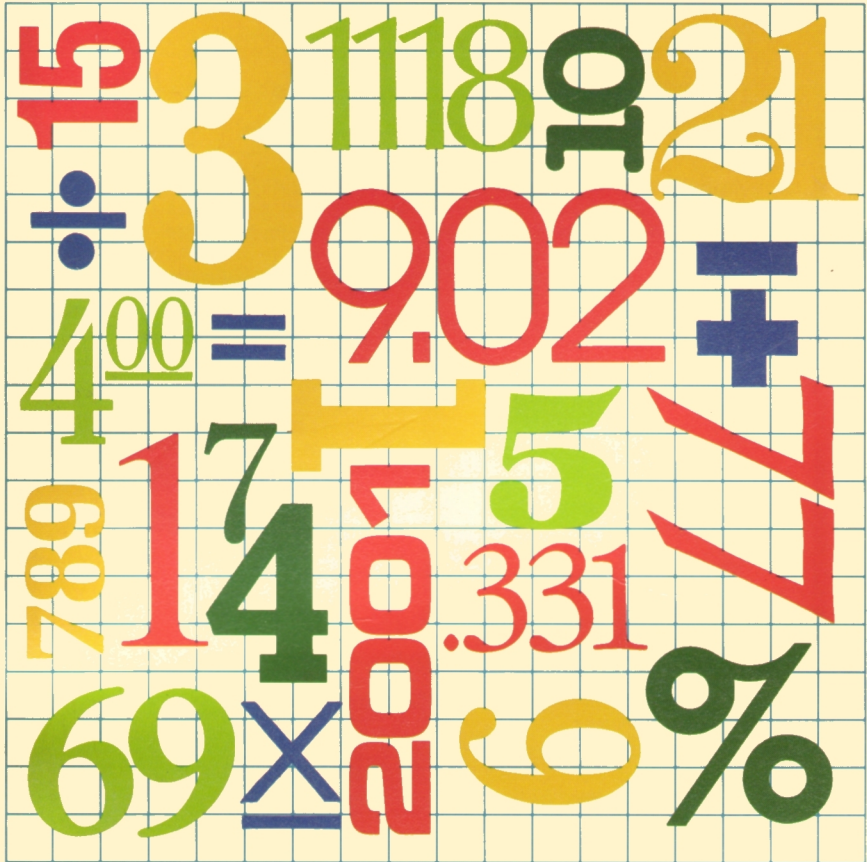


COLORSTAT

CAT. NO. 26-3107

16K Extended BASIC Required



Radio Shack

TRS-80



**COLOR
COMPUTER**

™

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COLORSTAT

Radio Shack
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10 9 8 7 6 5 4 3 2 1

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INTRODUCTION

COLORSTAT is a general purpose data analysis system for use on the Radio Shack® Color Computer. The system consists of a statistical analysis program stored on cassette tape and an instruction manual. Use this program to maintain your data files, calculate a wide variety of statistics on your data, display the results on your video screen and list the results on your line printer. You can produce vivid, detailed graphics by entering the results from COLORSTAT into the programs GRAPHIC Program Pak (Cat. #26-3157) or DISK GRAPHICS (Cat #26-3251).

Features

You can perform the following data analysis procedures:

- Descriptive statistics
- Frequency distribution
- Graphic histogram
- Correlation statistics
- Linear regression equation
- Least squares prediction
- Matched-pairs t test
- Scattergram with regression line
- Multiple regression with two predictors
- Analysis of variance for up to five groups

Equipment Requirements

To use COLORSTAT, you need the following equipment:

- Color Computer with 16K Extended Color BASIC
- Cassette tape recorder

Optional equipment includes:

- Line printer
- Expanded memory to 32K

System Capacities

Your computer can store only a certain amount of information before running out of memory. COLORSTAT is designed to store up to 75 data records in a 16K computer and 500 in a 32K computer.

How to Use This Manual

This manual is both a reference tool and a learning aid. To learn the operation of the program, follow the step-by-step instructions in the following sections, including the specific instructions for the sample data file (indented and printed in green). All examples of screen displays are the results you get when you enter the sample data.

Printer Message

If you attempt to make a printout and your printer is turned off or not connected properly, the following message appears momentarily:

PRINTER NOT READY!

Error Message

When you perform statistical analysis procedures and use invalid responses or variables you can get a division by zero error (?/0 Error). Type **GOTO20** and press **(ENTER)**. This procedure returns you to the Main Menu with your data file intact. Do not type **RUN!** Typing **RUN** destroys your entire file!

Loading Instructions

Load COLORSTAT by following the steps below:

1. Turn on your computer.
2. Type **PMODE0** and press **(ENTER)**.
3. Type **PCLEAR1** and press **(ENTER)**.
4. Place the COLORSTAT cassette into your tape recorder. Rewind it fully and set the controls to **PLAY**.

