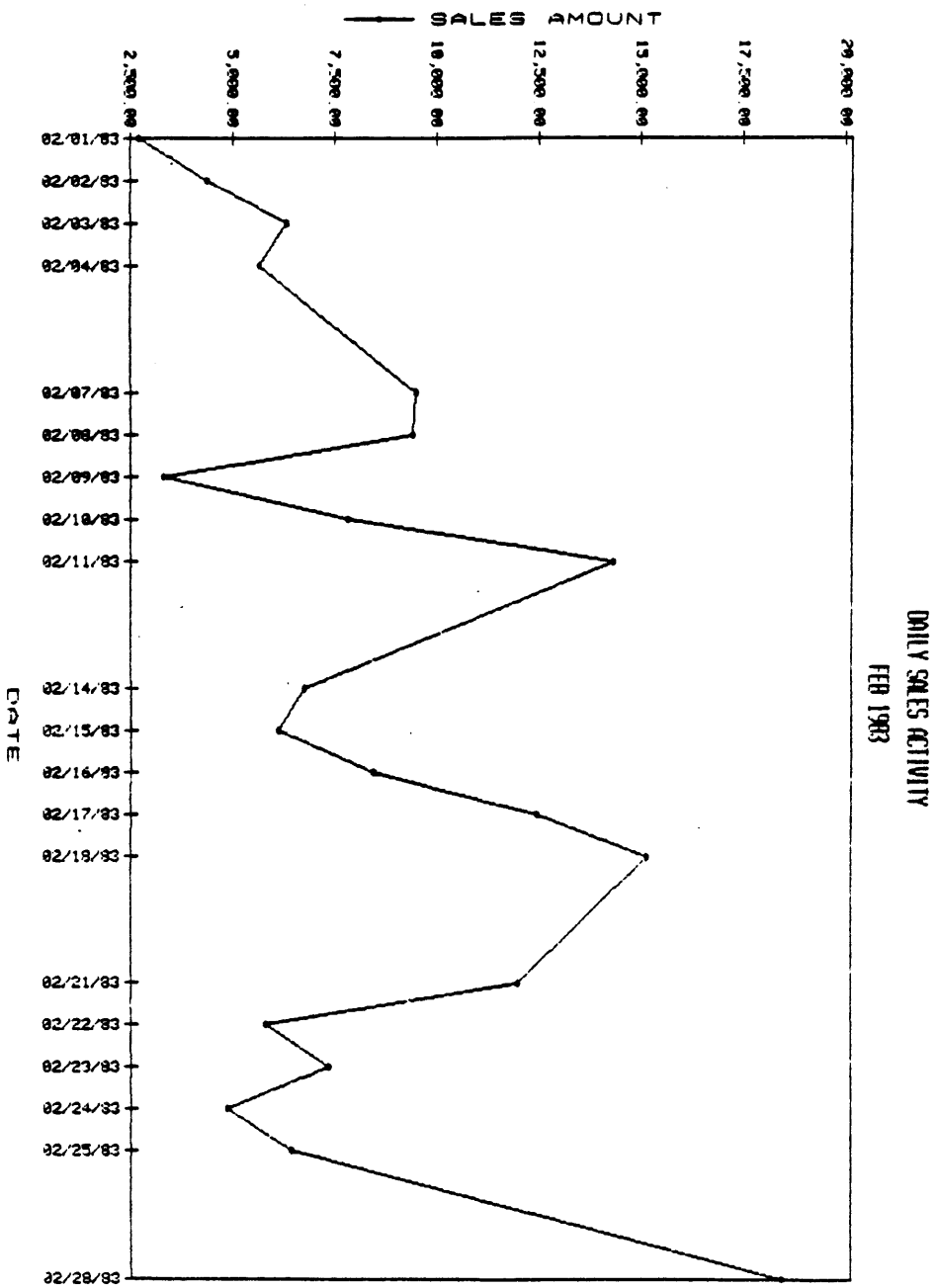


Figure 2-1. BREAK-ON Attribute as Caption Value (Sheet 2 of 3)

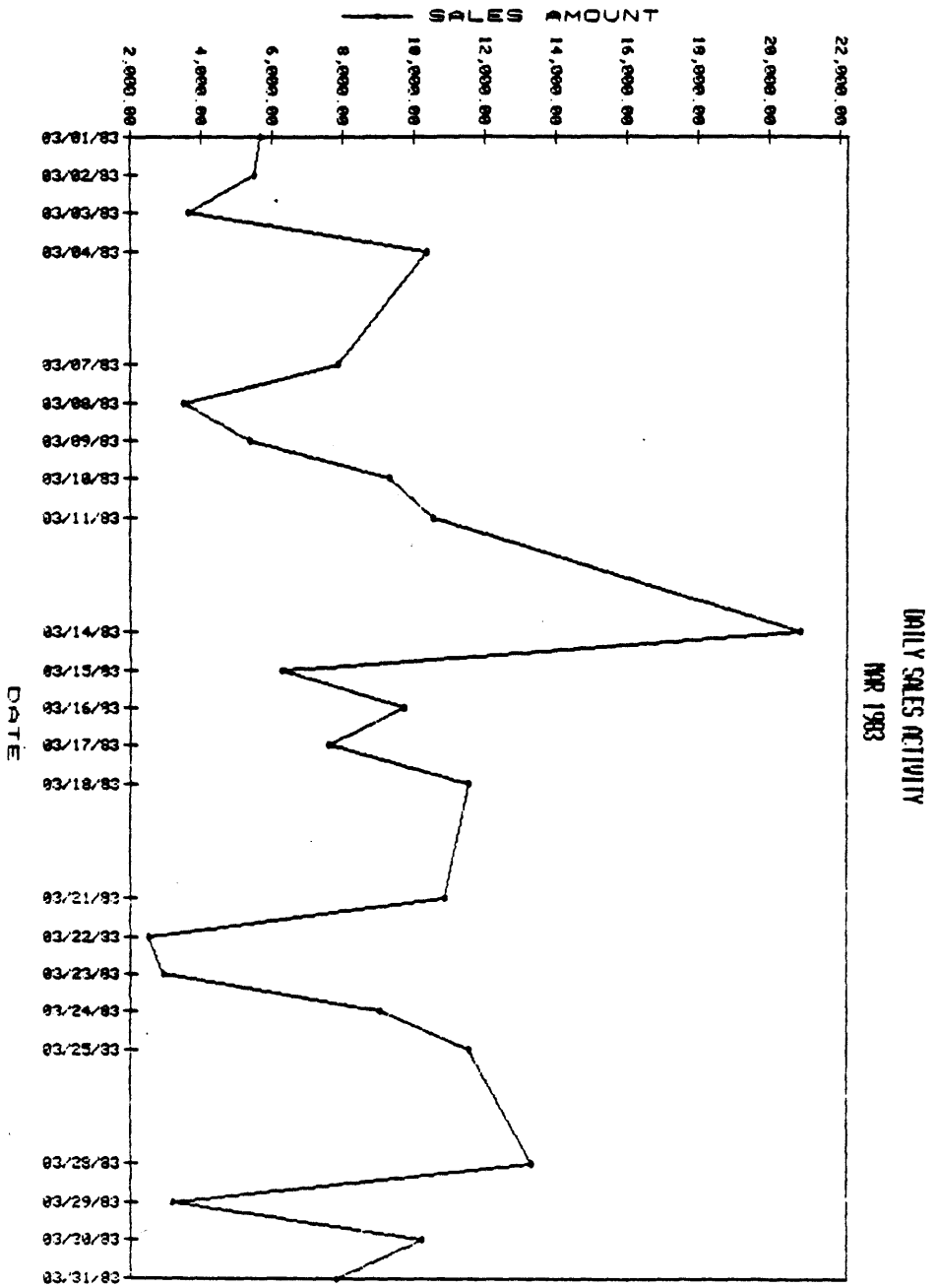


Figure 2-1. BREAK-ON Attribute as Caption Value (Sheet 3 of 3)

2.1.1.2 Modified Attribute as a Plottable Attribute

When DET-SUPP is specified in a PLOT statement, then a BREAK-ON must also be specified. In this case, the attribute modified by the BREAK-ON will be considered a plottable attribute and will be treated as the controlling (x-axis) attribute for the chart.

For example, to create a report showing the monthly sales activity for 1982, the selection-criteria should reflect all sales made in 1982 (i.e., WITH DATE GE "01/01/82" AND LE "12/31/82"). Include the attribute MONTH in the inquiry statement and modify it with a BREAK-ON. Since you want to use MONTH as the primary attribute, you no longer include the attribute DATE in the output-criteria. Also modify the secondary attribute, SALES.AMOUNT, with TOTAL and include the DET-SUPP modifier. The inquiry statement which will produce a year-end sales report showing a total SALES.AMOUNT for each month of the year is given below. The listing is provided on the bottom of this page.

```
>SORT SALES BY DATE WITH DATE GE "01/01/82" AND LE "12/31/82"
 BREAK-ON MONTH TOTAL SALES.AMOUNT DET-SUPP LPTR
```

To produce a chart of the information contained in this listing, replace SORT with SPLOT. Include the "'VL'" options for the attribute MONTH. The SPLOT statement is now:

```
>SPLOT SALES BY DATE WITH DATE GE "01/01/82" AND LE "12/31/82"
 BREAK-ON MONTH "'VL'" TOTAL SALES.AMOUNT DET-SUPP LPTR
```

The resulting chart is shown in Figure 2-2. In this example, MONTH is the controlling (x-axis) attribute for the chart. This is because MONTH is the last attribute (in this case, the only attribute) modified by a BREAK-ON, and DET-SUPP is also specified. Because DET-SUPP is being used, it is necessary to modify the attribute, SALES.AMOUNT, with the TOTAL connective. This will produce the total of SALES.AMOUNT between breaks.

In this example, the "T - Text Value" option is specified for the x-axis attribute MONTH (see Section 3.3.1, X-Axis Option Codes).

ACCU-PLOT LISTING FOR FIGURE 2-2

SALES.....	MONTH.....	SALES..... AMOUNT
	JAN 1982	179,627.83
	FEB 1982	144,718.08
	MAR 1982	170,830.33
	APR 1982	185,600.32
	MAY 1982	161,713.82
	JUN 1982	188,737.56
	JUL 1982	174,204.89
	AUG 1982	159,897.51
	SEP 1982	150,865.33
	OCT 1982	179,123.59
	NOV 1982	187,589.49
	DEC 1982	194,111.75
***		2,077,020.50

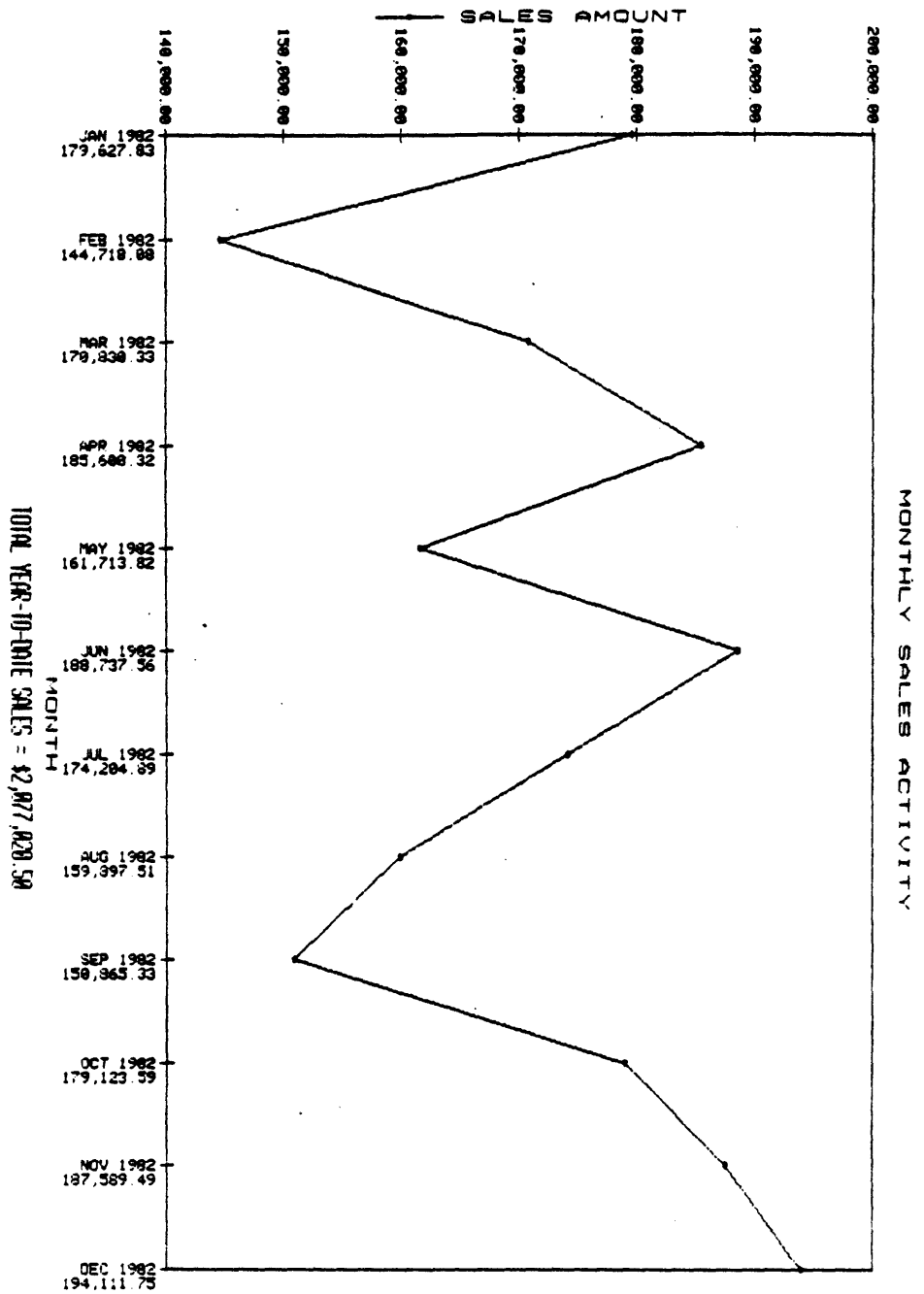


Figure 2-2. BREAK-ON Attribute as a Plottable Attribute Using V Option for AMOUNT

2.1.2 MULTIPLE LEVEL BREAK-ON

It is possible to specify more than one BREAK-ON modifier within a PLOT statement. Remember that when DET-SUPP is specified in a PLOT statement, the last attribute modified by BREAK-ON will be considered a plottable attribute, and will be treated as the controlling (x-axis) attribute for the chart.

2.1.2.1 Multiple BREAK Levels without DET-SUPP

Examples of multiple BREAK level SORT and SPLOT statements without DET-SUPP are:

```
>SORT SALES BY DATE BREAK-ON YEAR
 BREAK-ON MONTH DATE SALES.AMOUNT LPTR
```

and

```
>SPLOT SALES BY DATE BREAK-ON YEAR "'VL'"
 BREAK-ON MONTH "'VL'" DATE SALES.AMOUNT LPTR
```

In this example, both attributes YEAR and MONTH are treated as "caption" values. A separate graph will be constructed and printed for each MONTH of each YEAR found in the data of the SALES file. Assuming there are three years of data in this file, the above SPLOT statement will cause the generation of 36 individual charts. The output from this example is not included within this manual.

NOTE: It is possible to achieve the same results without modifying the attribute YEAR with a BREAK-ON. That is:

```
>SORT SALES BY DATE YEAR BREAK-ON
 MONTH DATE SALES.AMOUNT LPTR
```

or

```
>SPLOT SALES BY DATE YEAR BREAK-ON
 MONTH "'VL'" DATE SALES.AMOUNT LPTR
```

In this case, the attribute YEAR is specified for output before the last attribute associated with a BREAK-ON modifier, MONTH. Both of these attributes will, therefore, be treated as "caption" values.

2.1.2.2 Multiple BREAK Levels with DET-SUPP

As an example, take the SPLOT statement from the previous section and include a DET-SUPP modifier. Both attributes, YEAR and MONTH, will be modified by a BREAK-ON. As a result of adding the DET-SUPP modifier, the last attribute modified by a BREAK-ON, MONTH, will be considered a plottable attribute and treated as the controlling (x-axis) attribute. The attribute YEAR will be treated as a "caption" value and a new graph will be constructed and printed for each BREAK occurrence for the attribute YEAR. Since MONTH will be the first plottable (x-axis) attribute, you need not include DATE for the output-criteria. And, since you are suppressing the detail via the DET-SUPP modifier, you should modify the second plottable (y-axis) attribute with TOTAL. You should also use the "'VL'" options for both the YEAR and MONTH attributes. The SPLOT statement is:

```
>SPLOT SALES BY DATE BREAK-ON YEAR "'VL'" BREAK-ON
 MONTH "'VL'" TOTAL SALES.AMOUNT DET-SUPP LPTR
```

Each of the three charts for the 1981, 1982, and 1983 will have a caption according to the current BREAK value for the attribute YEAR. The attribute MONTH is considered to be the controlling (x-axis) attribute because it is the last attribute modified by a BREAK-ON in a SPLOT statement including the DET-SUPP modifier. For each MONTH of data, the TOTAL values for SALES.AMOUNT are used as the y-axis values for the charts (see Figure 2-3).

In this example, the "T - Text Value" option is selected for the x-axis attribute MONTH. Also the "B - Bar Format" and "V - Print Value" options are selected for the y-axis attribute SALES.AMOUNT (see Section 3.3.2, Y-Axis Option Codes).

ACCU-PLOT LISTING FOR FIGURE 2-3

SALES.....	YEAR	MONTH.....	SALES..... AMOUNT
		JAN 1981	146,275.53
		FEB 1981	145,131.37
		MAR 1981	205,305.52
		APR 1981	169,264.30
		MAY 1981	166,546.06
		JUN 1981	163,351.87
		JUL 1981	156,207.34
		AUG 1981	181,110.96
		SEP 1981	149,107.47
		OCT 1981	172,734.09
		NOV 1981	154,148.49
		DEC 1981	148,515.20
	1981		1,957,698.20
		JAN 1982	179,627.83
		FEB 1982	144,718.08
		MAR 1982	170,830.33
		APR 1982	185,600.32
		MAY 1982	161,713.82
		JUN 1982	188,737.56
		JUL 1982	174,204.89
		AUG 1982	159,897.51
		SEP 1982	150,865.33
		OCT 1982	179,123.59
		NOV 1982	187,589.49
		DEC 1982	194,111.75
	1982		2,077,020.50
		JAN 1983	178,097.16
		FEB 1983	167,506.71
		MAR 1983	189,699.65
		APR 1983	187,215.47
		MAY 1983	166,137.20
		JUN 1983	180,207.30
		JUL 1983	204,015.33
		AUG 1983	203,012.99
		SEP 1983	191,313.96
		OCT 1983	237,248.43
		NOV 1983	250,983.42
		DEC 1983	245,518.38
	1983		2,400,956.00
***			6,435,674.70

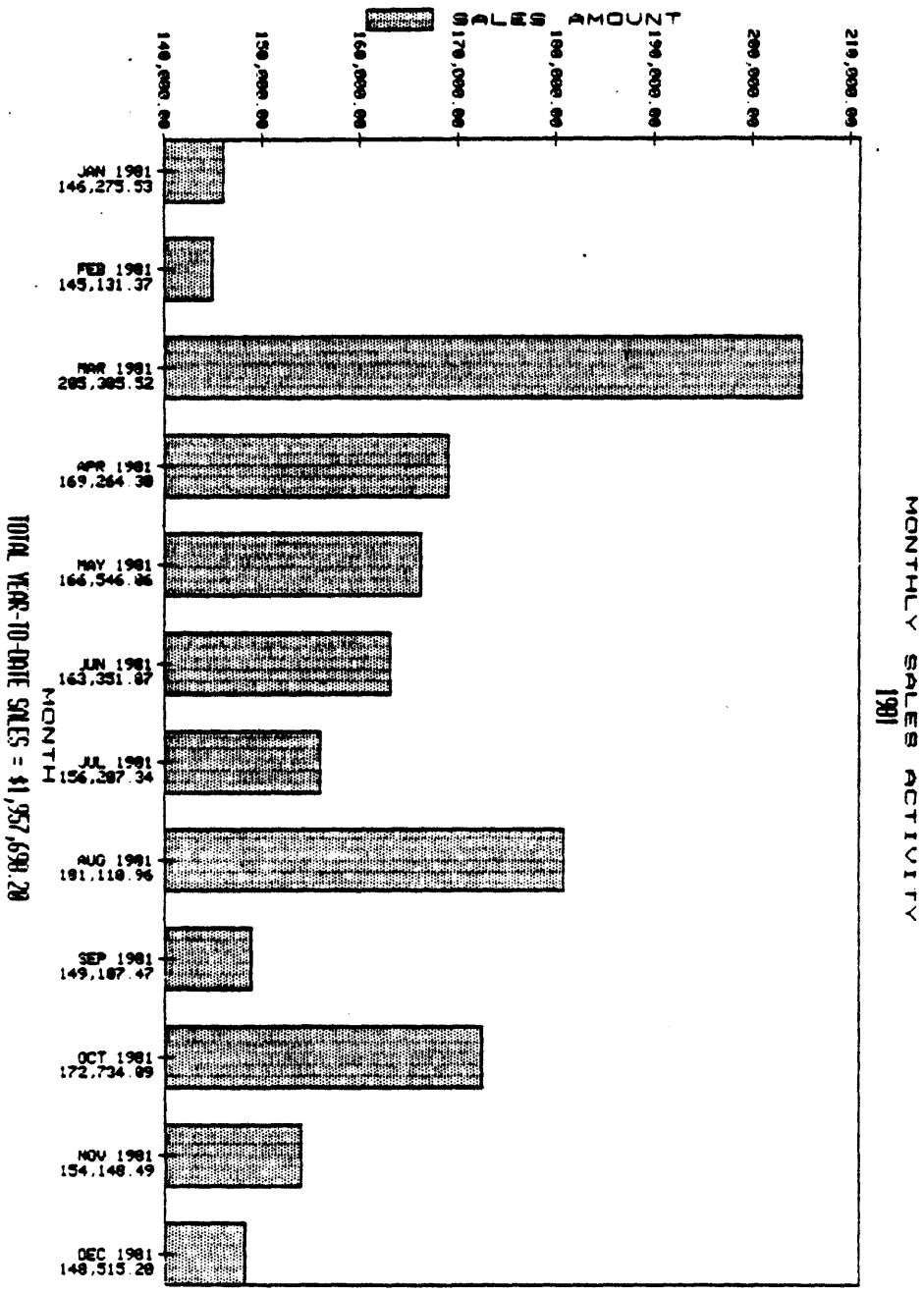


Figure 2-3. Multiple BREAK Levels with DET-SUPP Using V Option for AMOUNT (Sheet 1 of 3)