5. Type **CLOAD** and press **ENTER**.
6. Wait until the word **OK** appears on the screen, then type **RUN** and press **ENTER**.

Your screen looks like this:

```
          C O L O R S T A T
          V E R 1.00.00
    C O P R. 1984 T A N D Y C O R P O R A T I O N
          A L L R I G H T S R E S E R V E D

    1 — DATA FILE MAINTENANCE
    2 — DESCRIPTIVE STATISTICS
    3 — DISTRIBUTION/HISTOGRAM
    4 — CORRELATION/REGRESSION
    5 — PREDICTION BY EQUATION
    6 — MULTIPLE REGRESSION
    7 — ANALYSIS OF VARIANCE

          S E L E C T (1-7)

    F I L E : N O N E           R E C S : 0
```

This screen is the Main Menu. The last line indicates the name of the file you loaded and the number of records contained in the file. Since there is no data to analyze at this time, the only menu option you can choose is Data File Maintenance (Option 1). The next section, "DATA FILE MAINTENANCE," contains instructions for entering data files into your computer. After you enter a file, the name of the file and the number of data records contained in the file appear on the above screen.

After you enter the data, you can select any of the statistical analysis procedures listed on the Main Menu. Instructions for using each of these procedures are contained in separate sections in this manual.

Back-up Instructions

It is a good idea to make a back-up of your program tape to use as a working tape. Save a copy of COLORSTAT by following the steps below:

1. Turn on your computer.
2. Type `Pmode0` and press `(ENTER)`.
3. Type `PCLEAR 1` and press `(ENTER)`.
4. Place the COLORSTAT cassette into your tape recorder. Rewind it fully and set the controls to PLAY.
5. Type `CLOAD` and press `(ENTER)`.
6. When the word OK appears on the screen, remove the COLORSTAT cassette and place a blank (new or bulk erased) cassette tape into your recorder. Be sure that you position the tape past the plastic leader.
7. Set the control to RECORD. Type `CSAVE "STAT16"` for a 16K version or `CSAVE "STAT32"` for a 32K version. Then press `(ENTER)`. When the back-up is complete, the word OK appears.

DATA FILE MAINTENANCE

Your COLORSTAT program is designed to store and analyze data based on the “record” concept. A record is a group of data items (values) which belong to one subject (person or thing). For example, you may know the age, sex, and income level for four people. The variables are age, sex, and income. The numbers assigned to those variables are called data values. The data values can be arranged into a set of data records. A set of data records is called a data file. When preparing a file, always organize the data into a table before entering it.

The following table contains the sample data you will be using throughout the manual.

	Variable #1 (Age)	Vairable #2 (Sex)	Variable #3 (Income)
Record #1	33	2	15000
Record #2	52	1	27550
Record #3	28	1	18475
Record #4	49	2	25320

Comments: Sex is coded 1 for female, 2 for male.

A blank data file worksheet is included near the end of this manual (Appendix A). You can copy it and use it for preparing your own data files. Although there are spaces for entering a maximum of six data variables on each record, your data can contain fewer data variables per record.

The Data File Maintenance Menu

To select Option 1 on the Main Menu, press **1**. The computer displays:

```
-----  
DATA FILE MAINTENANCE  
-----  
1 — PREPARE A NEW FILE  
2 — RENAME PRESENT FILE  
3 — RENAME A VARIABLE  
4 — ADD RECORD(S) TO FILE  
5 — DISPLAY/UPDATE/PRINT  
6 — READ FILE FROM TAPE  
7 — WRITE FILE ON TAPE  
8 — RETURN TO MAIN MENU  
  
SELECT (1-8)  
  
FILE: NONE      RECS: 0
```

This screen is the Data File Maintenance Menu. If there is no data stored in the computer, the only options that you can choose are:

- 1 — Prepare a new file
- 6 — Read file from tape
- 8 — Return to Main Menu

Before continuing, you must provide the computer with a data file. To enter a new data file, you can type it in on your computer keyboard (Option 1) or read in an old data file that you have stored on a cassette tape (Option 6).

Once the data file is stored in the computer, you can use all of the Data File Maintenance options that are discussed in the rest of this section. You can also return to the Main Menu by pressing **8** and select any of the statistical analysis procedures.

Preparing a New Data File

After you prepare a table containing your data file, enter the data into your computer by following these steps:

See sample table earlier in this section.

1. Press (1). The computer displays:

FILE NAME ?

2. The blinking box (cursor) indicates that the computer is ready for you to enter information. Choose a name (using a maximum of 8 characters) that helps you remember what the data file contains. Type in the name and press (ENTER).

Press (1) at the Data File Maintenance Menu, type **INCOME** as the file name for our sample data file, and press (ENTER).