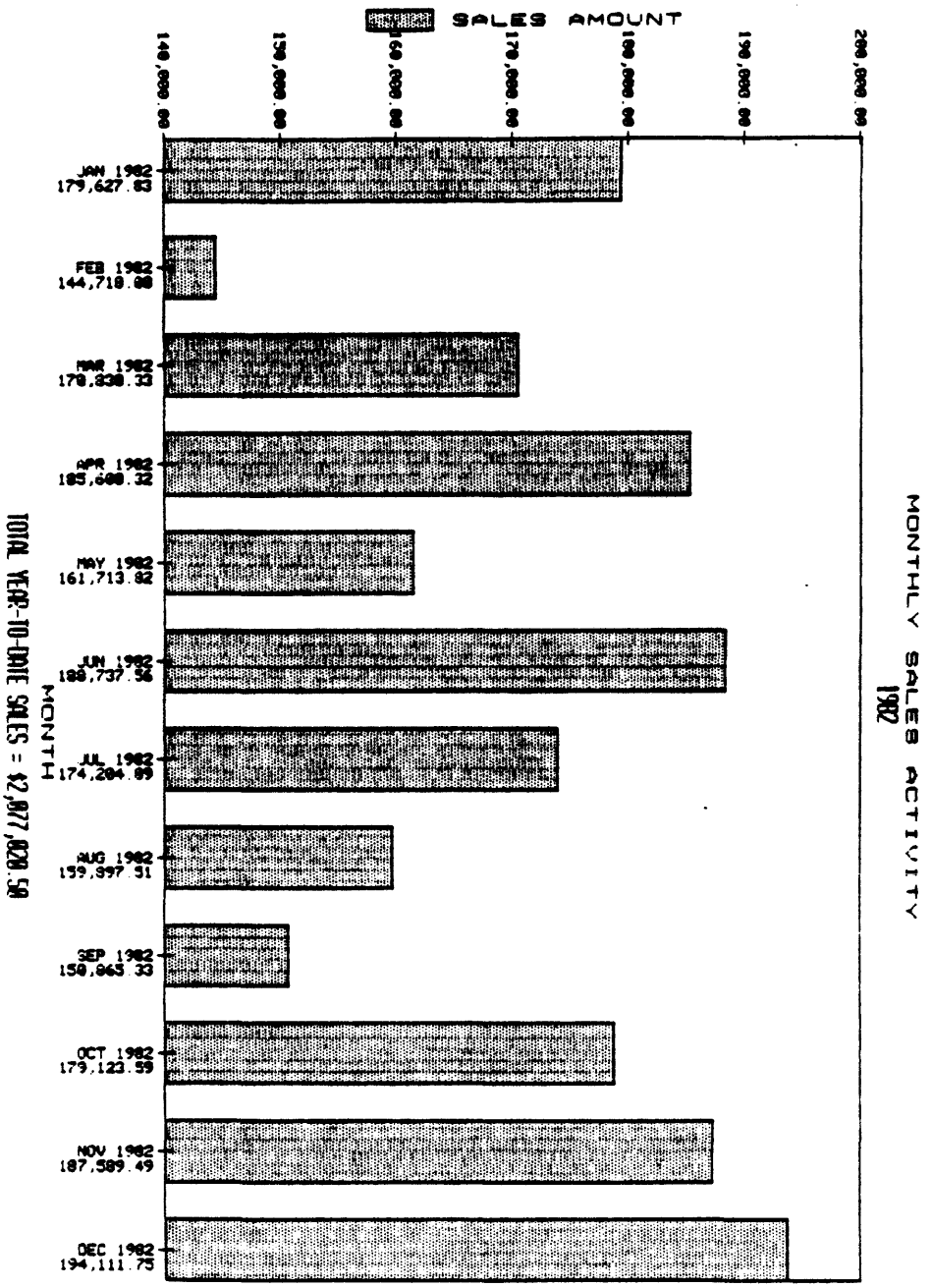


Figure 2-3. Multiple BREAK Levels with DET-SUPP Using V Option for AMOUNT (Sheet 2 of 3)

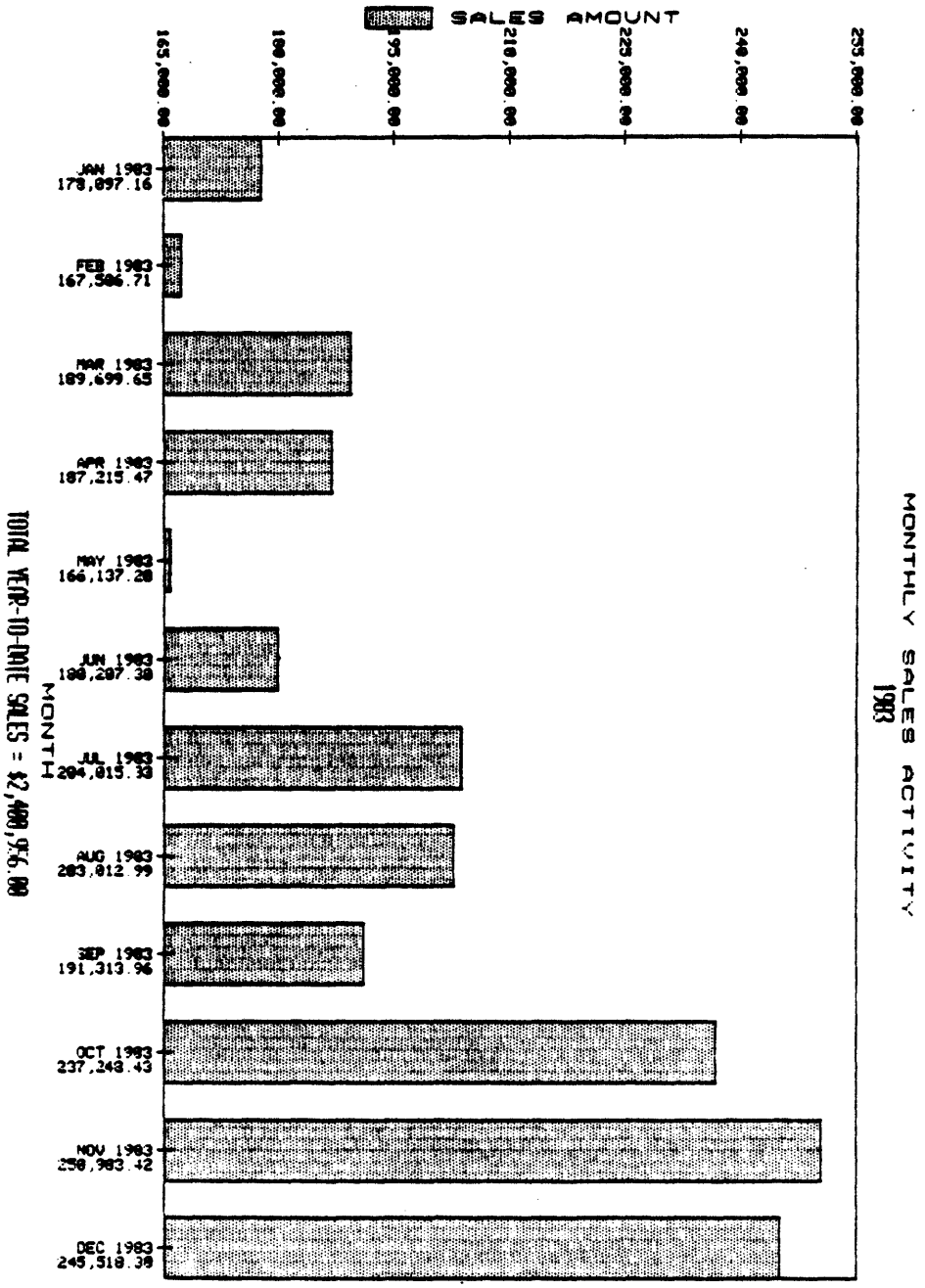


Figure 2-3. Multiple BREAK Levels with DET-SUPP Using V Option for AMOUNT (Sheet 3 of 3)

2.2 PLOT CAPTIONS

The CAPTION connective is used in a PLOT or SPLOT statement to specify chart captions, both above and below the graph. CAPTION can be used in place of or in addition to system headings and footings and is entered in the same way. The following special codes may be inserted within the CAPTION "text":

Primary Codes:

L - Lower Caption
U - Upper Caption

Secondary Codes:

A - Insert current attribute name (pie charts)
C - Center the current caption line
D - Insert the current date
L - Print the current line and begin new line
P - Insert the current page number
Sn- Select character size n
T - Insert the time and date
V - Insert the next caption value
Vn- Insert caption value n
Z - Insert current attribute total

The CAPTION "text," following the CAPTION connective, is enclosed in double quotation marks. All codes inserted within the CAPTION "text" are enclosed in single quotation marks. The first item in the CAPTION "text" must be a primary code and is used to designate the caption as either an "upper" ('U') or "lower" ('L') caption. No other codes may be included within the single quotation marks enclosing this code. Secondary codes may then be inserted into the CAPTION "text" to center the caption, insert the date, print and begin new line, insert page number, select character size, etc. Each series of secondary codes must also be enclosed within single quotation marks. An example of a CAPTION connective is:

```
... CAPTION "'U' 'CS1'THIS IS AN EXAMPLE OF AN UPPER
CAPTION, CENTERED AND USING CHARACTER SIZE 1"
```

When the S (Select character size) code is used, a numerical value is required. The ACCU-PLOT Graphics System has at least four standard sizes. The sizes available for most dot-matrix printers are defined below. Additional character sizes may be defined by the user if desired. See Appendix C, Character Matrix Definition Table.

1 - Single high, single wide
2 - Double high, single wide
3 - Single high, double wide
4 - Double high, double wide

Multiple character sizes may be selected for a single caption. When no CAPTION size is selected, the system will assume character size 4. (The standard size is specified by the Format Definition Table, Appendix A.)

In order to keep the first examples simple, CAPTION connectives were not included in any of the previous SPLOT statements. However, the CAPTION connective was actually used for several of the previous examples. Listed below are the CAPTION statements which were used for some of the figures in this manual.

Figure	Caption
2-1	CAPTION "'U''S3C'DAILY SALES ACTIVITY'LCS4V'"
2-2, 2-3	CAPTION "'U''S2C'MONTHLY SALES ACTIVITY'LCS4V'" CAPTION "'L''S3C'TOTAL YEAR-TO-DATE SALES = $'Z'"
3-2	CAPTION "'U''S4C'SINE 'S3'VS'S4'COSINE'LL'"
3-3, 3-4, 3-5	CAPTION "'U''S4C'MANUFACTURING COST ANALYSIS"

If no CAPTION connective is found in the PLOT statement, and if there are "caption" attributes (using BREAK-ON), then a default caption will be formed. The default caption will center each of the "caption" attribute values on a line above the graph. Figure 3-1 shows an example of a default caption.

If the [R] ROTATE option is specified for "OPTIONAL SIZE IN INCHES (WIDTH,DEPTH,[R]):" the CAPTION will also be rotated. The CAPTION will always be oriented to the top of the graph as opposed to the top of the page (see Section 3.2.3, ROTATE OPTION).

The HDR-SUPP connective may be used to suppress system headings and footings. COL-HDR-SUPP, like HDR-SUPP, may be included within the PLOT statement to suppress pagination, as well as system headings and footings. HDR-SUPP and COL-HDR-SUPP will not suppress any CAPTIONs which are specified in the PLOT statement. HDR-SUPP or COL-HDR-SUPP should be used when the chart is to be rotated for inclusion in bound reports.

ACCU-PLOT options 3

3.1 OUTPUT DEVICES SUPPORTED BY ACCU-PLOT

ACCU-PLOT is equipped with three generic driver modules which enables it to drive a variety of output devices, including dot-matrix printers, pen-plotters and graphics CRTs. For a complete list of devices currently supported by ACCU-PLOT, see Appendix H, Devices Supported by ACCU-PLOT.

3.1.1 DEVICE SELECTION

After the PLOT statement has been entered, the ACCU-PLOT system will prompt the user with several messages. The first message, "DEVICE:", asks the user to name the type of output device the final graph will be generated for. At least one device driver program is included with the original ACCU-PLOT package. To find the names of available devices, simply type "LIST-DEVICES" from TCL.

When initializing the ACCU-PLOT Graphics System, it is possible to establish one standard printer and one standard CRT. Answering the prompt "DEVICE:" with only a carriage return will cause ACCU-PLOT to automatically configure the graph for the standard device. If (P) or LPTR is stated in the PLOT statement, the graph will be formatted for the standard printer. If LPTR is not stated, the graph will be formatted for the standard CRT. (Note that ACCU-PLOT will not run on nongraphics CRTs.)

3.2 GRAPH SIZE AND CHART ORIENTATION

3.2.1 DEFAULT GRAPH SIZE USING THE CURRENT TERM SETTING

When creating a chart, the first step is to determine how large the desired chart will be and then to set the printer TERM size to a page that large. For example, if the desired chart is to be plotted on an 8-1/2" x 11" page, the TERM statement should be set: TERM ,,,,,,80,60. ACCU-PLOT will always use the current printer TERM setting as the default chart size*.

When you use the TERM statement to define the chart size, ACCU-PLOT will produce a chart, including axis scales, axis legends/labels, headings, footings, and plot captions, which will fit comfortably within the dimensions specified by the TERM statement.

3.2.2 DETERMINING GRAPH SIZE: THE SIZE OPTION

The second prompt issued by ACCU-PLOT is used to select the chart size and/or to change the chart orientation. This prompt is:

```
OPTIONAL SIZE IN INCHES (WIDTH,DEPTH,[R],:
```

Either width or depth or both may be entered (values may include up to two decimal places) to produce a customized chart. If only width or depth or neither are entered, ACCU-PLOT will use the current TERM setting* to determine the missing values. (Some devices do not use the TERM setting to determine size. Size is implied by the device itself (plotter bed area, screen size)). The last item in the prompt is the letter "R" and is used to rotate the orientation of the chart. This option will be discussed later.

3.2.2.1 Multiple Charts on One Page

It is possible to print three or four graphs on an 8-1/2" x 11" page by entering:

```
6, 1.2
```

for the size option. The x-axis will be 6 inches long and the y-axis will be 1.2 inches high. (These dimensions were used to produce Figure 3-1.)

Note that the size specified corresponds to the actual graph area and does not include axis scales, axis legends/labels, headings, footings, and plot captions.

3.2.2.2 Customized Graph Dimensions

The size option can also be used to specify customized graph dimensions for special applications. For example, if you wish to produce a square chart with the graph contained in a 5" x 5" area, simply enter:

```
5,5
```

for the size option. The example in Figure 3-2 shows a circle drawn within a 5 inch square box. Using the file named FUNCTIONS, the SPLOT statement for this example is:

```
>SPLOT FUNCTIONS BY ANGLE COSINE SINE ANGLE (P)
```

THIS PAGE INTENTIONALLY LEFT BLANK

THIS PAGE INTENTIONALLY LEFT BLANK

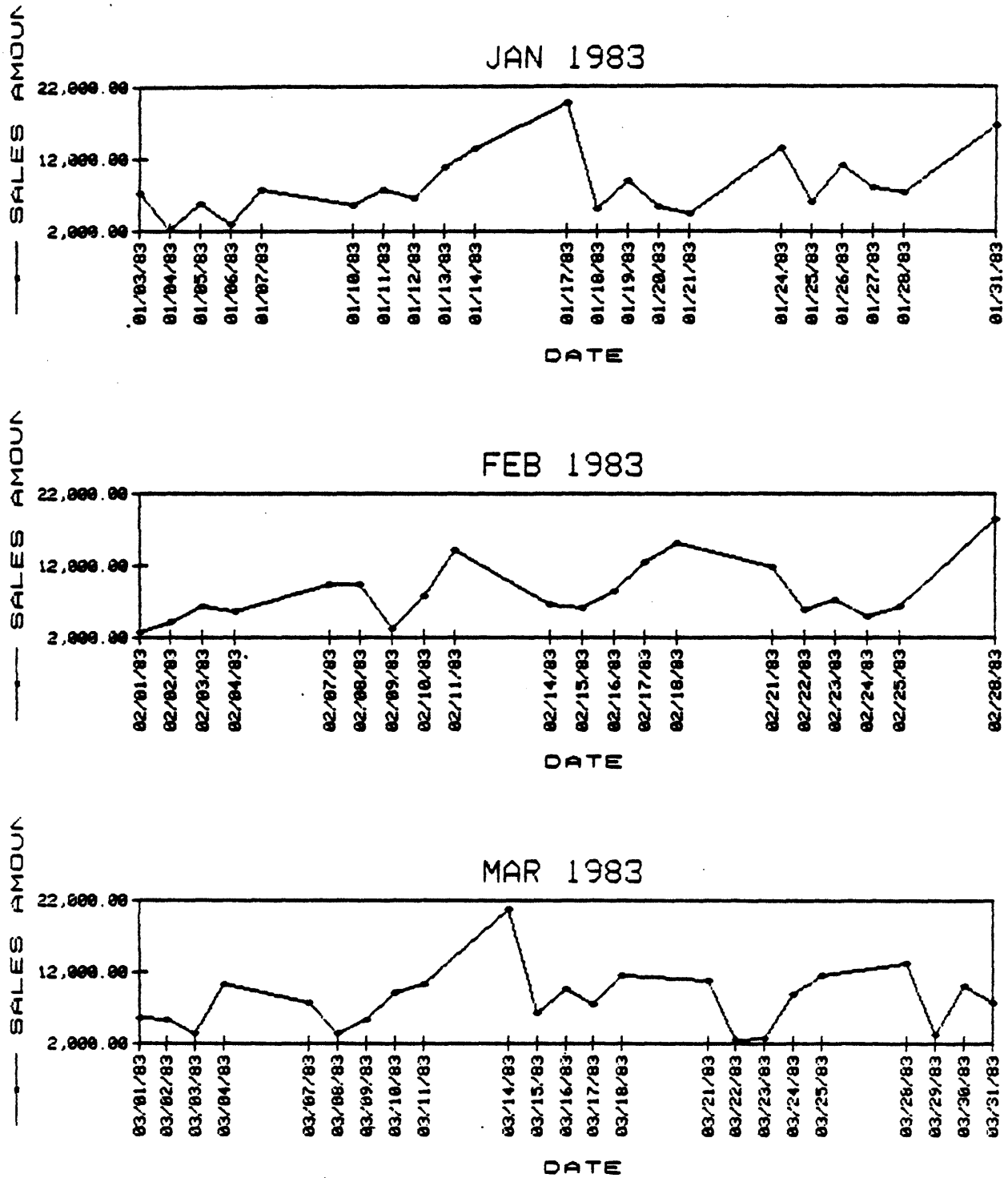


Figure 3-1. Multiple Charts on One Page

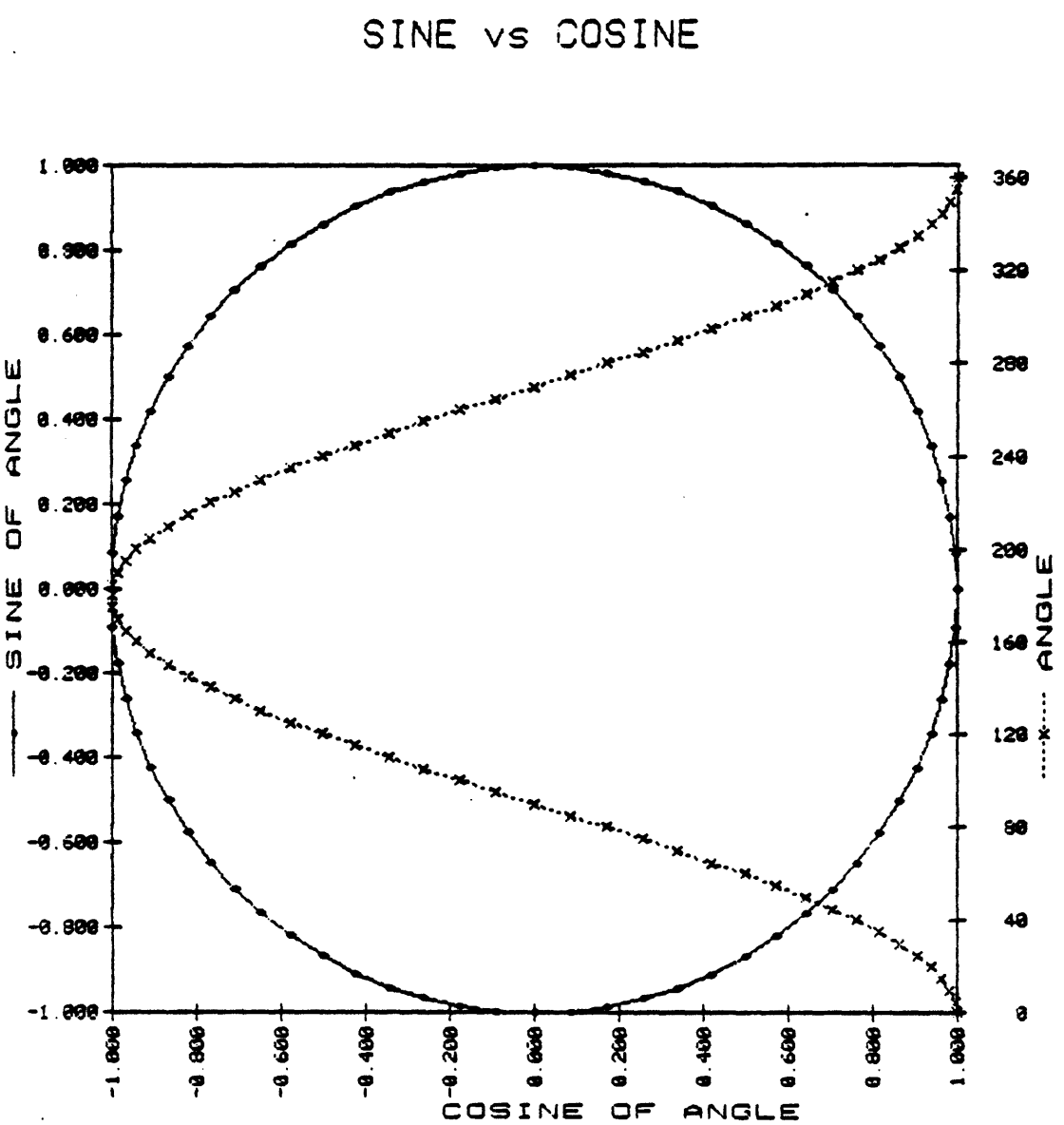


Figure 3-2. Customized Graph Dimensions

3.2.3 CHART PLACEMENT: THE ROTATE OPTION

ACCU-PLOT always assumes that the x-axis will be scaled along the bottom of the page. However, if you use the R option following the optional size prompt, ACCU-PLOT will rotate the chart 90 degrees clockwise. The x-axis will then be scaled along the left-hand side of the page with the y-axis scaled along the top of the page. If it is desirable to have the x-axis on the longest dimension of the page, this would mean rotating the chart when using 8-1/2" x 11" paper.

To determine if a chart should be printed on the long side of the page and rotated, first examine the data of the controlling (x-axis) attribute (between breaks if BREAK-ON is specified). Next, determine whether the data values will fit comfortaly across the bottom of the page. If there are too many data values, use the rotate option by specifying R in the response to the optional size prompt. The x-axis will now run down the page vertically. If there are still too many values to fit comfortably on the long side of the page, it is possible to extend the chart over multiple pages (see Section 3.2.3.2, Multiple Page Charts).

3.2.3.1 Multiple Attribute Charts

Use of the rotate option will improve the appearance of a chart when multiple y-axis attributes are plotted. By default, ACCU-PLOT will generate a separate scale and axis legend/label for each y-axis attribute plotted. Approximately one inch of plottable area is used for the scaling and labeling of each y-axis attribute, which reduces the available area for the actual graph and reduces the length of the x-axis. The size of the label could vary depending on V/MAX for the attribute as well as the label and symbol character sizes (see Appendices B and G). Assuming you are using an 8-1/2" x 11" page, the rotation of the chart will increase the plottable area for the x-axis from 8-1/2" to 11". This will allow additional room for multiple y-axis attribute scales and labels. For example, Figure 3-3 demonstrates a multiple y-axis attribute chart without rotation. Notice that the actual graph area is about twice as high as it is wide, and that the information presented within the chart is extremely compressed. This reduces the visual clarity and readability of the chart. Figure 3-4 shows the effect that rotating the x-axis has when multiple y-axis attributes are plotted on a single chart. The chart is now more easily read.

The SORT statement used to produce the listing on the next page is:

```
>SORT COSTS BY DATE DATE QUANTITY COST/UNIT LABOR-COST LPTR
```

Substituting the verb SPLOT for SORT results in the following SPLOT statement, which was used to create Figures 3-3, 3-4, and 3-5.

```
>SPLOT COSTS BY DATE DATE QUANTITY COST/UNIT LABOR-COST LPTR
```

ACCU-PLOT LISTING FOR FIGURES 3-3, 3-4, AND 3-5

COSTS.....	DATE.....	QUANTITY.	COST/UNIT	LABOR COST
5129	01/15/82	249,042	0.0979	24,391.94
5143	01/29/82	221,397	0.1084	24,000.34
5157	02/12/82	245,726	0.0966	23,759.47
5171	02/26/82	214,999	0.1160	24,943.57
5185	03/12/82	254,349	0.0949	24,154.82
5199	03/26/82	239,226	0.0970	23,226.03
5213	04/09/82	214,860	0.1043	22,417.29
5227	04/23/82	237,632	0.1037	24,651.25
5241	05/07/82	219,402	0.1094	24,016.97
5255	05/21/82	216,842	0.1124	24,384.69
5269	06/04/82	185,911	0.1230	22,867.22
5283	06/18/82	217,655	0.1176	25,611.34
5297	07/02/82	195,423	0.1232	24,083.44
5311	07/16/82	229,782	0.1126	25,873.74
5325	07/30/82	246,698	0.1021	25,210.06
5339	08/13/82	250,996	0.1034	25,976.77
5353	08/27/82	217,843	0.1207	26,310.21
5367	09/10/82	189,276	0.1459	27,633.34
5381	09/24/82	239,220	0.1101	26,356.48
5395	10/08/82	249,415	0.1084	27,038.26
5409	10/22/82	253,162	0.1048	26,549.71
5423	11/05/82	222,523	0.1246	27,733.30
5437	11/19/82	235,631	0.1156	27,260.90
5451	12/03/82	198,665	0.1315	26,129.24
5465	12/17/82	251,221	0.1197	30,074.53
5479	12/31/82	186,873	0.1254	23,444.30

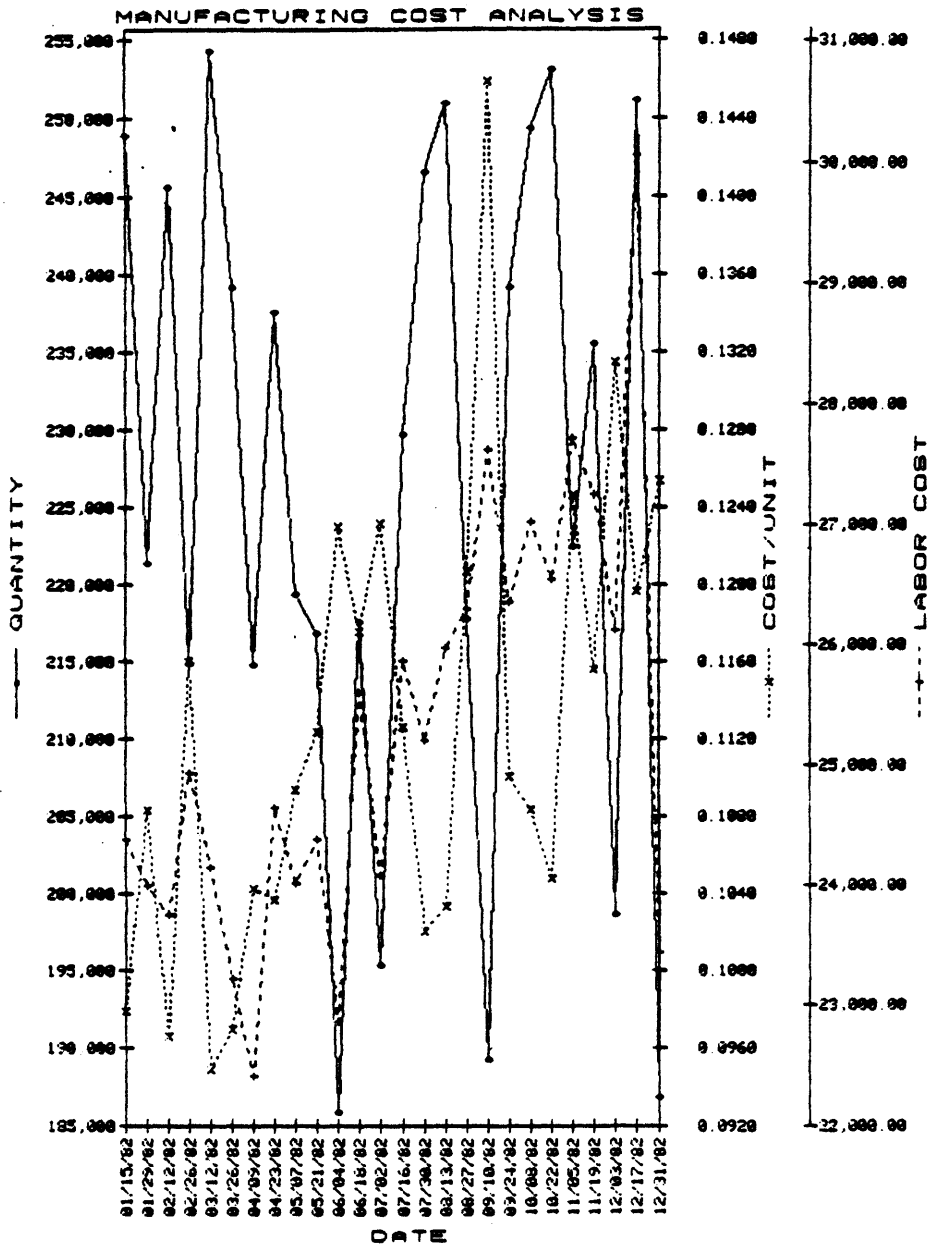


Figure 3-3. Multiple y-axis Chart without Rotation

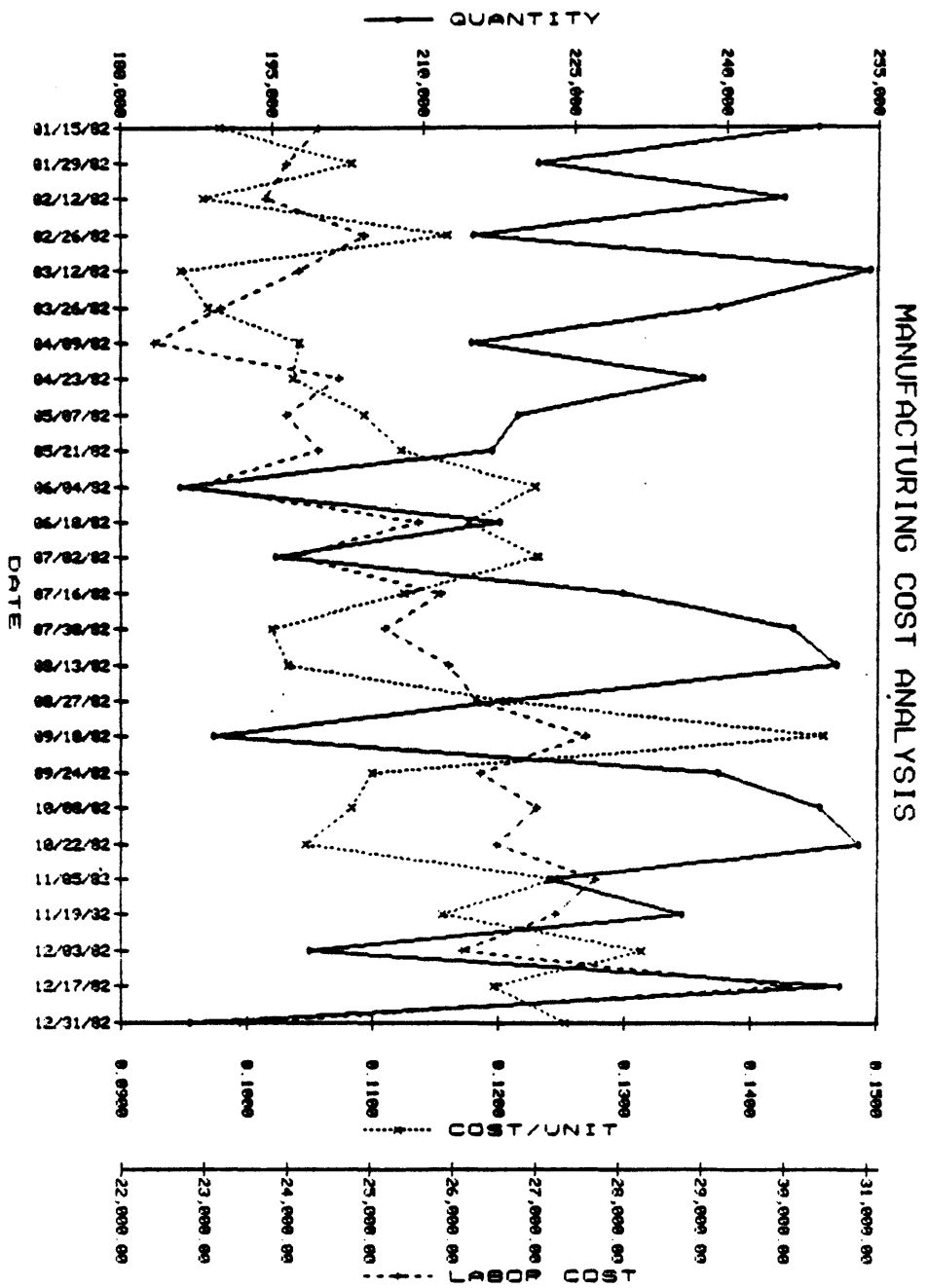


Figure 3-4. Multiple y-axis Chart with Rotation

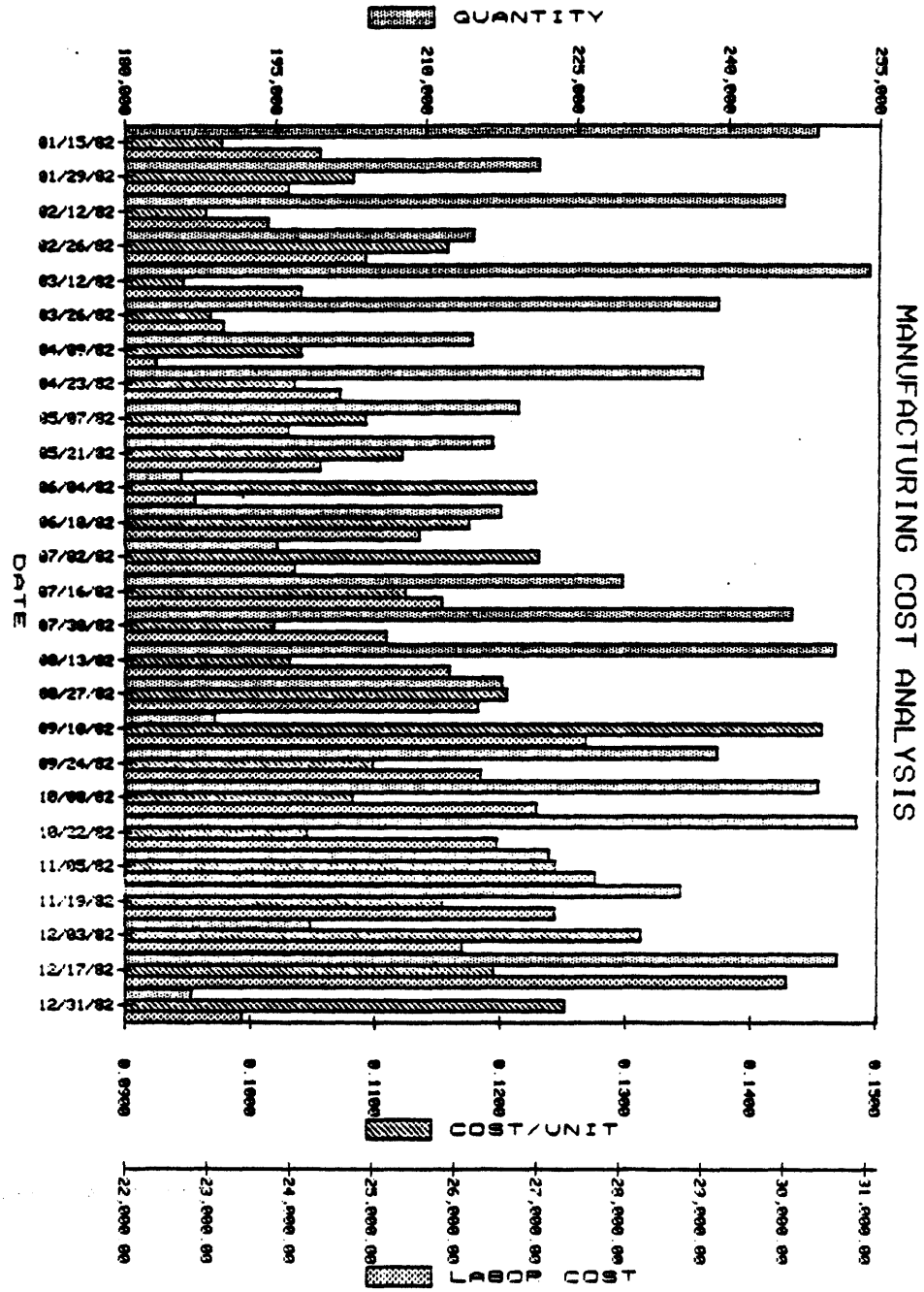


Figure 3-5. Multiple y-axis Chart with Rotation - Bar Format

3.2.3.2 Multiple Page Charts

If you have a dot-matrix type printer, you can produce multiple page charts by using the Rotate option in conjunction with the TERM statement. Use the TERM statement to specify "long" (i.e., multiple) pages; for example, a single page is 60 lines, two pages 126 lines, three pages 192 lines, etc. Use the rotate option so that the x-axis of the chart will be plotted vertically. The length of the page has now been stretched.

For example, look at Figure 3-5; this is the same chart as Figure 3-4, but in bar format. Due to the number of values plotted in this chart, the bars are extremely narrow. This reduces the clarity of the chart and makes it difficult to read. (This chart has already been rotated.) To make this bar chart easier to read, set the TERM statement to: TERM ,,,,,,80,126 and use the Rotate option to plot the chart vertically over the length of two pages.

3.2.3.3 Charts to be Included with Reports

Charts produced on 8-1/2" x 11" paper with the default chart orientation are not recommended for inclusion with reports. The reason for this is that the y-axis will be along the binding side (lefthand side) of the report and the chart may be difficult to read clearly and easily. For charts which are to be included with reports, it is recommended that the Rotate option be specified. The chart can then be put into the report with the x-axis toward the outside edge (righthand side) and with the y-axis along the bottom of the report. In other words, the x-axis should be plotted along the long side of the page. It is also recommended that system headings and footings <u>not</u> be used in this case. This is because the heading and footing text cannot be rotated with the graph, and will appear upside-down in the report. Use captions instead, as they will always be oriented to the top of the chart and not the top of the page (see Section 2.2, PLOT CAPTIONS).

NOTE: If 11" x 8-1/2" paper is used for this type of chart, the Rotate, R, option is not necessary.

3.3 OPTIONS FOR RECTANGULAR CHARTS

The default rectangular chart format is a point-to-point line chart. A different marker will be drawn at each (x,y) pair of values for every dependent (y-axis) attribute. A line will be drawn connecting the points with a different pattern or color for each dependent (y-axis) attribute. Options that may be selected to modify this format are described in the following sections.

Options are selected by entering the single letter corresponding to the desired option in the menus, which are given as the third and fourth prompts by the ACCU-PLOT Graphics System.

Each of the figures in the following sections will be preceded by a page showing the plot statement and option menu selections used for producing these examples.

3.3.1 X-AXIS OPTION CODES

The third prompt issued by ACCU-PLOT asks the user to specify options for the x-axis attribute. The following menu will be displayed:

```
---------- X AXIS OPTION CODES ----------

    F - SCALE FACTORS
    L - LITERAL VALUE
    R - REVERSE AXIS DIRECTION
    T - TEXT VALUE

0 attribute name.....OPTIONS:
```

3.3.1.1 F - Scale Factors

If automatic scaling is not desired for the x-axis attribute, scaling values may be specified by the user. When F - Scale Factors is included as an x-axis option, ACCU-PLOT will issue a series of three additional prompts:

```
MINIMUM:
MAXIMUM:
INCREMENT:
```

Either one, two, or all three prompts may be specified to attain the desired results. A null response (carriage return only) for any of the prompts will cause automatic generation of the scaling factor for that value.

Values should be input in their natural form. A date is entered in any standard date format (e.g., 01 JAN 1983). Masked numeric values should include the decimal point and sign (e.g., -1,000.00).

The INCREMENT prompt asks for the distance between the tick marks and labels along the x-axis in units of the data. For dates, specify the increment in number of days.

3.3.1.2 L - Literal Value

The Literal option overrides the automatic scaling for the x-axis. Instead, a tick mark and label is drawn for every x-axis value found in the data. Bear in mind that if there are too many values, the labels will overlap.

This option will also cause the tick mark and label to be placed on the x-axis at the position where it numerically belongs. For example, if the x-axis is 5 inches long and data values for the x-axis are 1, 2, 3, and 5, then the axis will be labeled with the values of 1, 2, 3, and 5, at 1, 2, 3, and 5 inches, with the label and tick mark at 4 inches missing.

The Literal option was specified for Figures 3-1, 3-3, 3-4, and 3-5. Notice on Figure 3-1 that the dates are grouped together into work weeks. In this example, there are only five values in the file for each week and the missing values (weekends) are shown as blank spaces on the chart.

3.3.1.3 R - Reverse Axis Direction

The Reverse option causes the x-axis to be labeled from right to left instead of left to right. The Reverse option is useful to represent values which are usually negative.

3.3.1.4 T - Text Value

The Text option will cause the x-axis data values used in labeling to be treated as text strings instead of numerical values. The Text option is useful for plotting nonnumeric data such as division names, expense descriptions, product names, etc.

Sometimes numeric data should be considered as text data; for example, in the case of stock numbers or account numbers where the numeric value is not important and only describes the data. Another example is the use of dates, where each date is labeled and equally spaced along the x-axis. This option would eliminate the blank areas for dates without values (weekends) that appear when using the Literal option (see Figures 3-1, 3-3, 3-4, and 3-5).

Figures 2-2 and 2-3 show examples of the Text option specified for the x-axis attribute MONTH. Figure 3-6 is an example of the Text option used for expense descriptions. The listing for this example is on the next page. The SORT and SPLOT statements for this example are:

```
    >SORT EXPENSES BY-DSND YTD EXPENSE YTD LPTR
and
    >SPLOT EXPENSES BY-DSND YTD EXPENSE YTD LPTR
```

In this example, EXPENSE is the controlling (x-axis) attribute and YTD is the dependent (y-axis) attribute.

Note that when specifying the L - Literal or T - Text options for the x-axis, ACCU-PLOT will label the x-axis without considering whether the labels will overlap or not. Therefore, it is possible for these labels to overlap when there are too many values to be labeled along the x-axis.

ACCU-PLOT LISTING FOR FIGURE 3-6

EXPENSES..	EXPENSE.....	YEAR TO. DATE
90	MATERIAL COST	28,293
01	LABOR	24,123
32	RENT	18,575
81	INTEREST	13,364
26	UTILITIES	11,489
86	FEDERA CORP TAX	11,416
69	BAD DEBTS	7,538
41	AUTO EXPENSE	7,241
35	DEPEC & AMORT	5,953
61	PRINTING	5,830
50	CONVENTION	5,698
31	INSURANCE - LIAB	5,620
16	INSURANCE - W/COMP	5,412
65	PROFESSIONAL FEES	5,406
17	INSURANCE - MEDICAL	4,901
39	FREIGHT	4,619
58	REPAIR & MAINTENANCE	3,256
57	COMMISSIONS	2,722
80	OUTSIDE SERV	2,597
18	PAYROLL TAXES	2,393
45	TRAVEL & ENTER	1,740
70	SUPPLIES	1,376
30	POSTAGE	1,107
33	TAXES	994
53	ADVERTISING & PROMO	908
49	MISC EXPENSE	746
62	LICENSE FEES	730
89	DONATIONS	591
63	SECURITY SERV	512
84	CASH DISCOUNTS	224
64	RENTAL EQUIP	150
68	DUES & SUBSCRIP	92
82	SERVICE CHARGES	86

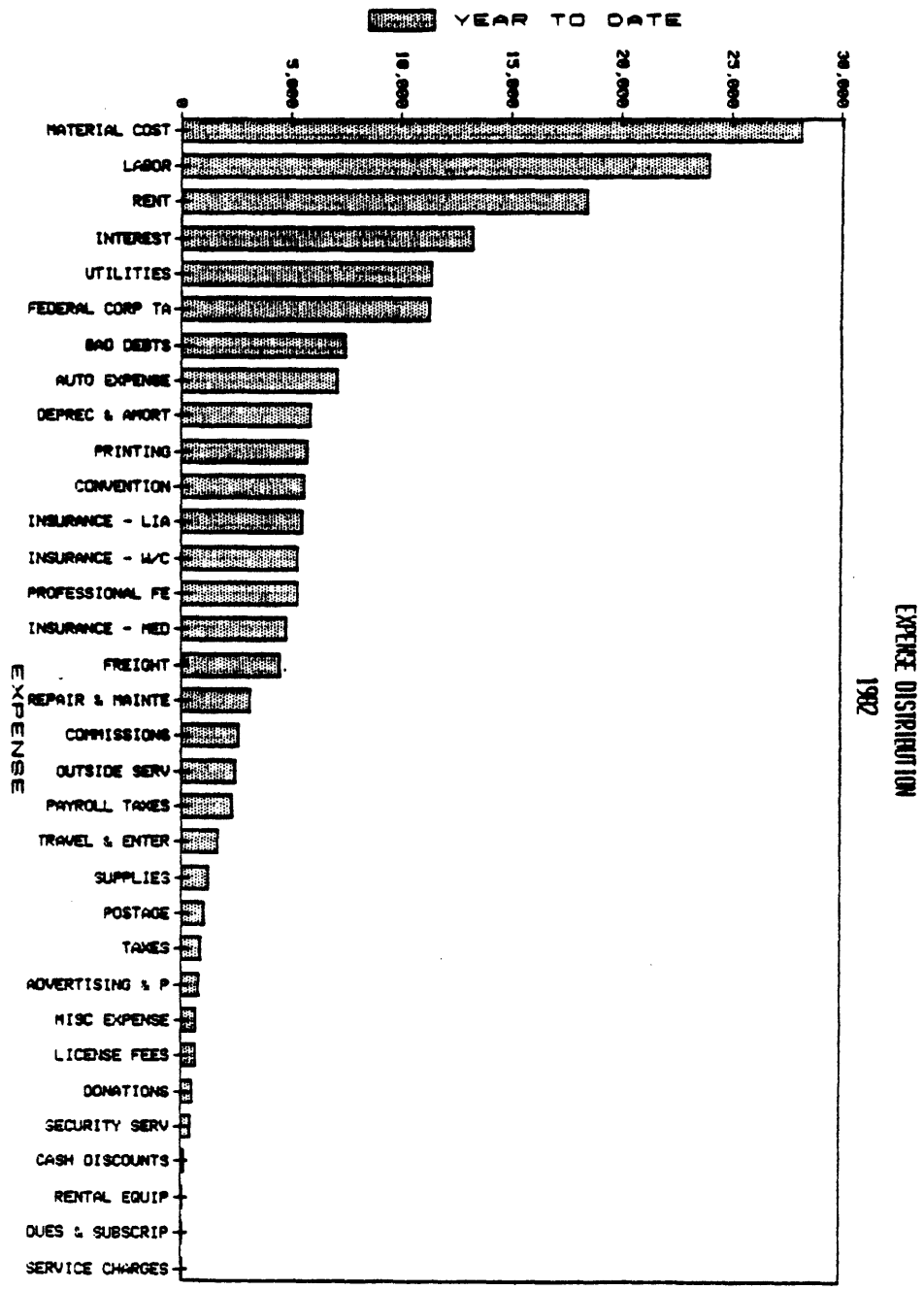


Figure 3-6. Use of T Option to Label Expenses

3.3.2 Y-AXIS OPTION CODES

The fourth and final prompt issued by ACCU-PLOT asks the user to specify options for the y-axis attribute(s). The following menu will be displayed:

```
---------- Y AXIS OPTION CODES ----------

    A - ACCUMULATE
    B - BAR FORMAT
    C - SUPPRESS CONNECTING LINE
    F - SCALE FACTORS
    G - GROUP WITH PREVIOUS ATTRIBUTE
    H - STACK BAR WITH PREVIOUS ATTRIBUTE
    R - REVERSE AXIS DIRECTION
    S - SUPPRESS SYMBOL/SHADING
    V - PRINT VALUE
    Z - DRAW ZERO LINE

1 attribute name.....OPTIONS:
```

3.3.2.1 A - Accumulate

The Accumulate option will cause the calculation of a running total for all data values plotted for the dependent (y-axis) attribute. The plotted point will be the actual sum of all plotted data values up to and including that point. For example, if the data values for the y-axis attribute are 1, 2, 3, and 4, the plotted values will be 1, 3, 6, and 10.