Note: If you select Option 1 accidentally, you can return to the Data File Maintenance Menu without destroying any data that is currently stored in the computer. To do this, press (ENTER) — do not type in a file name.

After you press (ENTER), the following prompt appears:

VARIABLE 1 ?

3. A variable name can contain a maximum of 10 characters. Type in the variable name and press (ENTER).

To enter the first variable name for our sample data file, type in **AGE** at the Variable 1 prompt and press (ENTER).

4. After pressing **(ENTER)**, a new prompt appears:

VARIABLE 2 ?

5. What you do next depends on the number of variables in your data file.
- If your file contains only one variable, press **(ENTER)**. Do not type in a variable name.
 - If your data file contains two through five variables, continue entering variable names. After you name all of your variables, press **(ENTER)** when the next variable prompt appears.
 - If your data file contains six variables, enter all six variable names. The computer automatically proceeds to the next step after you finish.

To enter the second variable for our sample data file, type **SEX** and press **(ENTER)**.

Type in the third variable, **INCOME**, and press **(ENTER)**.

Our sample data file contains three variables. Since there is no additional data to input, press **(ENTER)**.

6. The computer clears any data that is stored in the memory and creates the new data file. This procedure takes several seconds. Then the computer displays the data record screen with the cursor at the top of the Value Column. Enter the data value for variable 1 and press **(ENTER)**.

Our sample data record screen looks like this:

RECORD # 1	
VARIABLE	VALUE
1 — AGE	
2 — SEX	0
3 — INCOME	0
4 — ***	0
5 — ***	0
6 — ***	0

PRESS ENTER WHEN FINISHED

Note: The data value that you enter can contain a maximum of 15 characters and **must** be a numerical value — a value that the computer recognizes as a number. It can be positive, negative, or a decimal. The following are examples of valid and invalid entries:

Valid	Invalid
23	AGE 32
16.7	32YR6MO
05.002	LB17.5
6.23E4	-6.3 10X4
-.007	YES

To enter the first value for our sample data record, type 33 and press **ENTER**.

7. The cursor moves down to the next line, ready for a new value. Enter all following data values exactly as you did for the first variable.

Type 2 to enter the second value for our sample data record, and press **ENTER**.

Type 15000 for the third value and press **ENTER**.

8. After you enter values for all the variables on your data record, press **ENTER**. (Pressing **ENTER** is not necessary if you use all six variables — the computer automatically goes to the next step.)

After you enter the last value press **ENTER** again.

9. The computer displays your next data record. Enter data values for all following records exactly as you did for your first record.

The screen displays the next data record. Refer to the sample table earlier in this section and enter all data values exactly as you did for record #1.

10. After entering the data for all records, press **ENTER**. The computer displays the Data File Maintenance Menu. The last line on the screen shows the name of your file and the number of records stored in the computer.

Press **ENTER** to return to the Data File Maintenance Menu.

Note: If you are preparing a new data file or adding records to an existing data file and you attempt to enter more than your system capacity for records, this message appears:

TOO MANY RECORDS!

After a few seconds, the Data File Maintenance Menu is displayed.

Renaming a Data File

Once you have a data file stored in the computer, you can change the name of the file by selecting Option 2 on the Data File Maintenance Menu.

1. Press **(2)**. The following prompt appears:

FILE NAME ?

2. Type in a name with a maximum of 8 characters and press **(ENTER)**. The computer displays the new name on the last line of your screen

Note: If you decide not to change the file name after pressing **(2)**, press **(ENTER)**.

Renaming a Variable

To rename a variable, select Option 3 on the Data File Maintenance Menu.

1. Press **(3)**. The screen shows a list of variables.

Note: If your data file uses fewer than six variables, the unused variables are labeled with three asterisks (***)

2. Examine the display, and press the number (from **(1)** to **(6)**) to indicate the variable name that you want to change.

3. The computer erases the old variable name, and the cursor appears in its place. Type in a new variable name with a maximum of 10 characters, and press **(ENTER)**. The computer changes the variable name and returns to the Data File Maintenance Menu.

Adding Records to Your Data File

You can add records to your data file by selecting Option 4 on the Data File Maintenance Menu.

1. Press **(4)**. The computer displays a data record. The record number is one number greater than the number of records currently stored in your file.

2. Enter data values for the new record exactly as you did when you created the file initially.

3. When you finish adding new records, press **(ENTER)**. The Data File Maintenance Menu appears, and the last line on the screen reflects the number of records in your file.

Note: If you accidentally select Option 4 and have no new records to add, press **(ENTER)** to return to the Data File Maintenance Menu.

Displaying, Updating, and Printing Data Records

You can easily and quickly manipulate data that is stored in your computer with the display/update/print option (Option 5). During the session, you can “flip through” your data records in a forward or backward direction, update any values on a record, print a record on your line printer, or delete a record from the data file. (The records are in the order that you entered them.)