Figure 3-7 is the same example as Figure 2-2 with the Accumulate option specified for the y-axis attribute, AMOUNT. The resulting graph shows a total year-to-date SALES.AMOUNT.

3.3.2.2 B - Bar Format

The Bar Format option will cause the generation of a bar graph for the current attribute instead of the default point-to-point line chart. The width of the bars is dependent upon the number and range of values found for the x-axis and the width of the graph. The minimum and maximum width of any bar is specified in the Format Definition Table (Appendix B) with the default maximum width set at one inch. The height of the bars is proportional to the corresponding y-value. The bars will be shaded areas surrounded by solid borders, unless the Suppress Symbol/Shading option is specified. The patterns for bar shading and the specification of colors may be selected by the user through the Style Definition Table (Appendix D) and Pattern Definition Table (Appendix F).

FIGURE 3-7 SPLOT STATEMENT

```
SPLOT SALES BY DATE WITH DATE GE "01/01/82" AND LE "12/31/82"
BREAK-ON MONTH "'VL'" TOTAL SALES.AMOUNT DET-SUPP LPTR HDR-SUPP
CAPTION "'U''C'ACCUMULATED YEAR TO DATE SALES 'LCS2V'"

DEVICE:  <CR>
OPTIONAL SIZE IN INCHES (WIDTH,DEPTH,[R]): R <CR>

---------- X AXIS OPTION CODES ----------
    F - SCALE FACTORS
    L - LITERAL VALUE
    R - REVERSE AXIS DIRECTION
    T - TEXT VALUE

0 MONTH ..................... OPTIONS: T <CR>

---------- Y AXIS OPTION CODES ----------
    A - ACCUMULATE
    B - BAR FORMAT
    C - SUPPRESS CONNECTING LINE
    F - SCALE FACTORS
    G - GROUP WITH PREVIOUS ATTRIBUTE
    H - STACK BAR WITH PREVIOUS ATTRIBUTE
    R - REVERSE AXIS DIRECTION
    S - SUPPRESS SYMBOL/SHADING
    V - PRINT VALUE
    Z - DRAW ZERO LINE

1 SALES AMOUNT.............. OPTIONS: A <CR>
```

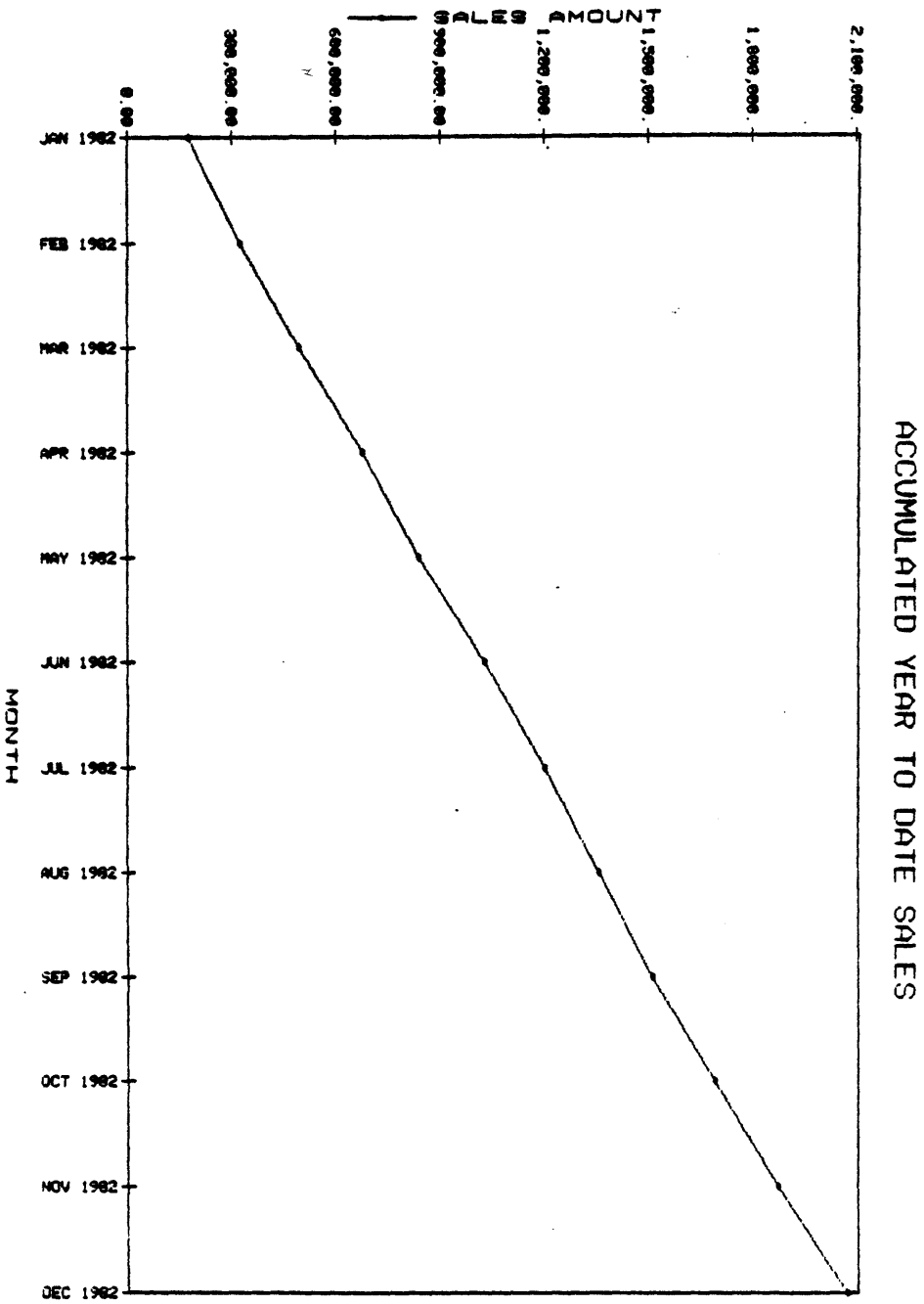


Figure 3-7. Using A Option to Total Plotted Values for y-axis Attribute

3.3.2.3 C - Suppress Connecting Line

The Suppress Connecting Line option will suppress the line connecting the y-axis data values on a point-to-point line chart. When specified, this option will print only a marker for each y-axis data value, thus, creating a scatter diagram.

The y-axis attribute, TANGENT OF ANGLE, in Figure 3-8 shows an example of the Suppress Connecting Line option.

3.3.2.4 F - Scale Factors

If automatic scaling is not desired for the current y-axis attribute, scaling values may be specified by the user. When "F" is entered for the y-axis options, ACCU-PLOT will return a series of three additional prompts:

```
MINIMUM:
MAXIMUM:
INCREMENT:
```

Either one, two, or all three prompts may be specified to attain the desired results. A null response (carriage return only) for any of the prompts will cause the automatic generation of the scaling factor for that value.

The Increment prompt asks for the distance between the tick marks and labels along the y-axis in units of the data.

If an actual data value is less than the specified minimum or greater than the specified maximum, then the actual data value will be used instead of the specified value.

FIGURE 3-8 SPLOT STATEMENT

```
SPLOT FUNCTIONS BY ANGLE ANGLE SIN COS TAN LPTR HDR-SUPP

DEVICE:  <CR>
OPTIONAL SIZE IN INCHES (WIDTH,DEPTH,[R]): R <CR>

---------- X AXIS OPTION CODES ----------
    F - SCALE FACTORS
    L - LITERAL VALUE
    R - REVERSE AXIS DIRECTION
    T - TEXT VALUE

0 ANGLE ..................... OPTIONS: T <CR>

---------- Y AXIS OPTION CODES ----------
    A - ACCUMULATE
    B - BAR FORMAT
    C - SUPPRESS CONNECTING LINE
    F - SCALE FACTORS
    G - GROUP WITH PREVIOUS ATTRIBUTE
    H - STACK BAR WITH PREVIOUS ATTRIBUTE
    R - REVERSE AXIS DIRECTION
    S - SUPPRESS SYMBOL/SHADING
    V - PRINT VALUE
    Z - DRAW ZERO LINE

1 SINE OF ANGLE.............. OPTIONS: BSZ <CR>

2 COSINE OF ANGLE............ OPTIONS: SG <CR>
      GROUP WITH ATTRIBUTE:  1 <CR>

3 TANGENT OF ANGLE........... OPTIONS: C <CR>
```

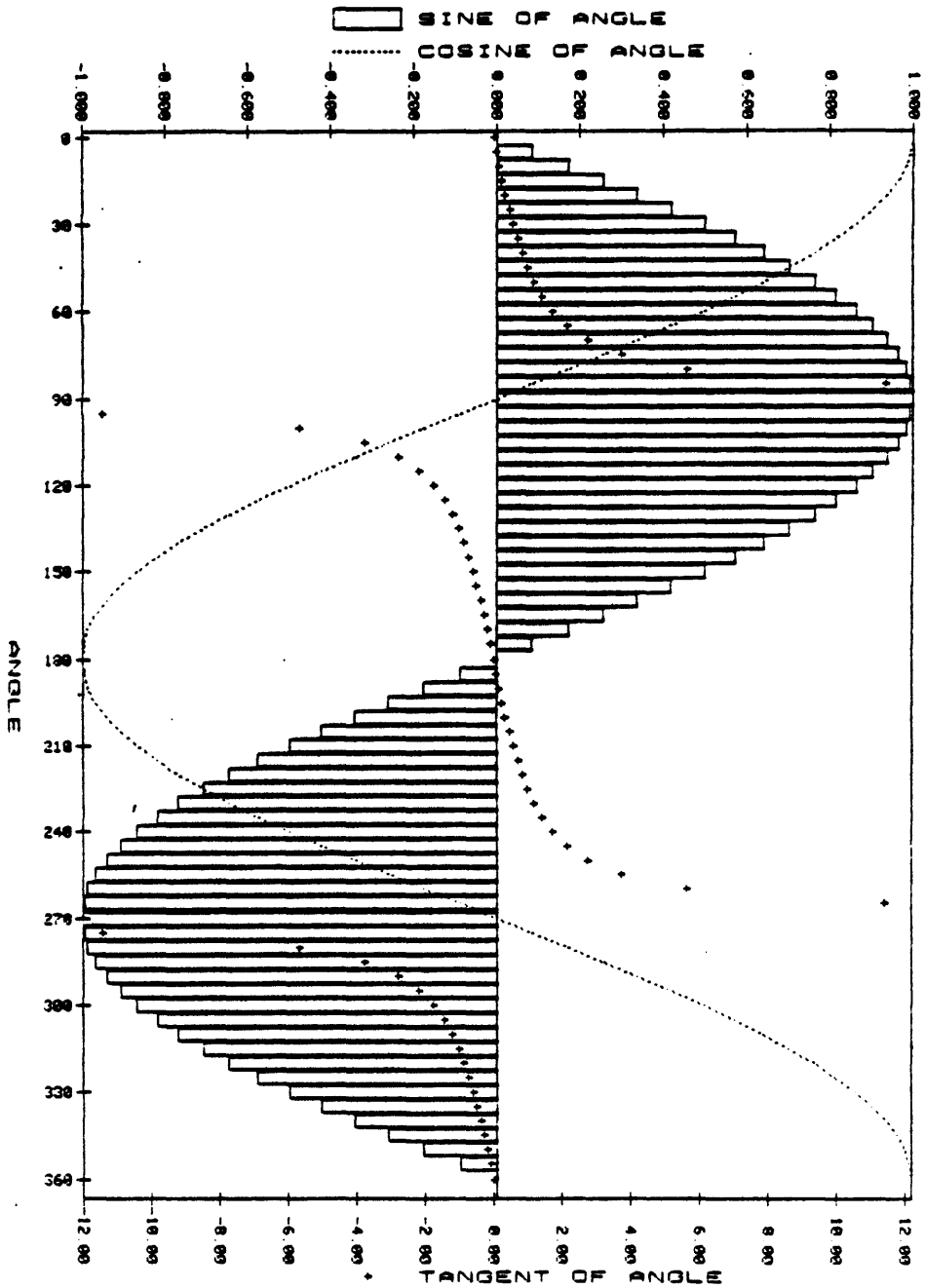


Figure 3-8. Example Using C, G, S, and Z Options

3.3.2.5 G - Group with Previous Attribute

The Group with Previous Attribute option may be used when there are multiple dependent (y-axis) attributes to be plotted in a single chart. This option is used to group y-axis attributes together for common scaling and labeling. This is useful to show actual correlations between the data for two or more dependent attributes. When G is included as a y-axis option code, ACCU-PLOT will return the following prompt:

GROUP WITH ATTRIBUTE:

The number of a preceding y-axis attribute (shown preceding its name on the screen) should be entered in response to the prompt. Therefore, the Group option may be used only for the second through last y-axis attributes. For example, in Figure 3-8, the second y-axis attribute, COSINE OF ANGLE, is grouped with the first y-axis attribute, SINE OF ANGLE. The result is the common scaling for both attributes with one scale at the top of the chart and with both attributes labeled next to this single scale. Another example is Figure 3-9, which is the same chart as Figure 1-3, with the attribute GROSS.PROFIT grouped with AMOUNT.

Note that when more than two attributes are to be grouped together, they must all be grouped to the first attribute of the group. For example, if there are three attributes to be grouped together, attribute 2 is grouped with attribute 1, and attribute 3 is also grouped with attribute 1.

FIGURE 3-9 SPLOT STATEMENT

```
SPLOT SALES BY DATE WITH DATE >= "1/1/83" AND <= "12/31/83"
DATE SALES.AMOUNT GROSS.PROFIT LPTR HDR-SUPP
CAPTION "^U^^S2C^ SALES VERSUS PROFIT"

DEVICE:  <CR>
OPTIONAL SIZE IN INCHES (WIDTH,DEPTH,[R]): R <CR>

---------- X AXIS OPTION CODES ----------
    F - SCALE FACTORS
    L - LITERAL VALUE
    R - REVERSE AXIS DIRECTION
    T - TEXT VALUE

0 DATE ..................... OPTIONS: L <CR>

---------- Y AXIS OPTION CODES ----------
    A - ACCUMULATE
    B - BAR FORMAT
    C - SUPPRESS CONNECTING LINE
    F - SCALE FACTORS
    G - GROUP WITH PREVIOUS ATTRIBUTE
    H - STACK BAR WITH PREVIOUS ATTRIBUTE
    R - REVERSE AXIS DIRECTION
    S - SUPPRESS SYMBOL/SHADING
    V - PRINT VALUE
    Z - DRAW ZERO LINE

1 SALES AMOUNT.............. OPTIONS: <CR>

2 GROSS PROFIT.............. OPTIONS: G <CR>
      GROUP WITH ATTRIBUTE: 1 <CR>
```

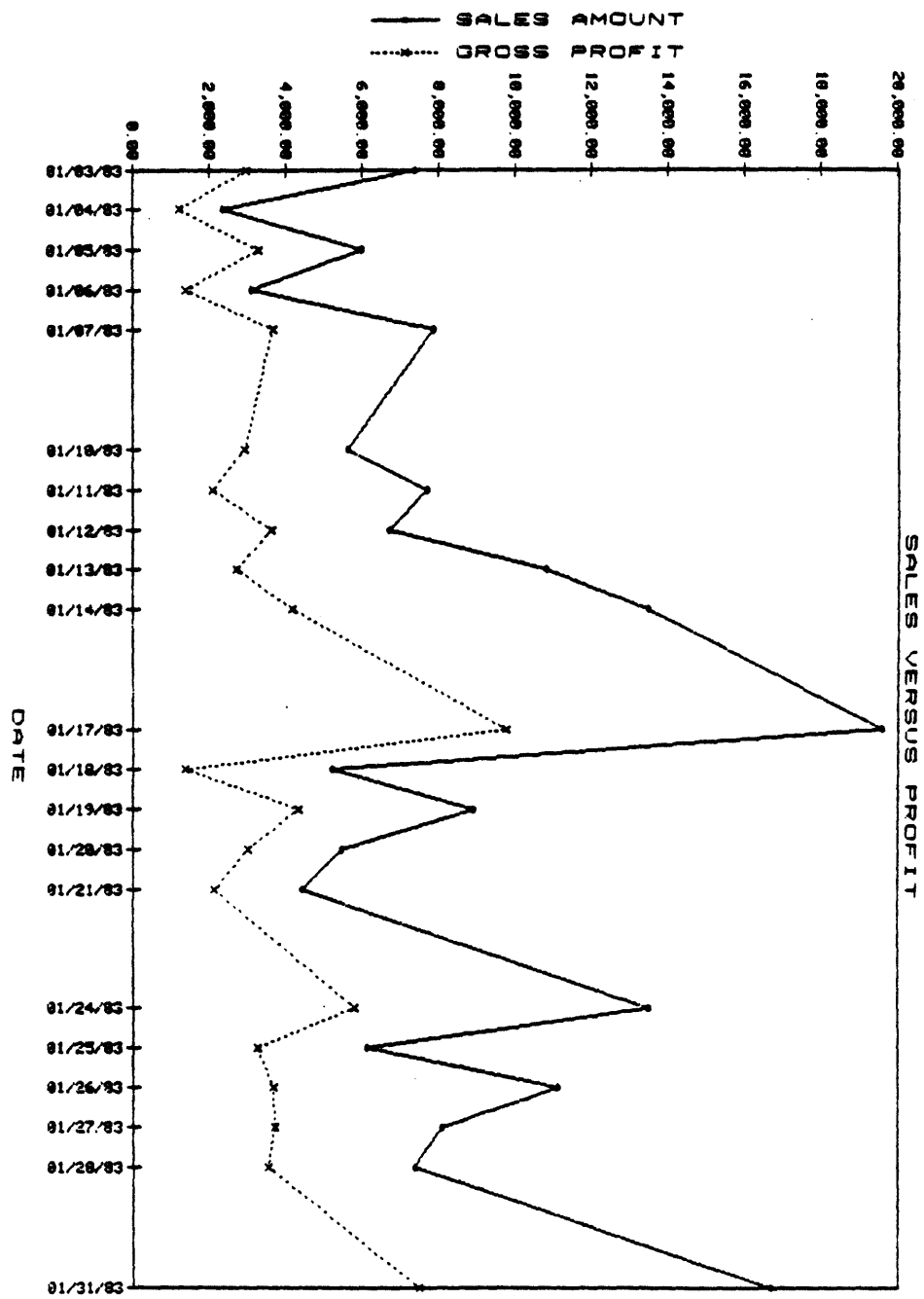


Figure 3-9. Using G Option to Plot Two Attributes with Common Scale

3.3.2.6 H - Stack Bar with Previous Attribute

The Stack Bar with Previous Attribute option works similarly to the Group with Previous Attribute option and is used when there are multiple dependent (y-axis) attributes plotted within a single chart. When H is specified for the y-axis option codes of the current y-axis attribute, ACCU-PLOT will return the following prompt:

STACK WITH BAR ATTRIBUTE:

Provided that a previous y-axis attribute was specified with the B - Bar Format option, any or all of the following y-axis attributes may be stacked on top of it. The Bar Format option is only required for the first y-axis attribute in the group.

The Stack Bar option may be used to display a single bar representing a total amount, broken down into sections representing product lines, time periods, divisions, etc. For example, Figure 3-10 represents an Expense Distribution chart for a single year. The data in the file is stored by quarter and each quarter is an attribute within the file. In this example, all four quarters are plotted on the same chart. The Bar Format option is selected for first quarter. The second quarter is stacked with first quarter, third quarter is stacked with first quarter, and fourth quarter is stacked with first quarter. Notice that all four quarters have a common scale and are labeled beside this single scale.

Note that the Group with Previous Attribute option and the Stack Bar with Previous Attribute option are mutually exclusive and cannot be used together in the same chart.

3.3.2.7 R - Reverse Axis Direction

The Reverse Axis Direction option will label the current y-axis attribute from the top of the chart to the bottom of the chart, as opposed to labeling it from bottom to top. The Reverse option is useful for representing values which are usually negative.

The Reverse option is also useful when plotting y-axis attributes which are inversely related to each other. For example, the Reverse option is specified for the y-axis attribute, COST/UNIT, in Figure 3-11. As a result, the attribute COST/UNIT appears to correlate directly with the attribute QUANTITY. Compare this example with Figure 3-4. Notice that in Figure 3-4 the attribute COST/UNIT is not reversed and appears to be inversely related to the attribute QUANTITY.

FIGURE 3-10 SPLOT STATEMENT

```
SPLOT EXPENSES BY-DSND YTD EXPENSE QTR1 QTR2 QTR3 QTR4
LPTR HDR-SUPP
CAPTION "^U^^CS3^QUARTERLY EXPENSE DISTRIBUTION^LC^1982"

DEVICE:  <CR>
OPTIONAL SIZE IN INCHES (WIDTH,DEPTH,[R]): R <CR>

---------- X AXIS OPTION CODES ----------
    F - SCALE FACTORS
    L - LITERAL VALUE
    R - REVERSE AXIS DIRECTION
    T - TEXT VALUE

0 EXPENSE..................... OPTIONS: T <CR>

---------- Y AXIS OPTION CODES ----------
    A - ACCUMULATE
    B - BAR FORMAT
    C - SUPPRESS CONNECTING LINE
    F - SCALE FACTORS
    G - GROUP WITH PREVIOUS ATTRIBUTE
    H - STACK BAR WITH PREVIOUS ATTRIBUTE
    R - REVERSE AXIS DIRECTION
    S - SUPPRESS SYMBOL/SHADING
    V - PRINT VALUE
    Z - DRAW ZERO LINE

1 FIRST QUARTER.............. OPTIONS: B <CR>

2 SECOND QUARTER.............. OPTIONS: H <CR>
      STACK WITH BAR ATTRIBUTE: 1 <CR>

3 THIRD QUARTER.............. OPTIONS: H <CR>
      STACK WITH BAR ATTRIBUTE: 1 <CR>

4 FOURTH QUARTER.............. OPTIONS: H <CR>
      STACK WITH BAR ATTRIBUTE: 1 <CR>
```

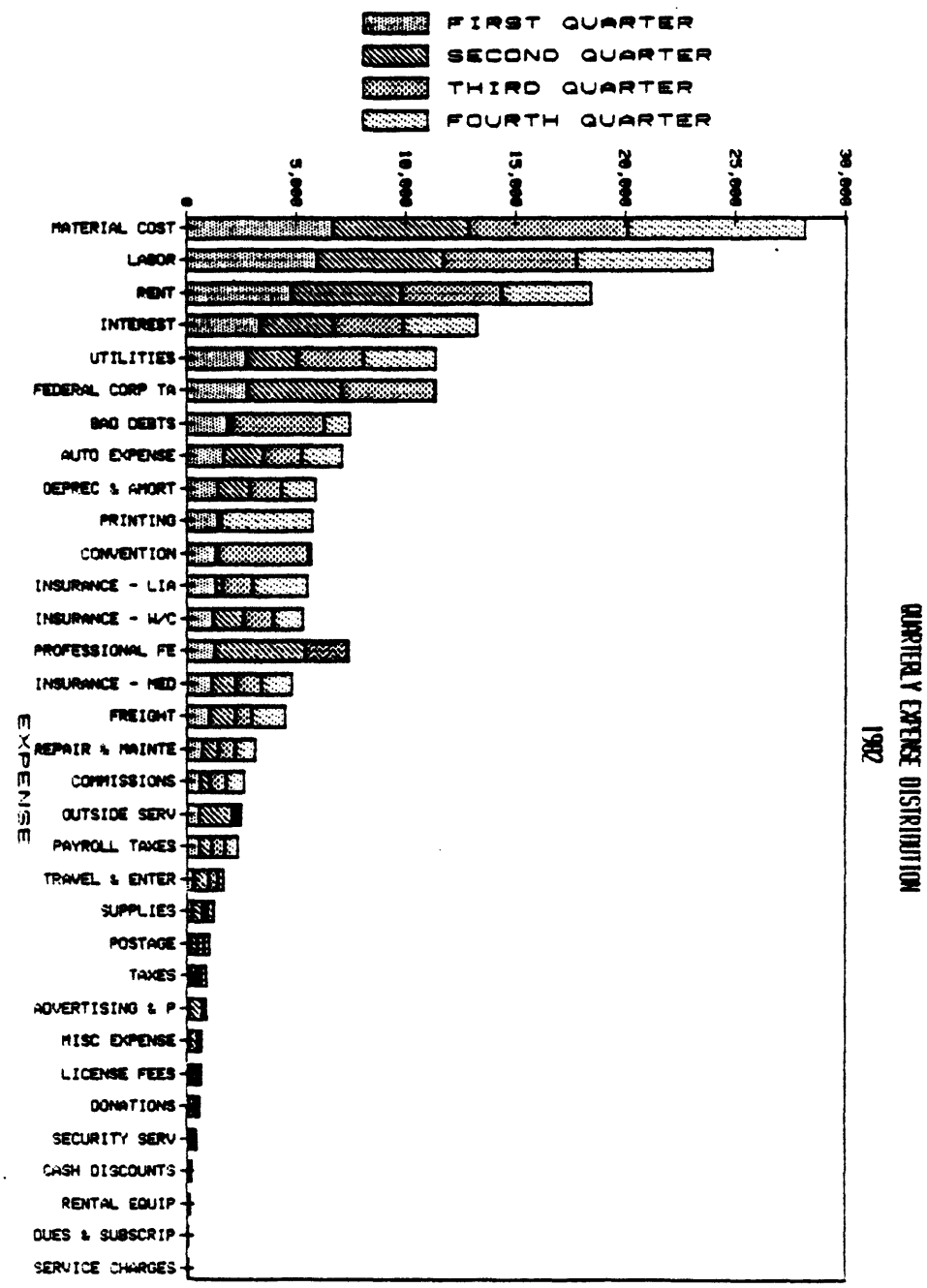


Figure 3-10. Using H Option to Stack Four Quarters on Each Bar

FIGURE 3-11 SPLOT STATEMENT

```
SPLOT COSTS BY DATE DATE QUANTITY COST/UNIT LABOR-COST
LPTR HDR-SUPP
CAPTION "^U^C^MANUFACTURING COST ANALYSIS"

DEVICE:  <CR>
OPTIONAL SIZE IN INCHES (WIDTH,DEPTH,[R]): R <CR>

---------- X AXIS OPTION CODES ----------
    F - SCALE FACTORS
    L - LITERAL VALUE
    R - REVERSE AXIS DIRECTION
    T - TEXT VALUE

0 DATE ..................... OPTIONS: L <CR>

---------- Y AXIS OPTION CODES ----------
    A - ACCUMULATE
    B - BAR FORMAT
    C - SUPPRESS CONNECTING LINE
    F - SCALE FACTORS
    G - GROUP WITH PREVIOUS ATTRIBUTE
    H - STACK BAR WITH PREVIOUS ATTRIBUTE
    R - REVERSE AXIS DIRECTION
    S - SUPPRESS SYMBOL/SHADING
    V - PRINT VALUE
    Z - DRAW ZERO LINE

1 QUANTITY ................. OPTIONS: <CR>

2 COST/UNIT ................ OPTIONS: R <CR>

3 LABOR-COST ............... OPTIONS: <CR>
```

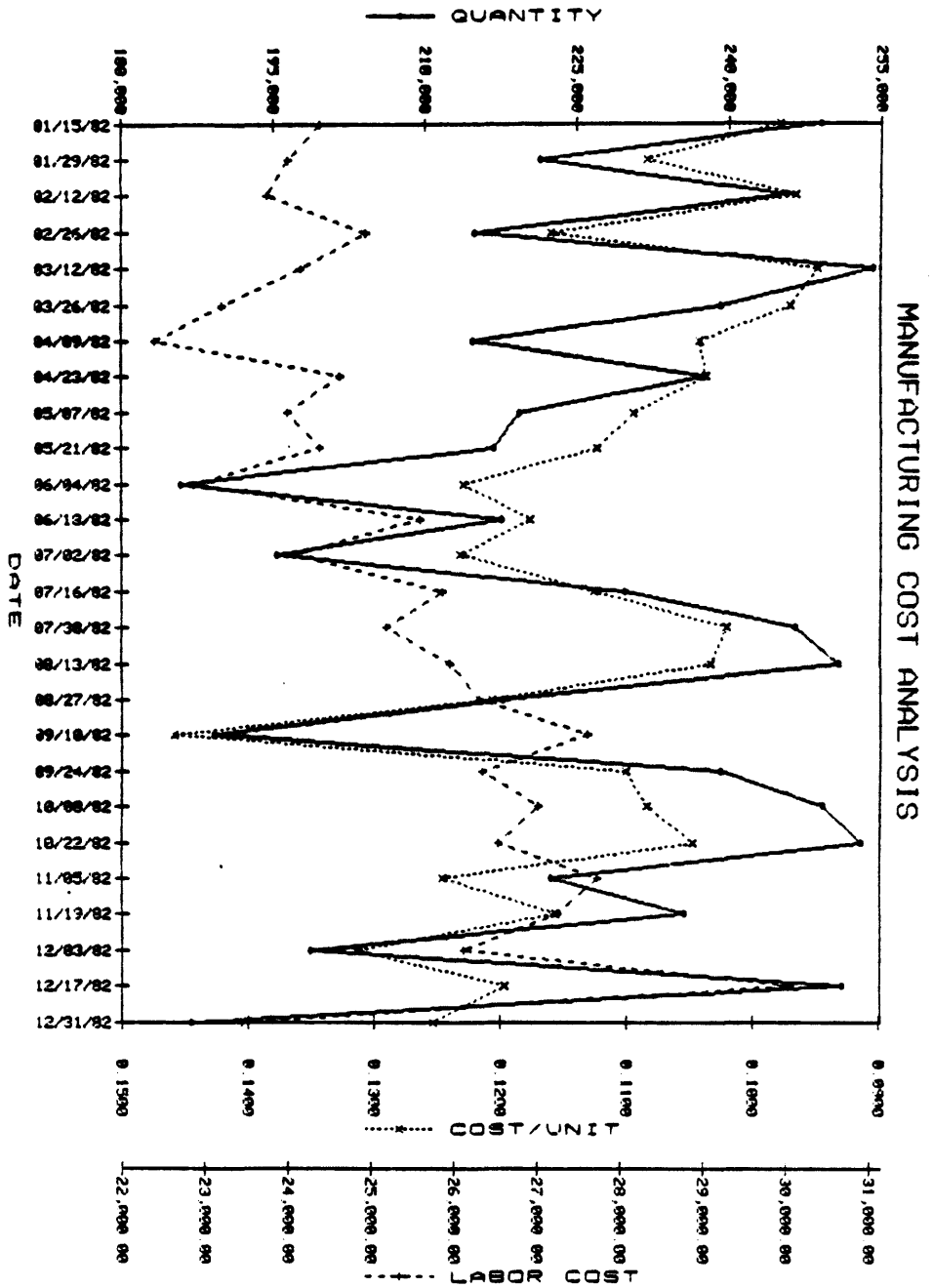


Figure 3-11. Using R Option to Directly Relate Cost/Unit to QUANTITY

3.3.2.8 S - Suppress Symbol/Shading

The Suppress Symbol/Shading option will cause the suppression of the markers which are drawn at each point formed by an (x,y) pair on a point-to-point line chart. When used with the Suppress Connecting Line option, each point will be identified by a single dot instead of a marker. When the Bar Format option is specified, the Suppress Symbol/Shading option will inhibit the shading of the bars.

The Suppress option is specified for the attribute COSINE OF ANGLE in Figure 3-8. The Suppress option is also specified for the attribute SINE OF ANGLE in the same example. This example demonstrates the effect of the Suppress option for both point-to-point line and bar formats.

3.3.2.9 V - Print Value

The Print Value option may be specified for the current y-axis attribute only when the Literal Value or Text Value options are specified for the x-axis option codes. When the Print Value option is specified, ACCU-PLOT will print the actual y-axis data value beside each corresponding x-axis data value.

No check will be made for spacing or label overlapping. Figures 2-2 and 2-3 demonstrate the use of the Print Value option for the y-axis attribute, AMOUNT.

3.3.2.10 Z - Draw Zero Line

The Draw Zero Line option will cause ACCU-PLOT to draw a horizontal line at the "zero" value for the current y-axis attribute. This option allows bars to be drawn both above and below the "zero" line in order to handle negative data values.

When more than one y-axis attribute is to use the "zero" line, it is recommended that those attributes be grouped together using either the Group or Stack Bar options.

The Draw Zero Line option is specified for the attribute SINE OF ANGLE in Figure 3-8. Notice that all the bars in this example are drawn with the "zero" line as their orientation.

3.4 OPTIONS FOR CIRCULAR CHARTS

The PIE and SPIE verbs are used to produce circular pie charts. The segment descriptions are analagous to the x-axis of a rectangular chart and the segment values are analagous to the y-axis of a rectangular chart.

ACCU-PLOT will automatically rotate the chart to determine the best chart position, as well as the optimum cutoff percentage. The default pie chart will have percentage values printed within the segments, and will not have any exploded segments. Segments which have negative values within a chart with a positive total will be represented without the outside arc of the circle. The same holds true for segments with positive values in a chart with a negative total. For an example of this, see the PROFESSIONAL FEES segment from the fourth quarter in Figure 3-12.

A separate chart will be generated and printed for each dependent (y-axis) attribute specified in a PIE statement.

FIGURE 3-12 SPIE STATEMENT

```
SPIE EXPENSES BY-DSND YTD EXPENSE QTR1 QTR2 QTR3 QTR4 LPTR
HEADING "'LL'ACCU-PLOT FIGURE 3-12'LL'"

DEVICE:  <CR>
OPTIONAL DIAMETER (INCHES,[R]): 2.75 <CR>

----------   PIE CHART DIRECTION  ----------
    R - REVERSE ROTATION (COUNTER-CLOCKWISE)

0 MONTH ..................... OPTIONS: <CR>

---------- PIE CHART OPTION CODES ----------
    C - SPECIFY CUTOFF PERCENTAGE
    P - SUPPRESS PERCENTAGE PRINTING
    Q - FORCE PERCENTAGE PRINTING
    V - PRINT SEGMENT VALUE
    X - EXPLODE SEGMENTS

1 FIRST QUARTER ..... OPTIONS: VP <CR>

2 SECOND QUARTER ..... OPTIONS: VP <CR>

3 THIRD QUARTER ..... OPTIONS: VP <CR>

4 FOURTH QUARTER ..... OPTIONS: VP <CR>
```

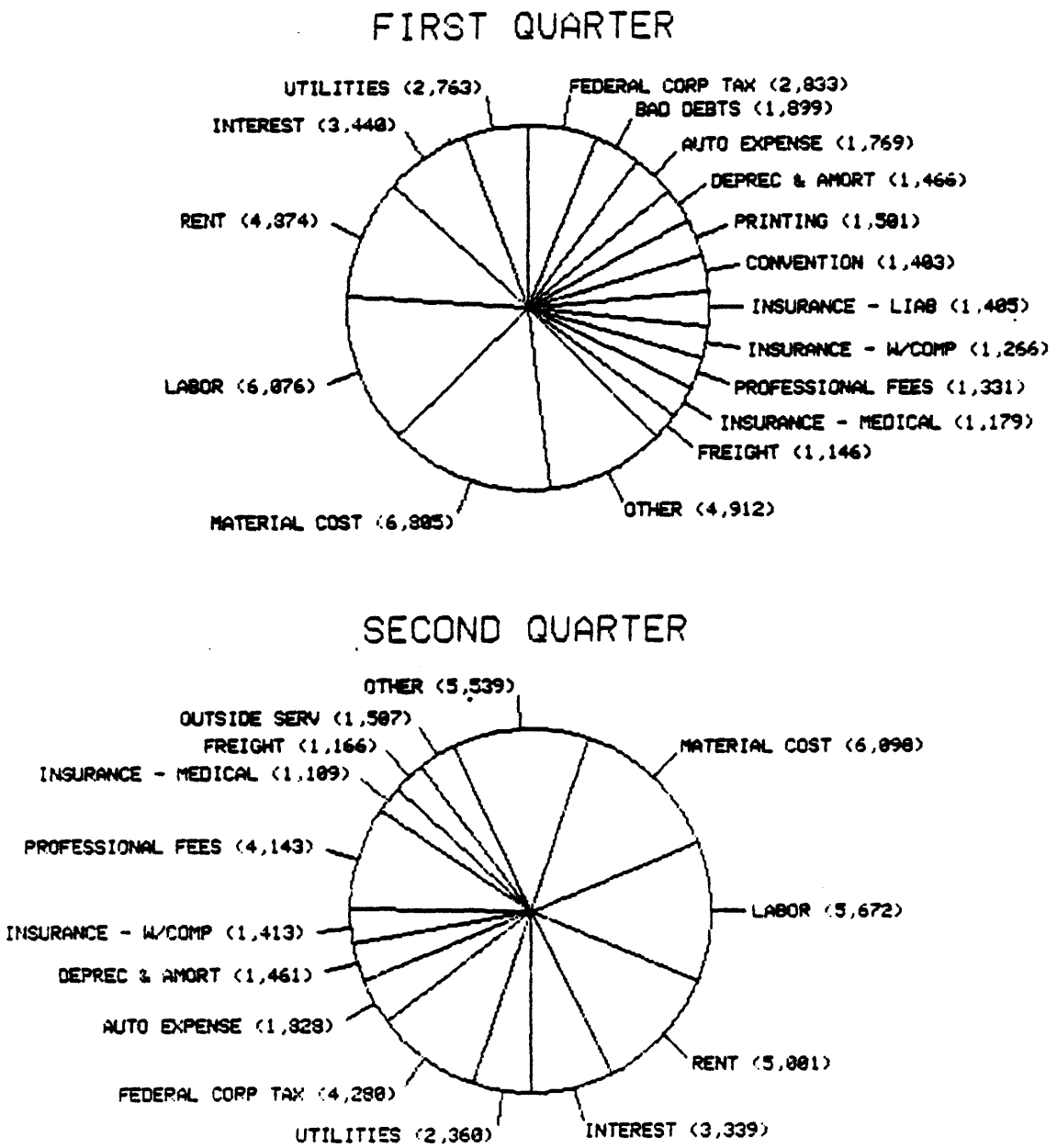


Figure 3-12. SPIE Chart with Four Dependent Attributes Using P and V Options (Sheet 1 of 2)

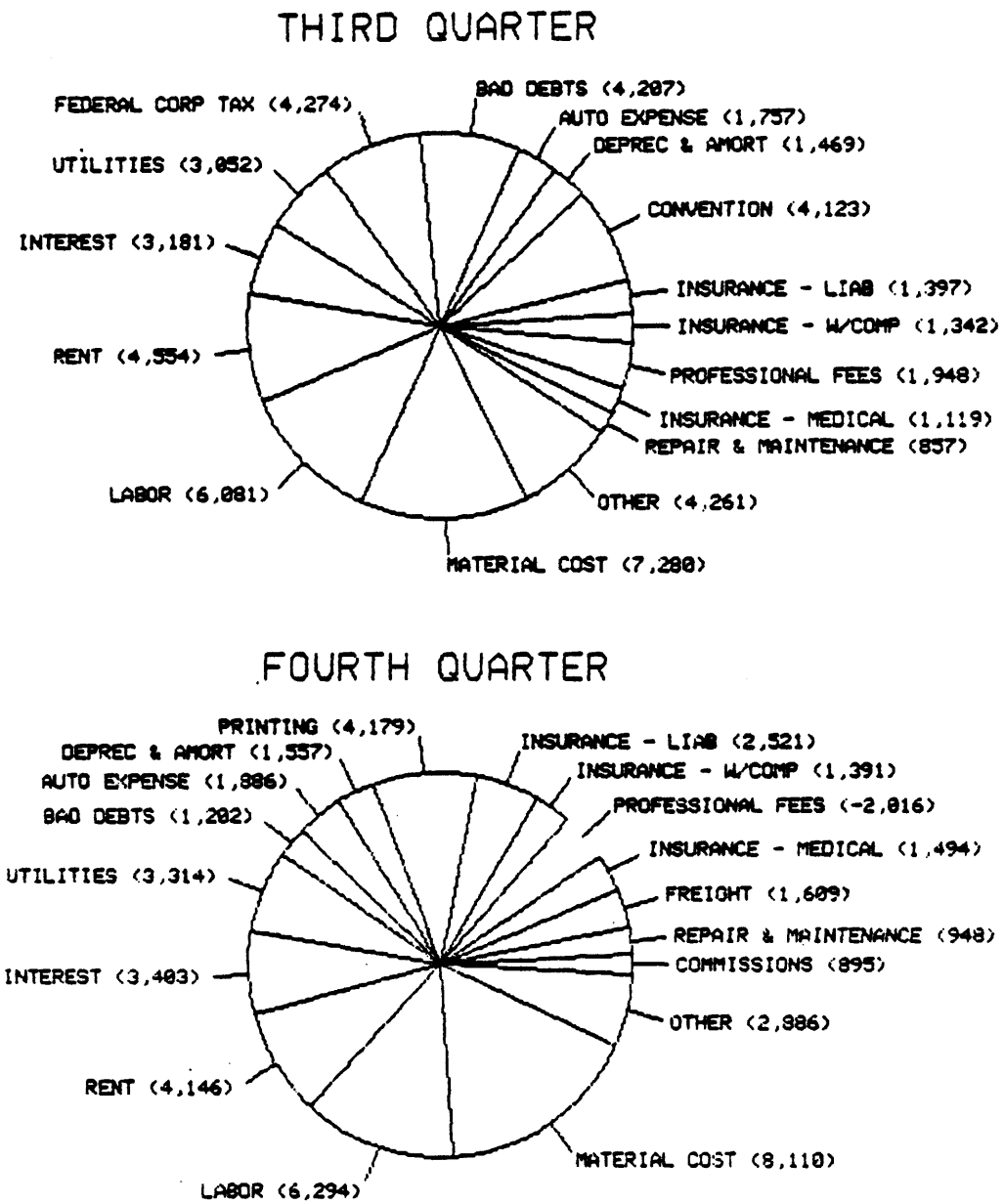


Figure 3-12. SPIE Chart with Four Dependent Attributes Using P and V Options (Sheet 2 of 2)

3.4.1 OPTIONAL DIAMETER

The second prompt* issued by ACCU-PLOT when creating a circular pie chart is:

```
OPTIONAL DIAMETER (INCHES,[R]):
```

If a specific diameter is desired for a pie chart, specify the desired diameter, in inches, in response to this prompt. For example, in Figure 3-12 an OPTIONAL DIAMETER of 2.75 inches is specified which allows two pie charts to be printed on one page.

Be sure to allow enough room on the page for labeling, or an error message will be returned. The minimum required diameter for a circular chart is two inches. A null response to this prompt will cause a default diameter to be determined by the system based on the page size and the required area for labeling. The letter R, if specified here, will rotate the graph 90 degrees.

3.4.2 X-AXIS OPTION CODE

The third prompt issued by ACCU-PLOT for circular charts is:

```
---------- PIE CHART DIRECTION ----------

    R - REVERSE ROTATION (COUNTER-CLOCKWISE)

0 attribute name.....OPTIONS:
```

The Reverse Rotation option will feed the segments into the pie in a counter-clockwise rotation instead of the default clockwise rotation.

Figure 3-13 shows an example of the Reverse Rotation option used on a year-to-date expense pie chart. Compare this example to Figure 3-15 which uses the default rotation.

*The first prompt issued by ACCU-PLOT, "DEVICE:", is the same for both circular and rectangular charts.

FIGURE 3-13 SPIE STATEMENT

```
SPIE EXPENSES BY-DSND YTD EXPENSE YTD LPTR HDR-SUPP
CAPTION "^U^^S3C^YEAR TO DATE EXPENSES"

DEVICE:  <CR>
OPTIONAL DIAMETER (INCHES,[R]): R <CR>

----------   PIE CHART DIRECTION  ----------
    R - REVERSE ROTATION (COUNTER-CLOCKWISE)

0 EXPENSE..................... OPTIONS: R <CR>

---------- PIE CHART OPTION CODES ----------
    C - SPECIFY CUTOFF PERCENTAGE
    P - SUPPRESS PERCENTAGE PRINTING
    Q - FORCE PERCENTAGE PRINTING
    V - PRINT SEGMENT VALUE
    X - EXPLODE SEGMENTS

1 YEAR TO DATE ............... OPTIONS: <CR>
```

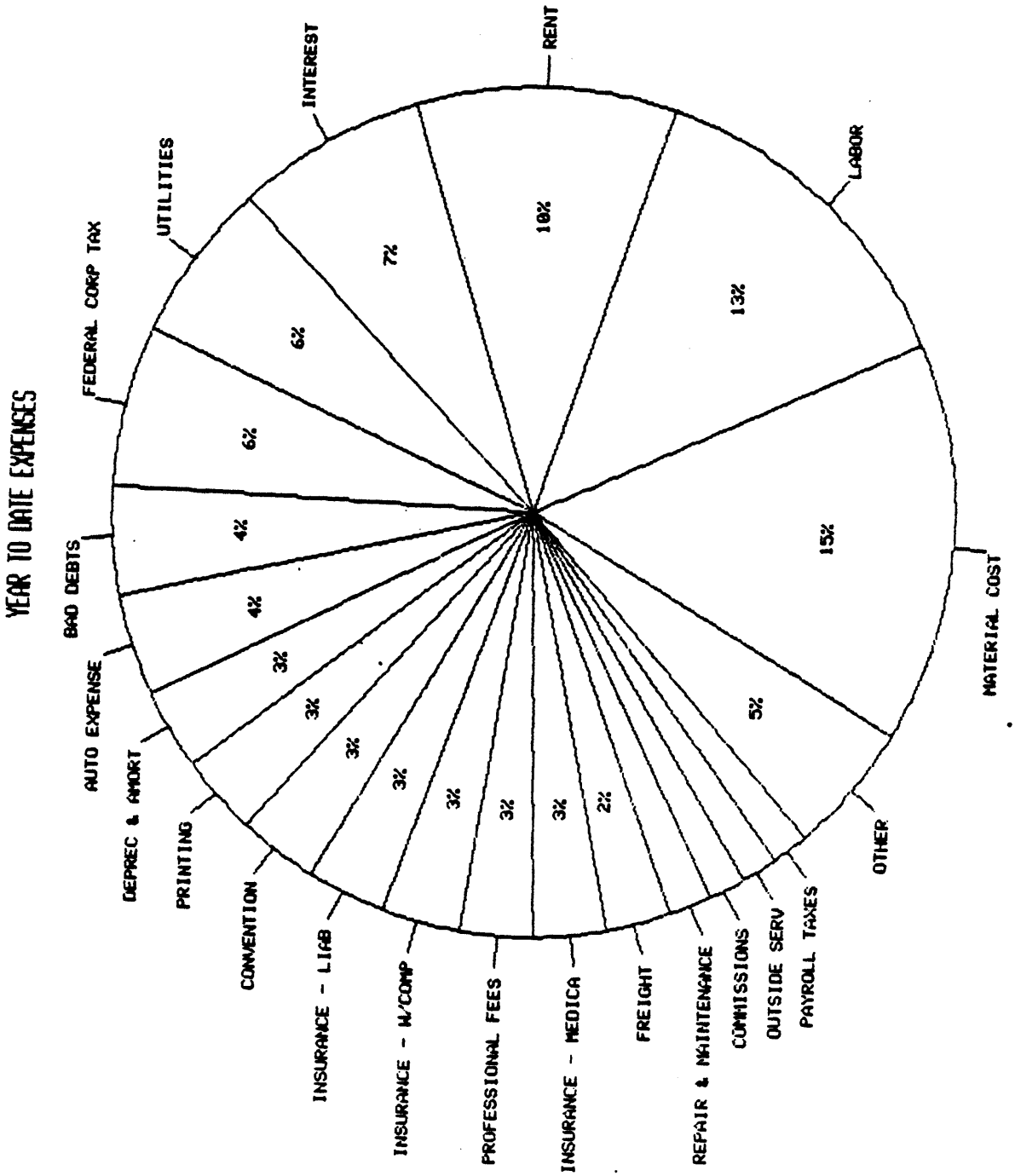


Figure 3-13. Use of R Option for Counter-Clockwise Segments

3.4.3 Y-AXIS OPTION CODES

The fourth and final prompt issued by ACCU-PLOT when creating a circular chart asks the user to specify options for the dependent attribute. The following menu will be displayed:

```
---------- PIE CHART OPTION CODES ----------

    C - SPECIFY CUTOFF PERCENTAGE
    P - SUPPRESS PERCENTAGE PRINTING
    Q - FORCE PERCENTAGE PRINTING
    V - PRINT SEGMENT VALUE
    X - EXPLODE SEGMENTS

1 attribute name..... OPTIONS:
```

3.4.3.1 C - Specify Cutoff Percentage

By default, ACCU-PLOT determines the optimum chart rotation and cutoff percentage. The system fills in the chart and checks for vertical overlapping of the segment descriptions. The system will then rotate the chart and adjust the cutoff percentage until it finds a combination where the segment descriptions do not overlap. The Specify Cutoff Percentage option is used to override the automatic generation of the optimum cutoff percentage. When specified, the system will rotate the chart to find the least amount of segment description overlap. When C is entered for the y-axis options, ACCU-PLOT will return the following prompt:

```
SEGMENT CUTOFF PERCENTAGE:
```

When a percentage is specified, any segments whose values are below that cutoff percentage wll be grouped into an "other" category and graphed accordingly. All data values above the cutoff percentage will remain as they are. For example, if you want to have all segments represented, no matter what size, you would specify 0 for the cutoff percentage. In this case, there would be no "other" category.