1. Press **(5)**. The computer asks for the number of the record you want to see. For example:

RECORD # (1 - 4)

2. Type the record number that is at the point where you want to enter the file and press **(ENTER)**. The computer displays the selected record.

Press **(5)** at the Data File Maintenance Menu. To enter the file at record #3, type **(3)** and press **(ENTER)**. The computer displays:

RECORD # 3	
VARIABLE	VALUE
1 — AGE	28
2 — SEX	1
3 — INCOME	18475
4 — ***	0
5 — ***	0
6 — ***	0
SELECT	
N = NEXT	U = UPDATE
L = LAST	D = DELETE
P = PRINT	F = FINISH

Think of the data records as note cards in a card file. The record number displayed on the screen is not a part of the data record. It only serves to indicate the physical position of the displayed data record within the file — for example, the third note card in the file box.

If a data record is deleted from your file, other records are “moved forward” to fill up the empty space. In the case of the card file, if the third card is removed from the box (deleted), the fourth card becomes the third card, the fifth card becomes the fourth card, and so on. The displayed record number lets you know where you are within your file during a file maintenance session.

Note: Since record numbers can change whenever a data record is deleted from a file, do not use them to identify a particular data record.

Below the data portion of your record is a line containing the word SELECT. During the data file maintenance session, this line contains messages and instructions to let you know what to do next. In this case, the computer asks you to select one of the record maintenance options. The options that you can choose are listed on the bottom three lines of your screen. Each option is discussed in the following paragraphs.

N — Display NEXT Record. This option lets you “flip forward” through your data records. Press **(N)** and the next record in your data file appears on the video screen. If the displayed record is the last record in your file, pressing **(N)** has no effect.

Press **(N)**. The next record (sample Record 4) is displayed.

L — Display LAST Record. This option lets you “flip backward” through your data records. Press **(L)** and the previous record appears on the video screen. If the displayed record is the first record in the file, pressing **(L)** has no effect.

Press **(L)**. The last record (sample Record 3) is again displayed.

P — PRINT Displayed Record. This option lets you print the displayed record on your line printer. Press **(P)**. The word PRINTING appears on the screen while the record is printed. When the printing is complete, the word SELECT is again displayed.

U — UPDATE a Value on the Record. You can change any of the data values displayed on the screen with this option. Press **(U)**. The screen displays:

VARIABLE (1-6)

Press a key from **(1)** to **(6)** to indicate which value you want to change. The computer displays:

ENTER NEW VALUE

The old value for the selected variable is erased, and the cursor is positioned in its place. Type in the new data value and press **(ENTER)**.

Note: If you accidentally select option U, replace any displayed data value with the same value, and press **(ENTER)**.

D — DELETE Displayed Record from File. This option lets you permanently remove the displayed record from the data file. When you press **(D)**, the screen displays:

ARE YOU SURE (Y/N)

If you are sure you want to delete the record, press **(Y)**. If you decide to leave the record in the file, press **(N)**.

After the record is deleted from the data file, the computer again displays the Data File Maintenance Menu. (This procedure can take several seconds if your data file is large.) The number of records (last line on the screen) is decreased by one. **Remember**, deleting a record causes the “record #” to change on all records following it in your file.

F — FINISH the Session. When you finish viewing, updating, and printing your data records, return to the Data File Maintenance Menu by pressing **(F)**.

To finish the session and return to the Data File Maintenance Menu, press **(F)**.

Reading a Data File from Tape

1. If you save a data file on a cassette tape, you can load that file into the computer by selecting **(6)** on the Data File Maintenance Menu. This prompt appears:

READY TO READ (Y/N)

2. Place the data tape into your tape recorder, rewind it fully, and set the control to PLAY.

3. Press **(Y)**. The computer reads the data file and displays the name of the file and the number of records read.

Note: Press **(N)** to exit this option without reading a tape.

Saving a Data File on Tape

1. After you prepare a new data file (or update an old data file), you can save it on a cassette tape for future use by selecting **(7)** on the Data File Maintenance Menu. The computer displays:

READY TO WRITE (Y/N)

2. Place a blank (new or bulk erased) cassette tape into your recorder. Be sure that you position the tape past the plastic leader. Then set the control to RECORD.
3. Press **(Y)**. The computer writes your data file on the tape. The file also remains in the computer's memory. If the file is large, you can ensure a good copy by saving it twice.

Note: If you decide not to write your data on tape after selecting Option 7, press **(N)**.

Returning to the Main Menu

Any time the Data File Maintenance Menu is displayed on the screen, you can return to the Main Menu by pressing **(8)**.