Figure 3-14 illustrates the use of the Segment Cutoff Percentage option on a chart with many segments. By specifying 3 as the cutoff percentage, many insignificant segments will be grouped in an "other" category leaving only the more significant segments.

3.4.3.2 P - Suppress Percentage Printing

This option will suppress the automatic printing of the segment percentage within the segments of the pie chart. The Suppress Percentage Printing option was specified for Figure 3-12.

FIGURE 3-14 SPIE STATEMENT

```
SPIE EXPENSES BY-DSND YTD EXPENSE YTD LPTR HDR-SUPP
CAPTION "'U''S4C'YEAR TO DATE EXPENSES"

DEVICE:  <CR>
OPTIONAL DIAMETER (INCHES,[R]): R <CR>

----------   PIE CHART DIRECTION  ----------
    R - REVERSE ROTATION (COUNTER-CLOCKWISE)

0 EXPENSE..................... OPTIONS: <CR>

---------- PIE CHART OPTION CODES ----------
    C - SPECIFY CUTOFF PERCENTAGE
    P - SUPPRESS PERCENTAGE PRINTING
    Q - FORCE PERCENTAGE PRINTING
    V - PRINT SEGMENT VALUE
    X - EXPLODE SEGMENTS

1 YEAR TO DATE ............... OPTIONS: CX <CR>
      LOWER EXPLODE PERCENTAGE: 10 <CR>
      UPPER EXPLODE PERCENTAGE: 5 <CR>
      SEGMENT CUTOFF PERCENTAGE: 3 <CR>
```

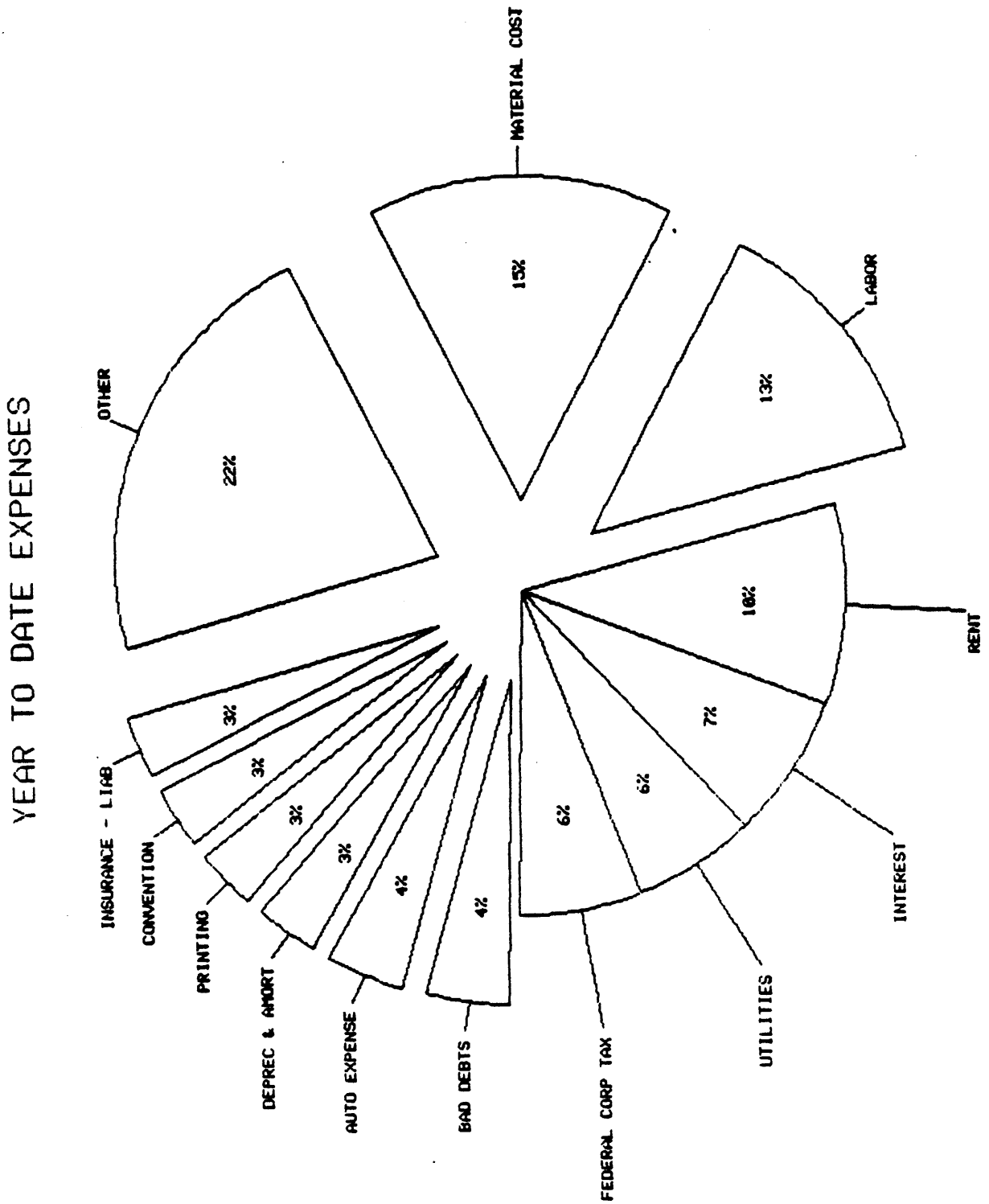


Figure 3-14. Using C Option to Group Insignificant Segments as OTHER and X Option for Exclusive Range

3.4.3.3 Q - Force Percentage Printing

By default, ACCU-PLOT will print the segment percentage within the segments of the pie. The system is designed to check each segment to determine if there is enough room to comfortably print the percentage within that segment. The system examines each segment horizontally, vertically, or both, depending on the angle of the slice. If the printed percentage will cross the segment boundary lines, the system will not print that percentage.

The Force Percentage Printing option is used to defeat the check for percentage overlap of segment boundaries. When Q is entered for the y-axis options, the system will print each segment percentage without regard to possible overlapping.

The Force Percentage Printing option was specified for Figure 3-15. Compare this chart to Figure 3-13 where the default percentage printing was used.

3.4.3.4 V - Print Segment Value

The Print Segment Value option will cause the actual data value to be printed next to the label for each segment within the pie chart. This value will be enclosed in parentheses.

Figures 3-12 and 3-16 illustrate the use of the Print Segment Value option.

FIGURE 3-15 SPIE STATEMENT

```
SPIE EXPENSES BY-DSND YTD EXPENSE YTD LPTR HDR-SUPP
CAPTION "^U^S2C^YEAR TO DATE EXPENSES"

DEVICE:  <CR>
OPTIONAL DIAMETER (INCHES,[R]): R <CR>

----------   PIE CHART DIRECTION  ----------
    R - REVERSE ROTATION (COUNTER-CLOCKWISE)

0 EXPENSE..................... OPTIONS: <CR>

---------- PIE CHART OPTION CODES ----------
    C - SPECIFY CUTOFF PERCENTAGE
    P - SUPPRESS PERCENTAGE PRINTING
    Q - FORCE PERCENTAGE PRINTING
    V - PRINT SEGMENT VALUE
    X - EXPLODE SEGMENTS

1 YEAR TO DATE ..............  OPTIONS: QX <CR>
      LOWER EXPLODE PERCENTAGE: 5 <CR>
      UPPER EXPLODE PERCENTAGE: 10 <CR>
```

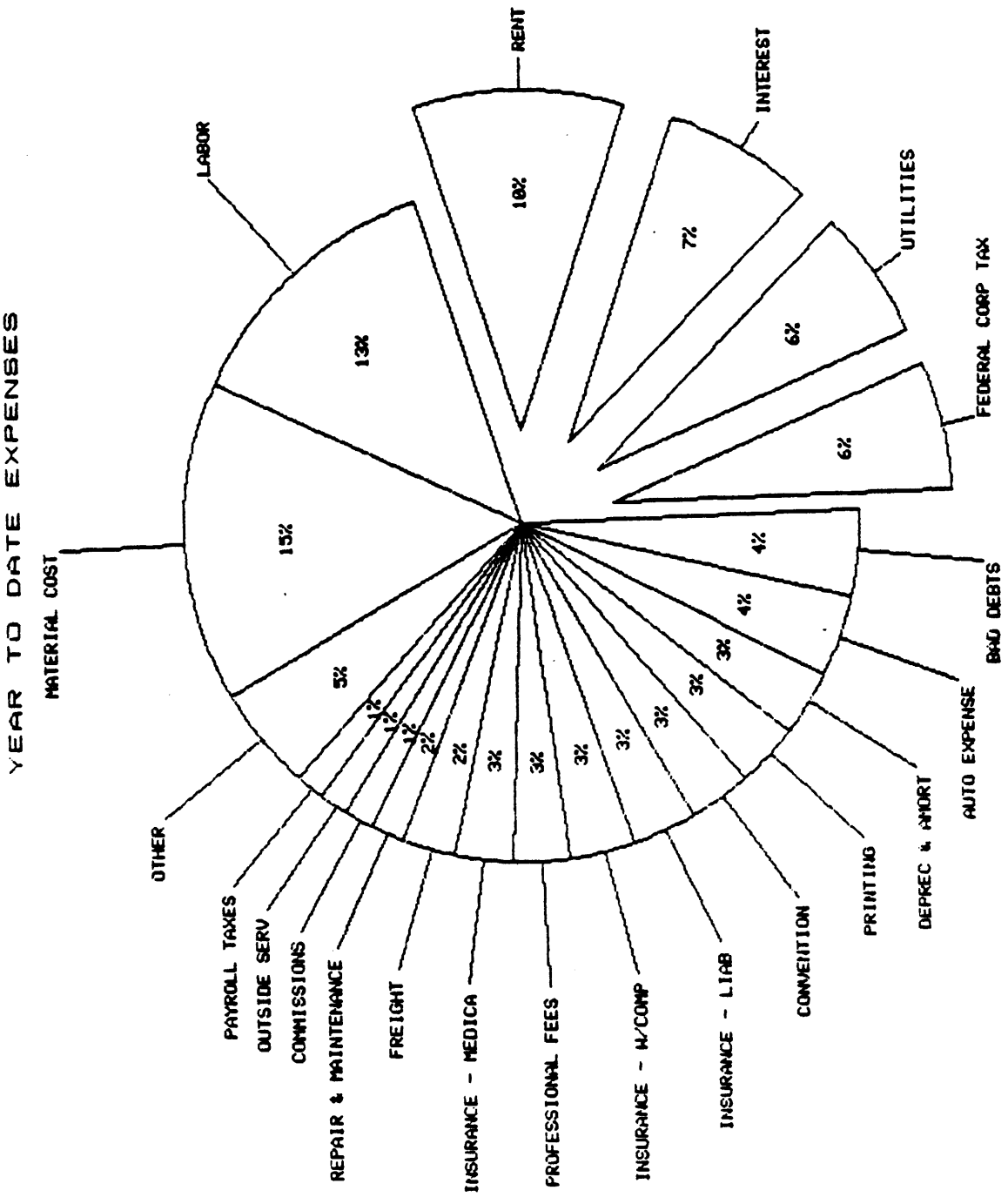


Figure 3-15. Using Q Option to Print Percentages in all Segments and X Option for Inclusive Range

3.4.3.5 X - Explode Segments

The Explode Segments option may be used when highlighting of data is desired. When X is specified for the current y-axis attribute, ACCU-PLOT will issue the following prompts:

```
LOWER EXPLODE PERCENTAGE:
UPPER EXPLODE PERCENTAGE:
```

For example, if the desired segments to be exploded lie in the range between five and ten percent, simply enter 5 for the LOWER EXPLODE PERCENTAGE and 10 for the UPPER EXPLODE PERCENTAGE. This is called an inclusive explode range and is illustrated by Figures 3-15 and 3-16. If the desired range for exploded segments is below five percent and above ten percent, enter 10 for the LOWER EXPLODE PERCENTAGE and 5 for the UPPER EXPLODE PERCENTAGE. In this case, the segments in the range between five and ten percent wll not be exploded, and any segments above or below that range will be exploded. This is called an exclusive explode range and is illustrated in Figure 3-14.

Note that the diameter of the pie may be reduced when exploding segments.

FIGURE 3-16 SPIE STATEMENT

```
SPIE SALES BY DATE WITH DATE GE "01/01/83" AND LE "12/31/83"
BREAK-ON MONTH "^VL^" TOTAL SALES.AMOUNT DET-SUPP LPTR HDR-SUPP
CAPTION "^U^^CS4^SALES DISTRIBUTION FOR 1983"
CAPTION "^L^^S3C^DOMESTIC OPERATIONS"

DEVICE:  <CR>
OPTIONAL DIAMETER (INCHES,[R]): R <CR>

----------   PIE CHART DIRECTION  ----------
    R - REVERSE ROTATION (COUNTER-CLOCKWISE)

0 MONTH ..................... OPTIONS: <CR>

---------- PIE CHART OPTION CODES ----------
    C - SPECIFY CUTOFF PERCENTAGE
    P - SUPPRESS PERCENTAGE PRINTING
    Q - FORCE PERCENTAGE PRINTING
    V - PRINT SEGMENT VALUE
    X - EXPLODE SEGMENTS

1 SALES AMOUNT ............... OPTIONS: VX <CR>
      LOWER EXPLODE PERCENTAGE: 0 <CR>
      UPPER EXPLODE PERCENTAGE: 99 <CR>
```

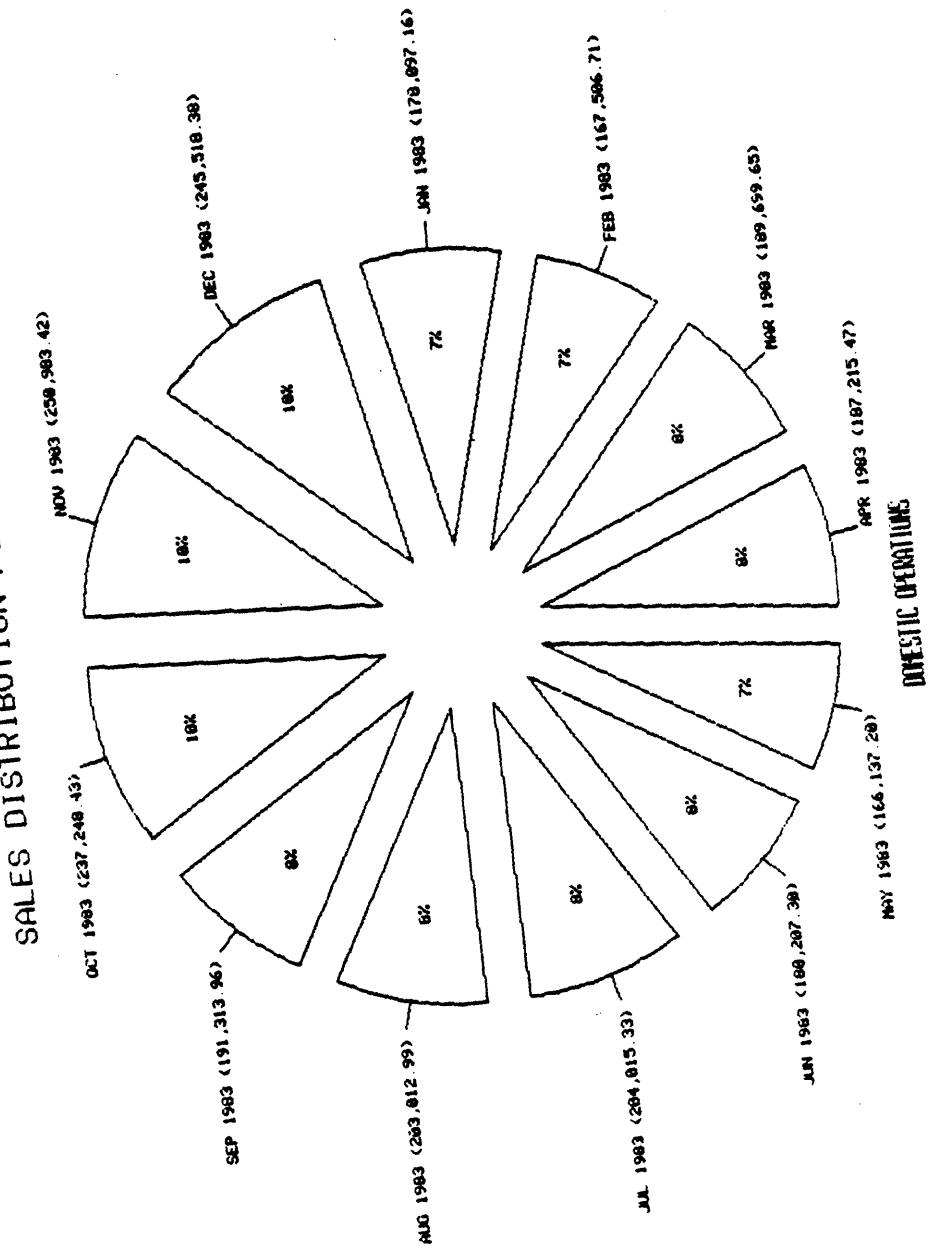


Figure 3-16. Use of X Option for Inclusive Range

system information 4

4.1 CONVERSIONS

Certain conversions are processed by ACCU-PLOT. Except when the T - Text Value option is specified for the controlling (x-axis) attribute, data must be converted into its internal form for scaling processing. The conversions which are processed by ACCU-PLOT are:

1. D (DATE - but not DD, DM, DY, DQ, or DJ)

2. MT (TIME - any form)

3. MD (MASK DECIMAL)

4. MR (MASK RIGHT DECIMAL)

If any allowable conversion is found as the last conversion code for a plottable attribute, the data prepared by the processor is reconverted to internal form for the ACCESS PLOT processing. When axis labels are generated, the data is converted again to external form.

With date conversion, if the year is not specified (D0) and data for other than the current year is processed, the internal representation will be incorrect and may result in an erroneous graph. To be safe, include the year in the form D2 or D4 with dates.

4.2 LIMITATIONS

The primary limiting factor in using the ACCU-PLOT Graphics System is available disk space. For some output devices, a contiguous block of frames is required as a working buffer. The size of the block depends on the size of the graph and the resolution of the device. Disk space is also required for the output data normally sent to the spooler. All of this disk space is temporary, and is returned to the system overflow pool when ACCU-PLOT is finished.

The second important limitation concerns work space. ACCU-PLOT stores a table of the data to be plotted in one of the user's work areas. The size of the work area affects the number of data values ACCU-PLOT may store before producing a graph. With a 100-frame extended work area, approximately 11,500 data values may be stored. Each frame holds 125 data values. If an attempt is made to store more data than can fit within the table, a 'FORWARD LINK ZERO' ABORT (REGISTER=12) system error condition will occur.

The last limitation concerns the range of values which are acceptable. Since ACCU-PLOT only operates on numeric data (text data is treated as sequential integers), there are maximum and minimum values. These are:

1. Maximum must be less than 2,147,483,648

2. Minimum must be greater than -2,147,483,648

3. Maximum - minimum must be less than 2,147,483,648

If it is not possible to keep values within these limits, consider using function or arithmetic correlatives to scale the data when using ACCU-PLOT.

4.3 ERROR CONDITIONS

Besides the error conditions normally associated with PICK System processing, the following conditions are unique to the ACCU-PLOT Graphics System.

[G1] MAXIMUM AXIS SIZE OUT OF RANGE!

An error has occurred in calculating the maximum axis length.

[G2] PLOT SIZE WOULD REQUIRE MORE THAN 10,000 FRAMES WORKING STORAGE. THE JOB WAS TERMINATED.

[G3] REQUESTED PLOT WIDTH 'A' IS GREATER THAN DEVICE MAXIMUM WIDTH.

[G4] REQUESTED PLOT DEPTH 'A' IS GREATER THAN DEVICE MAXIMUM DEPTH.

[G5] PLOT SIZE WOULD REQUIRE 'A' FRAMES WORKING STORAGE. THERE ARE NOT SUFFICIENT FRAMES AVAILABLE.

[G6] OUT OF OVERFLOW SPACE!

[G7] MINIMUM VALUE MUST BE LOWER THAN MAXIMUM VALUE!

This error condition will only result from incorrect values specified in a BASIC program using the BASIC interface to the ACCU-PLOT system.

[G11] PLOT TABLE DEFINITION ITEM 'A' IS NOT ON FILE.

[G12] PLOT TABLE DEFINITION ITEM 'A' HAS ENDED PREMATURELY.

[G13] PLOT TABLE ITEM 'A' HAS TOO FEW VALUES.

[G14] PLOT TABLE ITEM 'A' HAS TOO MANY VALUES.

[G15] PLOT TABLE ITEM 'A' CONTAINS NON-NUMERIC DATA.

[G16] PLOT DEVICE DEFINITION ITEM 'A' HAS ILLEGAL TYPE CODE IN LINE 1.

[G17] THERE ARE LESS THAN 50 LINES IN THE MESSAGE TABLE 'A'.

[G21] A PLOT STATEMENT REQUIRES AT LEAST 2 PLOTTABLE ATTRIBUTES.

[G22] COMPILED STRING FORMAT ERROR @ 'A'.

The output string from the ACCESS processor is not recognizable.

[G23] HISTORY STRING FORMAT ERROR @ 'A'.

The format of the data retrieved by the ACCESS processor is incorrect.

[G24] ILLEGAL ATTRIBUTE SEQUENCE NUMBER. THE SPECIFIED NUMBER DOES NOT HAVE THE "BAR" OPTION SELECTED.

[G25] ILLEGAL ATTRIBUTE SEQUENCE NUMBER. THE SPECIFIED NUMBER IS ALREADY STACKED WITH ANOTHER ATTRIBUTE.

[G26] ILLEGAL ATTRIBUTE SEQUENCE NUMBER. THE NUMBER MUST BE GREATER THAN ZERO.

[G27] ILLEGAL ATTRIBUTE SEQUENCE NUMBER. THE NUMBER MUST BE LOWER THAN THE CURRENT ATTRIBUTE.

[G28] ILLEGAL ATTRIBUTE SEQUENCE NUMBER. THE SPECIFIED NUMBER IS ALREADY GROUPED WITH ANOTHER ATTRIBUTE.