DESCRIPTIVE STATISTICS

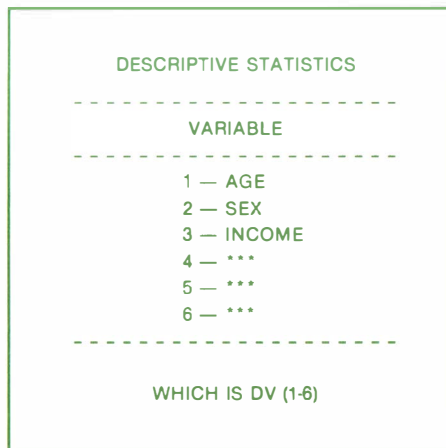
The descriptive statistics procedure calculates basic statistics for one variable on each record in your data file. Output from the analysis includes:

- MEAN Arithmetic Mean
- SUM Sum of the data values
- SUMSQ Sums of squares
- SD Standard deviation
- SD EST Estimate of population SD
- MINIMUM Smallest data value
- MAXIMUM Largest data value

Instructions for Descriptive Statistics

1. To select the descriptive statistics procedure from the Main Menu, press **(2)**. A table listing the variables in your data file appears on the screen.

Press **(2)** at the Main Menu to select Descriptive statistics. The screen displays:



2. Press a key from **(1)** to **(6)** to indicate which variable you want to analyze. The computer displays the results on your video screen.

Press **(3)** for an analysis of INCOME. Using our sample data you see the following display:

DESCRIPTIVE STATISTICS	
MEAN	21586.25
SUM	86345
SUMSQ	102565769
SD	5063.73796
SD EST	5847.10095
MINIMUM	15000
MAXIMUM	27550
PRINT OR MENU	

3. To print the results of the analysis on your line printer, press **(P)**. To return to the Main Menu, press **(M)**.

Press **(M)** and return to the Main Menu.

Special Considerations

If any of your data values are codes or identification values rather than actual measures of a variable, do not perform the descriptive statistics procedure on those variables. Means and standard deviations are not meaningful for that type of data. In our sample file, SEX is a coded variable (1 = female, 2 = male).

DISTRIBUTION/HISTOGRAM

The distribution and histogram procedure calculates an equal-interval frequency distribution for one variable on each data record in your data file. You select the number of intervals (up to five) in the distribution when you perform the analysis.

Output from the analysis includes:

- Smallest data value in the distribution
- Number of cases in each interval
- Percentage of cases in each interval
- Graphic histogram (can also be printed)

Instructions for Distribution and Histogram

1. To select the distribution and histogram procedure from the Main Menu, press **(3)**. A table listing the variables in your data file appears on the screen.

Press **(3)** to select the distribution and histogram procedure from the Main Menu.

This prompt appears:

WHICH IS DV (1-6)

2. Press a key from **(1)** to **(6)** to indicate which variable you want to analyze.

Press **(3)** for an analysis of INCOME.

A new prompt appears:

OF INTERVALS (1-5)

3. Press a key from (1) to (5) to indicate the number of intervals.

Select (3) to indicate three intervals.

The computer displays the frequency distribution table on the screen.

The frequency distribution for our sample looks like this:

DISTRIBUTION/HISTOGRAM	
FROM 15000	
TO 19183.6667	2 (50.0%)
TO 23367.3333	0 (0.0%)
TO 27550	2 (50.0%)
HISTOGRAM PRINT OR MENU	

4. a. To display the histogram, press (H). Press (ENTER) after you finish viewing the histogram, and the frequency distribution reappears.

Press (H). The histogram is displayed.

Press (ENTER) to return to the frequency distribution.

- b. To print the results of the analysis on your line printer, press **(P)**. After the frequency distribution table is printed, the computer asks:

PRINT HISTOGRAM (Y/N)

Press **(Y)** to print the histogram.

Press **(N)** if you do not want to print the histogram.

After the printing is complete, the frequency distribution again appears on the screen.

- c. Press **(M)** to return to the Main Menu.

Press **(M)** and return to the Main Menu.

Using GRAPHIC to Create Graphs and Charts

The distribution and histogram procedure lets you display a simple histogram (bar chart) on your screen and print it on your line printer. If you want a more detailed, labeled chart of the results in the frequency table, you can obtain one using the Color Computer GRAPHIC software. Appendix C illustrates the use of GRAPHIC in conjunction with your COLORSTAT package.

CORRELATION/REGRESSION

The correlation and regression procedure lets you obtain a variety of statistics for pairs of variables on each record in your data file. Output from the analysis includes:

- MEAN X Arithmetic mean of the X variable
- MEAN Y Arithmetic mean of the Y variable
- CORRELATION Pearson product-moment coefficient
- SLOPE Slope of the regression line
- Y-INT Y intercept for regression line
- T-RATIO T-ratio for difference in means
- DF Degrees of freedom for the t test
- Graphic scattergram of data with regression line

Instructions for Correlation and Regression

1. To select the correlation and regression procedure from the Main Menu, press **4**. A table listing the variables in your data file appears on the screen.