[G29] THE LABEL AREA (AND OPTIONAL WIDTH) WILL EXCEED THE AVAILABLE PLOT WIDTH.

[G30] THE LABEL AREA (AND OPTIONAL WIDTH) WILL EXCEED THE AVAILABLE PLOT DEPTH.

[G31] THE REQUIRED LABEL AREA WILL CAUSE THE CIRCLE DIAMETER TO BE LESS THAN TWO INCHES.

[G40] PLEASE CONTACT YOUR SUPPORT ANALYST IMMEDIATELY.
CODE = 0, A, B, C.

[G48] PLEASE NOTIFY GENERAL AUTOMATION USING RESPONSE CARD.
SERIAL NUMBER 'A' WILL EXPIRE IN 'B' DAYS. CODE = 'C'.

4.3.1 OTHER ERROR CONDITIONS

The following conditions may produce incorrect results, but are not identified by an error message. The following sections describe the usual results and their causes.

1. Random Lines

Random lines may sometimes appear in point-to-point line charts. This condition usually occurs because the data for the x-axis attribute is not sorted. The data for the controlling attribute must be sorted in some order to produce a meaningful graph. When random lines do occur, try using the verb SPLOT and include sorting criteria.

2. Overlapping Labels

Overlapping labels may occur when using the Text Value or Literal Value options for the x-axis. The data is scaled to leave as much space as possible between tick marks; but if there is not sufficient length along the x-axis, the labels will overlap. The best solution is to increase the length of the x-axis (which may require the use of the R - Rotate option). Another solution is to break the graph into smaller graphs so that the range of values for any given graph is able to fit comfortably along the x-axis. Overlapping labels may also occur when specifying the Print Value option for the y-axis in conjunction with either the Text Value or Literal Value options for the x-axis. Each of these extra values requires an extra row of characters for each x-axis tick mark.

3. Truncated Labels

Truncation of label data occurs because the V/MAX attribute definition specification for the truncated attribute is not large enough for the length of the label. Try increasing V/MAX.

4. Extra Blank Pages or Blank Lines

This condition occurs with DET-SUPP charts. Extra line feeds are output during data preparation by the ACCESS processor. These extra line feeds may be suppressed by using the 'L' option with the BREAK-ON modifiers in the PLOT statement.

4.4 BASIC INTERFACE

In addition to being an extension to the PICK ACCESS language, ACCU-PLOT also provides an interface for BASIC programs. This interface is through the conversion processor. The general format of the user exit is:

```
ERROR = OCONV(PARAMETER-STRING,'Uxxxx')
```

where PARAMETER-STRING is a string to be described for each exit and Uxxxx is the user conversion code (depending upon location of ACCU-PLOT). The result of the operation may be determined by the value of ERROR after the call. If a non-null value is returned, an error occurred; the program should execute a STOP ERROR instruction to abort execution and print the error message.

The facilities available from BASIC are described in the following sections. Generally, the ACCU-PLOT system works in a "virtual coordinate" system - the boundaries of which are user-selected. The ACCU-PLOT system maps this user-defined coordinate system onto the coordinate system of the output device selected. Because this virtual coordinate system is employed, BASIC programs using graphics are independent of the actual output devices (they may run on multiple devices without modification or recompilation.

Note that the BASIC interface requires that the frame at PCB+30 and the bit "SB30" are only used by the PLOT routines. If you will be using either of these, do not use the BASIC interface. The frame at PCB+30 is used as control storage and the bit "SB30" is used as a first-entry flag.

4.4.1 BASIC INTERFACE TECHNIQUES

This section will suggest techniques to make interfacing between ACCU-PLOT and BASIC programs easier. First, define an array "USEREXITS(16)" to contain all the USER-EXITS codes. To fill in this array, use MATREAD from the dictionary of the file "SPSYM". Next, set up a subroutine to be used to call the graphics system. Pass all data to the graphics system using a variable for the parameter-string (e.g., PD) and a variable for the entry point (e.g., PE). This graphics subroutine can then check for error conditions at every call and stop if an error occurs. A sample program is shown below.

```
001 DIM USEREXITS(16)
002 OPEN "DICT", "SPSYM" ELSE STOP 201,"SPSYM"
003 MATREAD USEREXITS FROM "USER-EXITS" ELSE STOP 202,"USER-EXITS"
004 PD="7,7,1;-1.00,0;1.00,2.00";PE=0;GOSUB 1000
005 PD="0.10,1.00;0.10,1.00";PE=1;GOSUB 1000
006 PD="4";PE=8;GOSUB 1000
007 PD="-0.75,1;0,1.75;0.75,1;0,0.25;-0.75,1",PE=2;GOSUB 1000
008 PD="2";PE=9;GOSUB 1000
009 PD="0.75,0.35,3;This is an example of TEXT";PE=3;GOSUB 1000
010 PD="0";PE=10;GOSUB 1000
011 PD="-0.90,0.10;0.90,1.90";PE=5;GOSUB 1000
012 PD="0.00,1.00,0;0.50,0,360";PE=6;GOSUB 1000
013 PD="0.00,1.10,3;0.00,0.90,4";PE=7;GOSUB 1000
014 PD="";PE=4GOSUB 1000
015 STOP
016 1000 * ACCU-PLOT USER EXIT SUBROUTINE
017 ERROR = OCONV(PD,USEREXITS(PE+1))
018 IF ERROR NE "" THEN STOP ERROR
019 RETURN
```

The examples in the following sections are based on this example.

4.4.1.1 INITIALIZATION (Entry Point = 0)

Before using any PLOT function, the plotting software and possibly the output device should be initialized. This step is required only once. The required parameters for the INITIALIZATION user exit are: 1) the size and orientation of the output plot in inches, 2) the minimum virtual coordinates, and 3) the maximum virtual coordinates. The output device name may be specified. The parameter-string is:

```
XSIZE,YSIZE,Z;XMIN,YMIN;XMAX,XMIN;DEVICE-NAME
```

where:

XSIZE	= Length in inches for the x-axis
YSIZE	= Depth in inches for the y-axis
Z	= Orientation (1 = normal; -1 = rotate 90 degrees)
XMIN	= Minimum virtual X value
YMIN	= Minimum virtual Y value
XMAX	= Maximum virtual X value
YMAX	= Maximum virtual Y value
DEVICE-NAME	= Name of device definition item

All parameters are required except the DEVICE-NAME. If the DEVICE-NAME is omitted, the default device will be used. The default device is "STDPTR" if output is being sent to the printer (PRINTER ON in effect), otherwise the device will be "STDCRT" (PRINTER OFF in effect). For some devices, the output should be directed to the spooler (PRINTER ON) during this step (some devices require special codes to be sent to enable graphics).

An example of a 7 by 7 inch output area, normal orientation, to the standard output device (STDPTR or STDCRT) is as follows. The virtual coordinate system chosen is: -1.00 <= X <= 1.00, 0 <= Y <= 2.00.

```
PD = '7,7,1;-1.00,0;1.00,2.00' ;  PE = 0 ;  GOSUB 1000
```

4.4.1.2 SET POINTS (Entry Point = 1)

The parameter-string for SET POINTS is a series of X-Y pairs separated by semicolons (;). The "X" value is separated from the "Y" value by a comma (,). An example for SET POINTS is:

```
PD = '-0.10,1.00;0.10,1.00' ;  PE = 1 ;  GOSUB 1000
```

4.4.1.3 DRAW LINES (Entry Point = 2)

The parameter-string for DRAW LINES is a series of X-Y pairs separated by semicolons (;). The "X" value is separated from the "Y" value by a comma (,). The first line is defined by the first two X-Y pairs, the second line by the second and third X-Y pairs, the third line by the third and fourth X-Y pairs, etc. An example for DRAW LINES is:

```
PD = '-0.75,1;0,1.75;0.75,1;0,0.25;-0.75,1' ;  PE = 2 ;  GOSUB 1000
```

4.4.1.4 PRINT TEXT (Entry Point = 3)

The parameter-string for PRINT TEXT is an X-Y-Z triple followed by a semicolon followed by a text string to be "printed." The "X", "Y", and "Z" values are separated by commas (,). "X" and "Y" specify the starting location for the text to be printed. The "Z" value is used to specify character size and orientation. If the "Z" value is even (0, 2, 4 ...), the orientation will be horizontal; if it is odd (1, 3, 5 ...), the orientation will be vertical. The size of the characters used is 1 plus 1/2 of the "Z" value (1 + INT(Z/2)). Thus:

```
Z = 0  Horizontal characters, size 1
Z = 1  Vertical characters, size 1
Z = 2  Horizontal characters, size 2
Z = 3  Vertical characters, size 2
Z = 4  Horizontal characters, size 3
Z = 5  Vertical characters, size 3
Z = 6  Horizontal characters, size 4
Z = 7  Vertical characters, size 4
```

The text-string may consist of any of the ASCII characters defined for the selected output device. If the device is dot oriented (e.g., a dot matrix printer), the characters are defined in a symbol file. The name of the symbol file is specified in the DEVICE DRIVER DEFINITION item.

If the character size specified is higher than the maximum size for the selected device, the largest size will be used. An example of printing a text-string vertically with character size 2 is:

```
PD = '-0.75,0.35,3;This is an example of TEXT' ;  PE = 3 ;  GOSUB 1000
```

4.4.1.5 PRINT BUFFER & INITIALIZE (Entry Point = 4)

No parameter-string is required for this exit. The buffer (if any) is sent to the currently active output device (normally, the spooler). This step is required to "finish up" the current plot. After this step, the output page will be set to "blank" again. An example of this exit is:

```
PD = '' ;  PE = 4 ;  GOSUB 1000
```

4.4.1.6 DRAW A RECTANGLE (Entry Point = 5)

The parameter-string for rectangle drawing consists of two X-Y pairs separated by a semicolon (;). The first "X" and "Y" values define the lower-left corner and the second "X" and "Y" values define the upper-right corner. An example of drawing a rectangle is:

```
PD = '-0.90,0.10;0.90,1.90' ;  PE = 5 ;  GOSUB 1000
```

4.4.1.7 DRAW ARC OR CIRCLE (Entry Point = 6)

The parameter-string for DRAW ARC OR CIRCLE consists of two sets of values. The first set defines the center of the circle (X,Y) and the beginning angle of the arc. The second set contains the radius of the circle (in units of the x-axis) and the number of degrees of the arc. The format is:

```
XCENTER,YCENTER,BEGIN ANGLE;RADIUS,0,DEGREES
```

An example of drawing a circle (360 degrees), beginning at 0 degrees, centered at X = 0 and Y = 1, with a radius of 0.50 is:

```
PD = '0.00,1.00,0;0.50,0,360' ;  PE = 6 ;  GOSUB 1000
```

Note that to form a true circle, the ratio of virtual X range to virtual Y range should be the same as the ratio of width to depth. It it is not, an elipse will result.

4.4.1.8 DRAW SYMBOLS (Entry Point = 7)

The parameter-string for DRAW SYMBOLS consists of any number of X-Y-Z triples separated by semicolons (;). The X, Y, and Z values are separated by commas (,). The X and Y values specify the center point for the symbol. The Z value specifies the symbol number to be drawn. The range of symbol values is dependent on the actual output device selected.

The symbol number references a table (Character and Symbol Definition Table) defined by the Device Definition Table item for the selected output device. Symbol selection is "circular." That is, if there are only 8 symbols available for the device, and symbol 10 is selected, the actual symbol selected will "circle" around to symbol 2. An example of DRAW SYMBOLS is:

```
PD = '0.00,1.10,3;0.00,0.90,4' ;  PE = 7 ;  GOSUB 1000
```

4.4.1.9 SELECT PATTERN (Entry Point = 8)

The parameter-string for SELECT PATTERN is a single decimal number specifying the pattern number to be used in subsequent operations. The pattern selection is for both line spacing and rectangle shading. The range of pattern numbers is dependent on the selected output device.

The pattern number references a table (Pattern Definition Table) defined by the Device Definition Table item for the selected output device. Pattern selection is "circular." That is, if there are only 4 patterns, and pattern 5 is selected, the actual pattern will "circle" back to 1. Pattern 0 is special - for lines, the pattern is a solid line; for rectangles, shading is inhibited. Pattern 0 is the default pattern. An example of SELECT PATTERN is:

```
PD = "4" ;  PE = 8 ;  GOSUB 1000
```

4.4.1.10 SELECT COLOR (Entry Point = 9)

The parameter-string for SELECT COLOR is a single decimal number specifying the color number to be used in subsequent operations. The range of color numbers is dependent on the selected output device. The Device Definition Table specifies the number of colors available for a particular device. Color selection is "circular." That is, if there are only 3 colors, and color 5 is selected, the actual color will "circle" around to color 2. Color 0 is special - it is the default, used for black. An example of SELECT COLOR is:

```
PD = "2" ;  PE = 9 ;  GOSUB 1000
```

4.4.1.11 SELECT STYLE (Entry Point = 10)

The parameter-string for SELECT STYLE is a siugle decimal number specifying a style number which, in turn, specifies a pattern and color number. The style number references a table (Style Definition Table) defined by the Format Definition Table item for the selected output device. The use of SELECT STYLE is significant because it allows BASIC programs to use devices with or without color. The Style Definition Table is usually defined for a black and white device so that each style selects a different pattern. For a color device, the table is defined so that each style selects a different color, using the most suitable pattern.

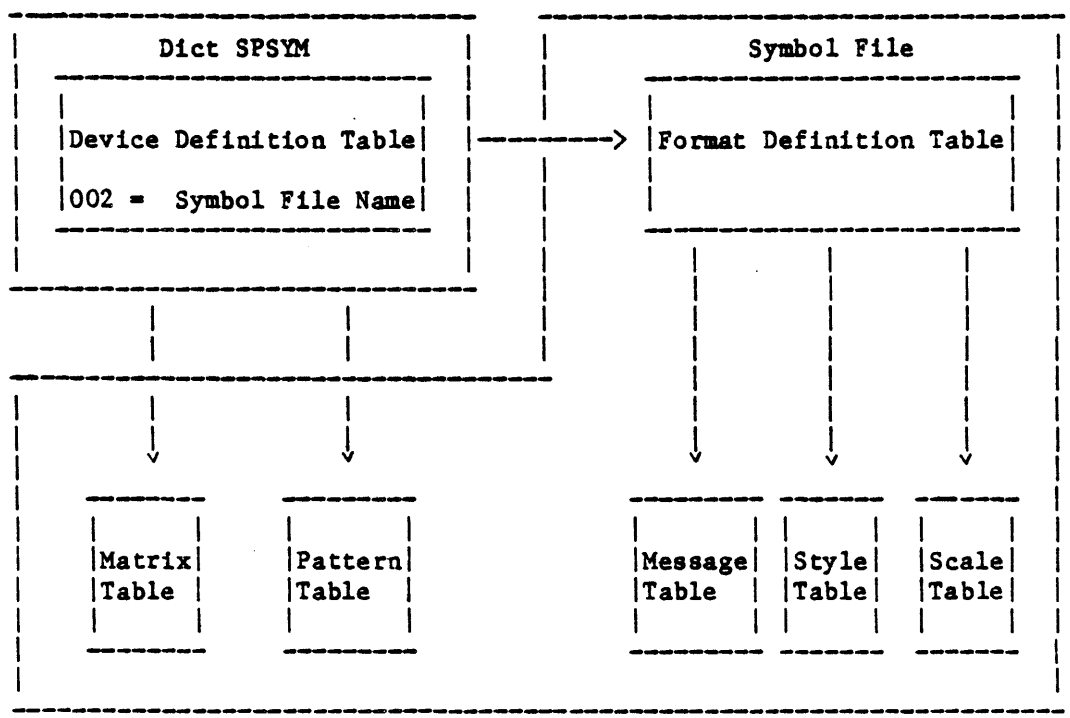
Style selection is "circular" as previously described. Style 0 is the default style, specifying pattern 0 and color 0. An example of SELECT STYLE is:

```
PD = "0" ;  PE = 10 ;  GOSUB 1000
```

4.5 USER CUSTOMIZATION

The ACCU-PLOT Graphics System is driven via a series of tables. These tables define the device characteristics, chart formatting information, character sizes, line and bar patterns and colors, and scaling increment factors. Any of these tables may be modified and new tables can also be created by the user.

The diagram below illustrates the interaction between the various ACCU-PLOT tables.



4.5.1 DEVICE DEFINITION TABLE

The DICT for the SPSYM file contains the Device Definition Table (see Appendix A). The Device Definition Table is found in the DEVICES/REL file and transferred to DICT SPSYM when the devices are linked. The name(s) of the Device Definition Table(s) can be found by typing LIST-DEVICES from TCL.

The Device Definition Table is used to configure the graphics system for a particular output device. A separate table is required for each output device supported by the ACCU-PLOT Graphics System. Line 2 in the table defines the symbol file which contains all formatting information, as well as character and symbol definitions for the device. (Dot-matrix printers use characters and symbols which are defined in the file SPSYM. Other types of devices, such as pen-plotters and graphics CRTs, use symbol files peculiar to those devices.)

The items in lines 3 through 5 point to tables which are stored in the file named on line 2 (SPSYM). Line 3 refers to the Format Definition Table (see Appendix B). This table will, in turn, reference other tables. Line 4 refers to the Character Matrix Definition Table (see Appendix C), and line 5 refers to the Pattern Definition Table (see Appendix F).

Lines 6 through 13 define the characteristics of the specific device.

4.5.2 FORMAT DEFINITION TABLE

The Format Definition Table (see Appendix B) is stored in the file defined in line 2 of the Device Definition Table (SPSYM for dot-matrix printers, see Appendix A). The Format Definition Table is used to define the formatting parameters associated with rectangular and circular charts.

For rectangular charts, these parameters include the tick mark length, the distance from label to legend, the length of the legend identifying mark, the minimum and maximum distance between tick marks, the minimum and maximum bar width, and the maximum coverage percentage for bar charts. Also included are the foreground and background colors (for applicable devices); the default plot caption character size; and label, symbol, and axis header character sizes.

For circular charts, these parameters include the distance from pointer line to label, the length of pointer line, the percent of radius to explode segments, and the percent of radius to print the percentage. Also included are the foreground and background colors (for applicable devices); the default plot caption, label, and percentage character sizes; and the number of decimal places used in the percentage.

Separate Format Definition Tables are required for both rectangular and circular charts. Please note that the sizes on lines 4 through 11 in these tables are specified in thousandths of an inch.

The Format Definition Table points to three other tables used for formatting purposes. Line 1 refers to the Message Table ITEM/ID. Line 2 references the Style Definition Table (see Appendix D), and line 3 refers to the Scaling Increment Table (see Appendix E).

4.5.3 CREATING CUSTOMIZED CHART FORMATS

It is possible to customize the ACCU-PLOT chart format for various applications by creating new formatting tables. The first step in changing the formatting characteristics for a particular device is to create a new Device Definition Table (see Appendix A). For example, to change the characteristics for a Printronix printer, create a new Device Definition Table named PTX1.

```
>ED DICT SPSYM PTX1
```

Note that the following is assumed: The desired change is to the formatting characteristics and not the character set, character matrix, or line and bar patterns. Therefore, the only difference between the new Device Definition Table, PTX1, and the old Device Definition Table, PTX, will be on line 3 which will reference new Format Definition Tables.

The next step is to create new Format Definition Tables, one for rectangular charts and one for circular charts. The formatting information in these tables can then be customized for the particular application.

New tables can also be created for the other tables which are referenced by the Device and Format Definition Tables. This allows the user complete control to modify the ACCU-PLOT Graphics System.

To use the newly created formatting information with ACCU-PLOT, it is only necessary to specify the new Device Definition Table name in response to the first prompt issued by ACCU-PLOT, "DEVICE:". The system will then use the tables and formatting information referenced by the new table.

4.5.4 CHARACTER SIZES

The ACCU-PLOT Graphics System includes four standard character sizes for most dot-matrix devices, which are defined in the Character Matrix Definition Table (see Appendix C). These sizes are:

1. Single high; single wide
2. Double high; single wide
3. Single high; double wide
4. Double high; double wide

Other types of devices (pen-plotters and graphics CRTs) may include up to six character sizes. The Character Matrix Definition Table is arranged so that one character size is represented on a single line within the table.

Additional character sizes may be created by the user. To do so, two functions must be performed. First, a new attribute must be created in the SYMBOL DEFINITION FILE (referenced on line 2 of the Device Definition Table (see Appendix A)) for each character (A, B, C, etc.) and symbol (S1, S2, S3, etc.) Also see Appendix G, Character and Symbol Definition. Second, a new character matrix must be created in the Character Matrix Definition Table which corresponds to the new attribute created in the SYMBOL DEFINITION FILE.

4.5.5 PATTERNS AND COLORS

The Style Definition Table (see Appendix D) specifies what patterns and colors will be used for dependent (y-axis) attributes when constructing a chart. There are two values for each style selection. The first value corresponds to a pattern found in the Pattern Definition Table (see Appendix F). The second value corresponds to the color selection. When producing color charts, the pattern style may remain constant while the color may be changed to differentiate between y-axis attributes.

Patterns for lines and bars are found in the Pattern Definition Table. Each line within this table defines both a line pattern and a bar pattern. The first value describes the line pattern and the subsequent values describe the bar pattern. These patterns can be modified or new patterns may be created by the user.

4.5.6 AUTOMATIC SCALING

Automatic scaling is a standard feature of the ACCU-PLOT Graphics System. The acceptable increment values between tick marks used for the automatic scaling are based on the information found in the Scaling Increment Table (see Appendix E). The standard values in this table may be changed by the user to customize the acceptable increments used by the system. It is recommended to start with 0, then 10, and to end with 100, followed immediately by a 0. The values in between the first 0 and 100 should be in ascending order and the number of values used is variable.

4.6 DEVICE DRIVER CHARACTERISTICS

4.6.1 HORIZONTAL DOT MATRIX - OVERVIEW

The Horizontal Dot Matrix (HDM) device driver module allows ACCU-PLOT to function with printers using the Printronix graphics protocol (or a similar 6-bit horizontal protocol). Printers using this protocol include the C.Itoh CI-300 and CI-600, the Printronix P150, P300, P600 and MVP, the Trilog Colorplot 100 (Black and White only), the Dataproducts M100, and the Printek 900 series. The HDM driver requires a "plot buffer" for vector-to-raster conversion. The buffer is transient (taken from the overflow space pool at initiation and returned at termination). All standard ACCU-PLOT features are supported with the HDM driver. The device names and characteristics are shown:

Printer	Device	Horiz DPI	Vert DPI	
C. Itoh CI-300/600	CI-300	60	72	
C. Itoh CI-300/600	CI-300.HI	120	144	
C. Itoh CI-300/600	CI-300.12CPI	70	72	
C. Itoh CI-300/600	CI-300.12CPI-HI	140	144	
C. Itoh CI-300/600	CI-300.13CPI	80	72	
C. Itoh CI-300/600	CI-300.13CPI-HI	160	144	
Printronix P-Series	PTX	60	72	
Printronix MVP	MVP	60	75	Native Mode
Printronix MVP	MVP-HI	100	100	Letter Quality Mode
Printronix MVP	PTX	60	72	P-Series Emulation
Printronix MVP	PTX-HI	100	96	P-Series Emulation & Letter Quality Mode
Trilog Colorplot 100	Colorplot-I	100	100	
Trilog Colorplot II	Colorplot-II	80	75	
DataProducts M100	DP.M100	70	84	
T. I. 810LQ	T1810LQ	60	72	
Printek 900 Series	PRINTEK	72	72	
Printek 900 Series	PRINTEK-HI	144	144	

4.6.2 VERTICAL DOT MATRIX - OVERVIEW

The Vertical Dot Matrix (VDM) device driver module allows ACCU-PLOT to function with many printers using a vertical dot-column protocol. The table in this section lists the devices currently supported by this driver.

The VDM driver requires a "plot buffer" for vector-to-raster conversion. The buffer is transient (taken from the overflow space pool at initiation and returned at termination).