This prompt appears:

WHICH IS DV (1-6)

2. Press a key from **1** to **6** to indicate which variable is the “Y” variable in the analysis.

At the Main Menu, press **4**. To answer the prompt for our example, press **3** (INCOME).

The screen displays:

WHICH IS IV (1-6)

3. Press a key from **(1)** to **(6)** to indicate which variable is the “X” variable in the analysis.

To select AGE, press **(1)**.

The computer performs the analysis and displays the results on the screen.

Using our sample data the results look like this:

```
CORRELATION/REGRESSION  
  
MEAN X 40.5  
MEAN Y 21586.25  
CORRELATION .911989233  
SLOPE 452.296163  
Y-INT 3268.25539  
T-RATIO 7.3832951  
DF 3  
  
SCATTERGRAM PRINT OR MENU
```

4. To display the scattergram on the screen, press **(S)**.

Press **(S)** to display the scattergram.

The computer asks:

PLOT REGRESSION LINE? (Y/N)

- a. Press **(Y)** if you want the computer to plot the regression line on the scattergram.

b. Press **(N)** if you want only the data points.

Press **(Y)** to plot the regression line.

5. The scattergram appears on the screen. After you finish viewing the display, press **(ENTER)**. The correlation statistics reappear.

Press **(ENTER)** and return to the correlation statistics.

6. To print the results of the analysis on your line printer, press **(P)**. After the correlation statistics are printed, the computer asks:

PRINT THE SCATTERGRAM? (Y/N)

a. If you do not want to print the scattergram, press **(N)**. The correlation results are again displayed.

b. To print the scattergram, press **(Y)**. The computer asks:

PLOT REGRESSION LINE? (Y/N)

Press **(Y)** to print the regression line on the scattergram, or press **(N)** to print only the data points.

After all printing is complete, the correlation results are again displayed.

7. Press **(M)** to return to the Main Menu.

Press **(M)** and return to the Main Menu.

Special Considerations

The correlation and regression procedure is performed only for X and Y values that are measures rather than coded variables.

If you perform the correlation and regression procedure on variables which are “unused” in your data file, or if either your X or Y variable has no variance (all values are the same), you get a division by zero error (?!0 ERROR). Type **GOTO20** and press **(ENTER)**. Do not type **RUN!** (See “Error Message.”)

PREDICTION BY EQUATION

You can select the prediction by equation procedure **only** after you perform a correlation and regression analysis (previous section). The correlation and regression procedure calculates the least squares prediction equation and stores it in the computer. The prediction by equation procedure lets you obtain predicted values of the “Y” variable by entering values for the “X” variable.

Instructions for Prediction by Equation

1. To select the prediction by equation procedure from the Main Menu, press (5). If a regression equation is stored in the computer, the following display appears:

PREDICTION BY EQUATION	
PRESS ENTER TO RETURN TO MENU	

X VALUE	PREDICTED Y

2. The cursor appears under X VALUE. Type in a numerical value for X and press (ENTER).

3. The computer displays the predicted value for Y based on the regression equation and asks for another X value. You can obtain as many predictions as you wish by entering different values for X.
4. After you finish, press **ENTER**.

Note: Exercise caution when you select X values. Predictions based on X values outside the range of your data set can be unreliable.

MULTIPLE REGRESSION

The multiple regression procedure provides least squares regression statistics for data records that contain at least three variables. You select the dependent variable and the two predictor variables when you select the procedure. Output from the analysis includes:

- B1 (variable) Regression coefficient #1
- B2 (variable) Regression coefficient #2
- CONSTANT Constant term for regression equation
- SS REG Regression sums of squares
- SS RES Residual (error) sums of squares
- F-RATIO Regression F-ratio
- DF REG Regression degrees of freedom
- DF RES Residual degrees of freedom
- R SQUARE Coefficient of determination

Instructions for Multiple Regression

1. To select the multiple regression procedure from the Main Menu, press **(6)**. A table listing the variables in your data file appears on the screen. The computer display reads:

WHICH IS DV (1-6)

2. Press a key from **(1)** to **(6)** to indicate which variable on your data records is the dependent variable.

At the Main Menu, press **(6)**. For our sample, press **(3)** (INCOME) at the prompt.

The next prompt appears:

WHICH IS IV#1 (1-6)

3. Press a key from **(1)** to **(6)** to indicate which variable is the first predictor variable.

To select **SEX** for our sample, press **(2)**.

The screen displays a new prompt:

WHICH IS IV#2 (1-6)

4. Press a key from **(1)** to **(6)** to indicate which variable is the second predictor variable.

Press **(1)** to select **AGE**.

The computer calculates and displays the multiple regression statistics.

For our sample, the computer displays the following:

MULTIPLE REGRESSION	
B1 (SEX)	-3312.74039
B2 (AGE)	460.240385
CONSTANT	7915.62501
SS REG	96254380.3
SS RES	6311388.47
F-RATIO	7.62545205
DF REG	2
DF RES	1
R SQUARE	.938464962
PRINT OR MENU	

5. a. Press **(P)** to print the results on your line printer.
- b. Press **(M)** to return to the Main Menu.

Press **(M)** and return to the Main Menu

Special Considerations

If you perform the multiple regression procedure on variables which are “unused” in your data file or if your independent variables contain no variance, you get a division by zero error (?/0 ERROR). Type **GOTO20** and press **(ENTER)**. Do not type **RUN!** (See “Error Message.”)

ANALYSIS OF VARIANCE

The analysis of variance procedure performs a one-way (randomized) analysis of variance for up to five groups (levels). Each record in the data file must contain at least two variables. One variable is the dependent variable. You use a second variable to place the records into the appropriate analysis groups. Output from the analysis includes:

- SS TOTAL Total sums of squares
- SS BETWEEN Between-groups sums of squares
- SS WITHIN Within-groups sums of squares
- DF BETWEEN Between-groups degrees of freedom
- DF WITHIN Within-groups degrees of freedom
- MS BETWEEN Between-groups mean square
- MS WITHIN Within-groups mean square
- F-RATIO F-ratio

Instructions for Analysis of Variance

1. To select the analysis of variance procedure from the Main Menu, press (7). A table listing the variables in your data file appears on the screen. This prompt appears:

WHICH IS DV (1-6)

2. Press a key from (1) to (6) to indicate which variable in your data file is the dependent variable.

At the Main Menu, press (7). Then press (3) to select INCOME.

The screen displays:

WHICH IS IV (1-6)

3. Press a key from **(1)** to **(6)** to indicate which variable is the independent variable. The independent variable contains values that indicate the analysis group to which the record belongs.

At the next prompt, press **(2)** (SEX). In our sample data file, the second variable contains a 1 for female subjects and a 2 for male subjects. You can use that variable to test for differences in income between female and male subjects (two-group design).

The following prompt appears:

OF LEVELS (2-5)

4. Press a key from **(2)** to **(5)** to indicate how many analysis groups there are.

For our sample data file, press **(2)**. (There are two levels, female and male.)

5. For each level in your design a prompt appears. For example:

CODE FOR LEVEL 1?

Type in the exact independent variable value that is found on all records that you want in the first analysis group and press **(ENTER)**.

To place all females into the first group, type 1 and press **ENTER**. At the prompt for level 2, type 2 and press **ENTER** to place all males into the second analysis group.

After you enter the codes (data values representing each group in your analysis), the computer performs the calculations and displays an analysis of variance summary results.

Our sample results are displayed as follows:

ANALYSIS OF VARIANCE	
SS TOTAL	102565763
SS BETWEEN	8136755
SS WITHIN	94429007.5
DF TOTAL	3
DF BETWEEN	0
DF WITHIN	2
MS BETWEEN	8136755
MS WITHIN	47214503.8
F-RATIO	.172335921
PRESS ENTER	

6. Press **ENTER** to display the means and standard deviations for your analysis groups.

Press **(ENTER)** to display the sample means and standard deviations:

GROUP STATISTICS	
GROUP 1 — MEAN	23012.5
SD	3208.49688
GROUP 2 — MEAN	20160
SD	3648.67094
PRINT SUMMARY OR MENU	

- 7.a. Press **(P)** to print the results of the analysis of variance. Both the summary table and the group statistics are printed.
- b. Press **(S)** to return to the analysis of variance summary table.
- c. Press **(M)** to return to the Main Menu.

Press **(M)** and return to the Main Menu.

Special Considerations

If the computer can't find any subjects in one of your analysis groups a division by zero error (?/0 ERROR) occurs. Type **GOTO 20** and press **(ENTER)**. Do not type **RUN!** (See "Error Message.")