All standard ACCU-PLOT features are supported with the VDM driver except when driving a printer which is not capable of maintaining the vertical form position when using graphics. If a printer is unable to maintain vertical form position, headings, footings, and pagination are not supported. The plot is configured to fill a full page (vertically). The default page size is 11 inches, and is defined in the Device Definition Table. The TERM setting is used only to determine page width. In the Device Definition Table (in "DICT SPSYM", the device name is ITEM-ID, also see Appendix A), line 12 determines the page depth. The value for this line may be calculated by multiplying the page depth in inches times the dot density (table line 11), then subtracting 1. For example, if the page depth is 8-1/2 inches and the dot density is 72, the entry on line 12 should be 611 ((8.5 x 72) - 1). Alternate device names may be created for other page depths.

Some of the printers supported by the VDM driver require that all 7 or 8 bits be used for graphics output. Some systems support only 7 bits for serial ports. Check with the system vendor before selecting a device which requires 8 bits.

If a printer requires 7 or 8 bits, it will not be possible to drive that printer from a slave port on a terminal. This is because the control sequences for enabling and disabling the slave port may be produced falsely as part of the graphics output. Also, when using the spooler to output to the terminal, carriage returns, line feeds, and form feeds are converted to other control characters, which destroy the graphics output. Printers that use only 6 bits for graphics output do not have this problem.

On PICK Systems, when using a printer from a serial spooler port, it is important to start the printer without delay characters. To do this, before starting the printer, type "TERM ,,,0,0". Then start the printer using "STARTPTR ...". After the printer is started, the delay characters for your terminal may be changed back.

The device names and characteristics are shown below:

Printer Model	Device	Resolution	Bits	TOF	Colors
DATAPRODUCTS/IDS PRISM	PRISM80	84x84	7	OK	1
DATAPRODUCTS/IDS PRISM	PRISM80-CLR	84x84	7	OK	6*
DATAPRODUCTS/IDS PRISM	PRISM132	84x84	7	OK	1
DATAPRODUCTS/IDS PRISM	PRISM132-CLR	84x84	7	OK	6*
OKIDATA 83	ML83	60x66	7	NO	1
OKIDATA 84	ML84	60x72	7	NO	1
OKIDATA 84	ML84.12CPI	72x72	7	NO	1
OKIDATA 92	ML92	60x72	7	OK	1
OKIDATA 92	ML92.12CPI	72x72	7	OK	1
OKIDATA 93	ML93.12CPI	72x72	7	OK	1
OKIDATA 93	ML93	60x72	7	OK	1
OKIDATA 2410	OKI2410	60x72	7	OK	1
OKIDATA 2410	OKI2410-HI	120x144	7	OK	1
OKIDATA 2410	OKI2410.12CPI	72x72	7	OK	1
OKIDATA 2410	OKI2410.12CPI-HI	144x144	7	OK	1
DATASOUTH 180	DS180	75x72	6	NO	1
DATASOUTH 220	DS220	60x72	8	OK	1
ANADEX 9000	ADX9000	60x72	6	NO	1
ANADEX 9001	ADX9001	75x72	6	NO	1
ANADEX 9500	ADX9500	60x72	6	NO	1
ANADEX 9501	ADX9501	75x72	6	NO	1
CENTRONICS 352	CENT352	66x72	6	OK	1
PROWRITER 8510/1550	PRO	80x72	7	OK	1
PROWRITER 8510/1550	PRO-HI	160x144	7	OK	1
PROWRITER 8510/1550	PRO-CLR	80x72	7	OK	6*
PROWRITER 8510/1550	PRO-CLR-HI	160x144	7	OK	6*
T. I. 855	TI855	72x72	8	OK	1
T. I. 855	TI855-HI	144x144	8	OK	1
TALLY 160	MT160	100x64	8	OK	1
TALLY 180	MT180	100x64	8	OK	1
EPSON MX80	MX80	60x72	8	NO	1
EPSON MX100	MX100	60x72	8	NO	1
LEAR SIEGLER VP500	VP500	72x72	7	OK	1
LEAR SIEGLER VP500	VP500-CLR	72x72	7	OK	6*
G.E. 3000 SERIES	GE3000	72x72	6	OK	1
DEC LA100	LA100	66x72	6	OK	1

*Black, Blue, Red, Green, Orange, Violet.

4.6.3 VECTOR - OVERVIEW

The "VECTOR" device driver module enables ACCU-PLOT to interface with a variety of pen plotters and graphic CRTs. The following table lists the devices that are currently defined and supported by this driver.

All standard ACCU-PLOT features are supported with the ""VECTOR" driver. Headings, footings, and pagination are not supported. The no page option "(N)" may be used with graphic CRTs. The system will wait the number of seconds in the form feed delay before displaying the next graph. Only one graph may be produced on a single page or screen.

Plotter Model	Device	Plotter Size	Colors
HEWLETT PACKARD 7220C	HP7220C	11x17	8
HEWLETT PACKARD 7220T	HP7220T	11x17	8
HEWLETT PACKARD 7470A	HP7470	8.5x11	2
HEWLETT PACKARD 7475	HP7475	11x17	6
HEWLETT PACKARD 7475	HP7475S	8.5x11	6
HOUSTON INSTRUMENTS DMP29	DMP29	11x17	8
HOUSTON INSTRUMENTS DMP29	DMP29S	8.5x11	8
MANNESMANN TALLY PIXY1	PIXY1	8.5x11	1
MANNESMANN TALLY PIXY3	PIXY3	8.5x11	3
NICOLET ZETA CORP. ZETAB	HP7220C	11x17	8
ROLAND DXY101	DXY101	8.5x11	1
ROLAND DXY800	DXY800	8.5x11	8
TEKTRONIX, INC. 4662	TEK4662	11x15	1
TEKTRONIX, INC. 4662 w/OPTION 31	TEK4662.OPT31	11x15	8
TEKTRONIX, INC. 4663	TEK4663	17x24	2

CRT Model	Device	Reslution	Colors
CIE TERMINALS	CIT467	572x480	7
DIGITAL ENGINEERING RETRO-GRAPHICS BOARD FOR:			
DATAMEDIA	DM800	640x480	7
TELEVIDEO	RG512	512x250	1
LEAR SIEGLER	RG512	512x250	1
VIEWPOINT	RG512	512x250	1
ENVISION 215	ENV215	640x408	6
ENVISION 220	ENV220	640x480	8
ENVISION 230	ENV230	640x480	8
INTECOLOR 2427D	INTECOLOR	560x288	7
NABU 4404GX	4404GX	512x240	1
QUME CORP. QVT211gx	QUME	644x288	1
TAB PRODUCTS 132/15G	RG512	512x384	1
TEKTRONIX, INC. 4010	TEK4010	1024x780	1
TEKTRONIX, INC. 4010	TEK4010C	1024x780	7
TEKTRONIX, INC. 4014	TEK4014		1
TEKTRONIX, INC. 4014	TEK4014C		7
TEKTRONIX, INC. 4027	TEK4027	640x462	7
TEKTRONIX, INC. 4105	TEK4105		7
TEKTRONIX, INC. 4112	TEK4112		1
TEKTRONIX, INC. 4113	TEK4113		7
VISUAL 102	V102	768x293	1

device definition table A

The Device Definition Table is stored in the dictionary of the file SPSYM. The Device Definition Table is used to configure the graphics system for a particular output device. A separate table is required for each device supported by ACCU-PLOT. The item in line 2 refers to the symbol file to be used for chart labeling. Items in lines 3 through 5 refer to tables stored in the file specified in line 2. Lines 6 through 13 define the graphics characteristics for a particular device. The values shown below are for a Printronix printer.

ITEM-ID = TABLE NAME ('PTX' for Printronix)

001 GP	- DEVICE TYPE CODE
002 SPSYM	- SYMBOL DEFINITION FILE NAME
003 STDFMT	- FORMAT DEFINITION TABLE NAME
004 MATRIX	- CHARCTER MATRIX DEFINITION TABLE NAME
005 PATTERN	- LINE & BAR PATTERN DEFINITION TABLE NAME
006 495	- DEVICE DRIVER PROGRAM FRAME-ID
007 10	- DEVICE HORIZONTAL CHARACTERS PER INCH
008 60	- DEVICE HORIZONTAL DOTS PER INCH
009 132	- DEVICE HORIZONTAL CHARACTERS MAXIMUM
010 6	- DEVICE VERTICAL LINES PER INCH
011 72	- DEVICE VERTICAL DOTS PER INCH
012 32767	- DEVICE VERTICAL LINES MAXIMUM
013 1	- NUMBER OF COLORS AVAILABLE TO DEVICE
014-030	- DEVICE & DRIVER CONTROL CODES (DO NOT MODIFY)

format definition table B

The Format Definition Table is stored in the file defined in line 2 of the Device Definition Table. The Format Definition Table is used to specify the formatting parameters for chart production. A separate format table is required for rectangular and circular charts. This table contains the names of three other tables used for formatting purposes (lines 1 through 3). The sizes in this table are specified in thousandths of an inch (lines 4 through 11). The values shown below are standard for the ACCU-PLOT System.

```
ITEM-ID = TABLE NAME : *R (RECTANGULAR)
                       ('STDFMT*R' IS STANDARD TABLE NAME)

001 MSG*R          - MESSAGE TABLE ITEM-ID
002 STYLE*R        - STYLE DEFINITION TABLE NAME
003 STDSCALE       - SCALING INCREMENT TABLE NAME
004 50             - HALF LENGTH OF TICK MARK
005 50             - DISTANCE FROM LABEL TO LEGEND
006 250            - HALF LENGTH OF LEGEND IDENTIFYING MARK
007 70             - HALF WIDTH OF LEGEND IDENTIFYING BAR
008 500            - MINIMUM DISTANCE BETWEEN TICK MARKS
009 1000           - MAXIMUM DISTANCE BETWEEN TICK MARKS
010 100            - MINIMUM BAR WIDTH
011 1000           - MAXIMUM BAR WIDTH
012 65             - MAXIMUM COVERAGE PERCENTAGE OF BARS
013 0
014 0              - FOREGROUND COLOR (WHERE APPLICABLE)
015 0              - BACKGROUND COLOR (WHERE APPLICABLE)
016 4              - DEFAULT PLOT CAPTION CHARACTER SIZE
017 1              - LABEL CHARACTER SIZE
018 1              - SYMBOL CHARACTER SIZE
019 2              - AXIS HEADER CHARACTER SIZE
```

```
ITEM-ID = TABLE NAME : *C (CIRCULAR)
                           ('STDFMT*C' IS STANDARD TABLE NAME)

001 MSG*C           - MESSAGE TABLE ITEM-ID
002 STYLE*C         - STYLE DEFINITION TABLE NAME
003 STDSCALE        - SCALING INCREMENT TABLE NAME
004 0
005 60              - DISTANCE FROM LABEL TO POINTER LINE
006 200             - LENGTH OF POINTER LINE
007 0
008 0
009 0
010 0
011 0
012 20              - PERCENT OF CIRCLE RADIUS TO "EXPLODE" SEGMENTS
013 70              - PERCENT OF CIRCLE RADIUS TO PRINT "PERCENTAGE"
014 0               - FOREGROUND COLOR (WHERE APPLICABLE)
015 0               - BACKGROUND COLOR (WHERE APPLICABLE)
016 4               - DEFAULT PLOT CAPTION CHARACTER SIZE
017 1               - LABEL CHARACTER SIZE
018 1               - PERCENTAGE CHARACTER SIZE
019 0               - NUMBER OF DECIMAL PLACES USED IN PERCENTAGE
```

character matrix definition table C

The Character Matrix Definition Table is used to determine the number of character sizes available for a particular device. The table is arrange such that one character size is represented on each line. Within each line are the parameters (separated by value marks) for the horizontal and vertical dimensions for each of the sizes. The following parameters are required for each character size.

COLS	= Number of dot columns (including space between adjacent characters)
ROWS	= Number of dot rows (including space between adjacent lines of characters)
CENTER COL	= Number of columns from leftmost column to center the character horizontally
CENTER ROW	= Number of rows from top row to center the character vertically
SHORT ROWS	= Number of dot rows without space between adjacent lines

The format for defining a character size is

COLS] ROWS] CENTER COL] CENTER ROW] SHORT ROWS]

The sample table shown below defines the fc r standard sizes for dot-matrix printers.

ITEM-ID = TABLE NAME (´MATRIX´ IS STANDARD TABLE NAME)

001 6]12]2]3]9
002 12]12]4]3]9
003 6]24]2]6]18
004 12]24]4]6]18

style definition table D

The Style Definition Table is used to select patterns and colors for y-axis attributes (rectangular) or "exploded" segments (circular). The first y-axis attribute (or first "exploded" segment) uses the first entry in the table, the second y-axis attribute (or second "exploded" segment) uses the second entry, etc. Each line of the table is one style selection consisting of two values separated by a value mark. The first value is the pattern number (referencing the Pattern Definition Table, see Appendix F) and the second value is the color number (0 = black or foreground color). If the pattern or color specified in this table is higher than the number of patterns or colors available, the number "wraps around" to the beginning. Thus, if a device only supports 6 patterns and the pattern entry in this table is 8, pattern 2 will be selected. The sample table shown below is the standard for black and white dot-matrix printers.

```
ITEM-ID = TABLE NAME ('STYLE*R' IS STANDARD FOR RECTANGULAR

001 1]0
002 2]0
003 3]0
004 4]0
005 5]0
006 6]0
007 7]0
008 8]0
009 9]0


ITEM-ID = TABLE NAME ('STYLE*C' IS STANDARD FOR CIRCULAR

001 0]0
```

scaling increment table E

The Scaling Increment Table is used by the automatic scaling feature to generate acceptable scaling factors. The values in this table are used to select the most acceptable increments between tick marks. The table must begin and end with zero (0). The last increment value should be ten times the first increment value and the values must be in ascending order. By changing, adding or removing entries, the user can select the increments most suited to a particular application. For instance, 10 on line 2 indicates that the sequence 0,1,2,3... is acceptable. Likewise, the sequences 500,600,700,800... and -0.06,-0.05,-0.04,-0.03... are acceptable. 30 on line 6 means that the sequence 0,300,600,900,1200... is acceptable. 25 on line 5 means that the sequence 1000,1250,1500,1750... is acceptable. The sample table shown below gives the standard values for ACCU-PLOT.

ITEM-ID = TABLE NAME ('STDSCALE' IS STANDARD TABLE NAME)

001 0
002 10
003 15
004 20
005 25
006 30
007 40
008 50
009 100
010 0

pattern definition table F

The Pattern Definition Table is used to describe line and bar patterns available for a particular device. Each line of the table must describe both a line and a bar pattern available. The first value describes the line pattern while the subsequent values describe the bar pattern. The pattern is described in terms of "dots" and "blanks." A "dot" is any character other than a blank. The pattern will repeat itself for lines longer than the pattern definition. Bars will also repeat both horizontally and vertically. A null value is used to specify a missing line in a bar pattern. The sample table shown below is standard for dot-matrix printers.

ITEM-ID = TABLE NAME ('PATTERN' IS STANDARD TABLE NAME)

```
001 @ @ @ @ ]@ @ @ @ @ @ ]] @ @ @ @ @ ]
002 @  @  ]@   @   ] @   @  ]  @   @ ]   @   ]
003 @@    @@.   ]@  @  @  @  ]]  @  @  @  @]
004 @@  @  @@  @  ]@   @   @   ]] @   @   @  ]] @   @   @ ]
005 @@@@    @@    ]@    @    ]]  @    @  ]]    @    @]
006 @ @ @   @ @ @   @ @ @   ]@  @  ]]@  @  ]
```

character and symbol definition table G

The characters and symbols used by a device are described in the file named in line 2 of the Device Definition Table. The format for defining a character in this file is similar to the pattern definitions discussed in the previous appendix. A character is formed by using "dots" and "blanks." Each line of the character/symbol definition corresponds to the character size being defined. Thus, character size 3 is found on line 3 of the character/symbol definition. Each row of dots needed to form a character or symbol is separated by a value mark. The key used for symbols is the letter "S" followed by the number of the symbol (e.g., "S2" is symbol number 2). To create a new character size, it is necessary to define the new size for each character and symbol in the symbol file used by the device.

```
ITEM-ID = CHARACTER (A,B,C) OR S : NUMBER (S1,S2,S3)

>ED SPSYM A

001   ] @ ]@   ]@   ]@@]@   ]@   @
002     ]  @ @]@     @]@       ]@@@@]@       ]@       @
003   ] @] @ ]@   ]@   ]@   ]@   ]@   ]@@]    ]
    @   ]@   ]@   @
004     ]   @ ]  @   ] @     ]@       ]@       ]@       ]
    @       ]@@@@]@       ]@       ]@       ]@       @

>ED SPSYM S1

001 ]] @]@@] @@
002 ]]   @]  @@]   @@
003 ]]]]  @]@@]@@]@@] @@
004 ]]]]   @] @@] @@] @@]  @@
```

devices supported by ACCU-PLOT H

PRINTERS

Manufacturer	Model No.	ACCU-PLOT Device Name	Resolution
Advanced Color Tech.	ACT-II (ink jet)	ACT-II	86x85
Anadex	DP9000/DP9500	ADX9000/ADX9500	60x72
	DP9001/DP9501	ADX9001/ADX9501	75x72
C. Itoh Electronics	8510A PRO/WRITER &	PRO	80x72
	1550 PRO/WRITER II	PRO-HI	160x144
	8510SC Color	PRO-CLR	80x72
		PRO-CLR-HI	160x144
CIE Terminals	CI-300/600	CI300	60x72
		CI300-HI	120x144
		CI300.12CPI	70x72
		CI300.12CPI-HI	140x144
		CI300.13CPI	80x72
		CI300.13CPI-HI	160x144
Centronics	350 Series	CENT352	66x72
Dataproducts	M100	DP.M100	70x84
	Prism	IDS (B&W)	84x84
DataSouth	DS180	DS180	75x72
	DS220	DS220	60x72
DEC	LA100	LA100	66x72
Envision	430 Vectorprinter	ENV430	144x144
Epson	MX80	MX80	60x72
	MX100	MX100	60x72
	LQ1500	LQ1500	60x60
General Electric	GE3000	GE3000	72x72

PRINTERS (Cont)

Manufacturer	Model No.	ACCU-PLOT Device Name	Resolution
Lear Siegler, Inc.	Versaprint 500	VP500	72x72
	w/color option	VP500-CLR	72x72
Mannesmann Tally	MT160	MT160	100x64
	MT180	MT180	100x64
Okidata	ML83	ML83	60x66
	ML84	ML84	60x72
		ML84.12CPI	72x72
	ML92	ML92	60x72
		ML92.12CPI	72x72
	ML93	ML93	60x72
		ML93.12CPI	72x72
	Pacemark 2410	OKI2410	60x72
		OKI2410-HI	120x144
		OKI2410.12CPI	72x72
		OKI2410.12CPI-HI	144x144
Printek	900 Series	PRINTEK	72x72
		PRINTEK-HI	144x144
Printronix	P150, P300, P600	PTX	60x72
	MVP	PTX	60x72
		PTX-HI	100x96
		MVP	60x75
		MVP-HI	100x100
Texas Instruments	TI810LG	TI810LG	60x72
	TI855	TI855	72x72
		TI855-HI	144x144
		TI855.WP	72x72
		TI855.WP-HI	144x144
Trilog	Colorplot-I	COLORPLOT-I	100x100
	Colorplot-II	COLORPLOT-II	80x75

PEN PLOTTERS

Manufacturer	Model No.	ACCU-PLOT Device Name	Plotter Size
Hewlett Packard	7220C (8 pen)	HP7220C	11x17
	7220T (8 pen)	HP7220T	11x17
	7470A (2 pen)	HP7470	8.5x11
	7475 (6 pen)	HP7475	11x17
		HP7475S	8.5x11
Houston Instruments	DMP29 (8 pen)	DMP29	11x17
		DMP29S	8.5x11
Mannesmann Tally	PIXY1 (1 pen)	PIXY1	8.5x11
	PIXY1 (3 pen)	PIXY3	8.5x11
Nicolet Zeta Corp.	Zeta8 (8 pen)	HP7220C	11x17
Roland	DXY101 (1 pen)	DXY101	8.5x11
	DXY800 (8 pen)	DXY800	8.5x11
Tektronix, Inc.	4662 (1 pen)	TEK4662	11x15
	4662 w/option 31 (8 pen)	TEK4662.OPT31	11x15
	4663 (2 pen)	TEK4663	17x24

GRAPHIC CRTS

Manufacturer	Model No.	ACCU-PLOT Device Name	Resolution Pixels
CIE Terminals	CIT467	CIT467	572x480
Digital Engineering	DM800 (Datamedia)	DM800	640x480
Retro-Graphics	DM802	DM800	640x240
	TV512 (Televideo)	RG512	512x250
	LS512 (Lear Siegler)	RG512	512x250
	AD512 (Viewpoint)	RG512	512x250
Envision	215	ENV215	640x408
	220	ENV220	640x480
	230	ENV230	640x480
Intecolor	2427D	INTECOLOR	560x288
Nabu	4404GX	4404GX	512x240
Qume Corp.	GVT211gx	QUME	644x288
TAB Products	132/15-G	RG512	512x384
Tektronix, Inc.	4010	TEK4010	1024x780
	4014	TEK4014	
	4027	TEK4027	640x462
	4105	TEK4105	
	4112	TEK4112	
	4113	TEK4113	
Visual	102	V102	768x293

index

ASCII codes J

The ASCII codes used by the PICK System are:

DEC	Hex	Character	DEC	Hex	Character
0	0	NULL	36	24	$
1	1	SOH	37	25	%
2	2	STX	38	26	&
3	3	ETX	39	27	'
4	4	EOT	40	28	(
5	5	ENQ	41	29	)
6	6	ACK	42	2A	*
7	7	BEL	43	2B	+
8	8	BS[1]	44	2C	,
9	9	HT[1]	45	2D	-
10	A	LF[1]	46	2E	.
11	B	VT[1]	47	2F	/
12	C	FF[1]	48	30	0
13	D	CR[1]	49	31	1
14	E	SO	50	32	2
15	F	SI	51	33	3
16	10	DLE	52	34	4
17	11	DC1	53	35	5
18	12	DC2	54	36	6
19	13	DC3	55	37	7
20	14	DC4	56	38	8
21	15	NAK	57	39	9
22	16	SYN	58	3A	:
23	17	ETB	59	3B	;
24	18	CAN	60	3C	<
25	19	EM	61	3D	=
26	1A	SUB	62	3E	>
27	1B	ESC	63	3F	?
28	1C	FS	64	40	@
29	1D	GS	65	41	A
30	1E	RS[1]	66	42	B
31	1F	US[1]	67	43	C
32	20	SPACE	68	44	D
33	21	!	69	45	E
34	22	"	70	46	F
35	23	#	71	47	G

DEC	Hex	Character	DEC	Hex	Character
72	48	H	104	68	h
73	49	I	105	69	i
74	4A	J	106	6A	j
75	4B	K	107	6B	k
76	4C	L	108	6C	l
77	4D	M	109	6D	m
78	4E	N	110	6E	n
79	4F	O	111	6F	o
80	50	P	112	70	p
81	51	Q	113	71	q
82	52	R	114	72	r
83	53	S	115	73	s
84	54	T	116	74	t
85	55	U	117	75	u
86	56	V	118	76	v
87	57	W	119	77	w
88	58	X	120	78	x
89	59	Y	121	79	y
90	5A	Z	122	7A	z
91	5B	[	123	7B	{
92	5C	\	124	7C	:
93	5D	]	125	7D	}
94	5E	^	126	7E	~
95	5F	_	127	7F	DEL
96	60	`	•		
97	61	a	•		
98	62	b	•		
99	63	c	251	FB	SB[2]
100	64	d	252	FC	SVM[2]
101	65	e	253	FD	VM[2]
102	66	f	254	FE	AM[2]
103	67	g	255	FF	SM[2]

[1]For special use on LSI-11 and -12 terminals:

BS	Cursor Backspace	FF	Cursor Forward
HT	Cursor Tab	CR	Cursor Carriage Return
LF	Cursor Down	RS	Cursor Home
VT	Cursor UP	US	Cursor New Line

[2]For special use by PICK:

SB	Start buffer
SVM	Secondary value mark (displays \ )
VM	Value mark (displays])
AM	Attribute mark (displays ^)
SM	Segment mark (displays _)