APPENDIX B

SAMPLE PRINTOUTS

```
-----  
VARIABLE    VALUE  
-----  
AGE         33  
SEX         2  
INCOME      15000  
-----
```

```
-----  
VARIABLE    VALUE  
-----  
AGE         52  
SEX         1  
INCOME      27550  
-----
```

```
-----  
VARIABLE    VALUE  
-----  
AGE         28  
SEX         1  
INCOME      18475  
-----
```

```
-----  
VARIABLE    VALUE  
-----  
AGE         49  
SEX         2  
INCOME      25320  
-----
```

DESCRIPTIVE STATISTICS

```
MEAN          21586.25  
SUM           86345  
SUMSQ        102565769  
SD           5063.73796  
SD EST       5847.10095  
MINIMUM      15000  
MAXIMUM      27550
```

DISTRIBUTION/HISTOGRAM

FROM 15000

TO 19183.6667 2 (50.0%)

TO 23367.3333 0 (0.0%)

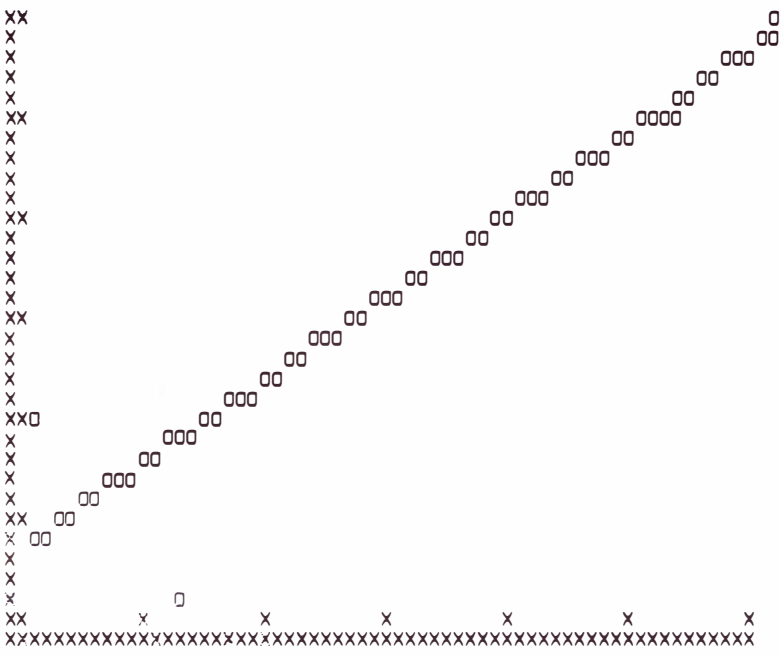
TO 27550 2 (50.0%)

Σ

```
XX 0000000000      0000000000      XX
X  0000000000      0000000000      X
X  0000000000      0000000000      X
X  0000000000      0000000000      X
X  0000000000      0000000000      X
XX 0000000000      0000000000      XX
X  0000000000      0000000000      X
X  0000000000      0000000000      X
X  0000000000      0000000000      X
X  0000000000      0000000000      X
XX 0000000000      0000000000      XX
X  0000000000      0000000000      X
X  0000000000      0000000000      X
X  0000000000      0000000000      X
X  0000000000      0000000000      X
XX 0000000000      0000000000      XX
X  0000000000      0000000000      X
X  0000000000      0000000000      X
X  0000000000      0000000000      X
X  0000000000      0000000000      X
XX 0000000000      0000000000      XX
X  0000000000      0000000000      X
X  0000000000      0000000000      X
X  0000000000      0000000000      X
X  0000000000      0000000000      X
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

CORRELATION/REGRESSION

MEAN X 40.5
 MEAN Y 21586.25
 CORRELATION .911989233
 SLOPE 452.296163
 Y-INT 3268.25539
 T-RATIO 7.3832951
 OF



MULTIPLE REGRESSION

B1 (SEX)	-3082.34394
B2 (AGE)	229.843938
CONSTANT	16901.0864
SS REG	52142676.5
SS RES	50423092.2
F-RATIO	.517051556
DF REG	2
DF RES	1
R SQUARE	.508382837

ANALYSIS OF VARIANCE

SS TOTAL	102565763
SS BETWEEN	8136755
SS WITHIN	94429007.5
DF TOTAL	3
DF BETWEEN	1
DF WITHIN	2
MS BETWEEN	8136755
MS WITHIN	47214503.8
F-RATIO	.172335921

GROUP STATISTICS

GROUP 1 - MEAN	23012.5
SD	3208.49682
GROUP 2 - MEAN	20150
SD	3648.67094

APPENDIX C

Using GRAPHIC to Create Graphs

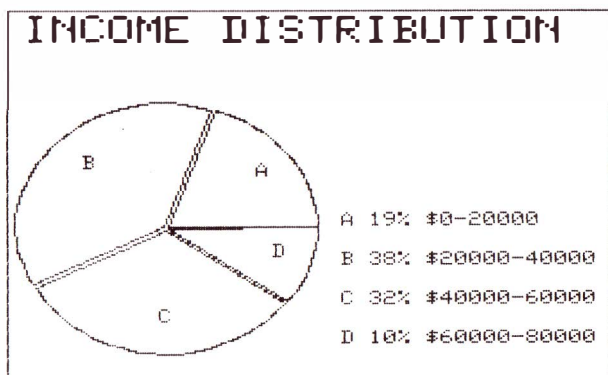
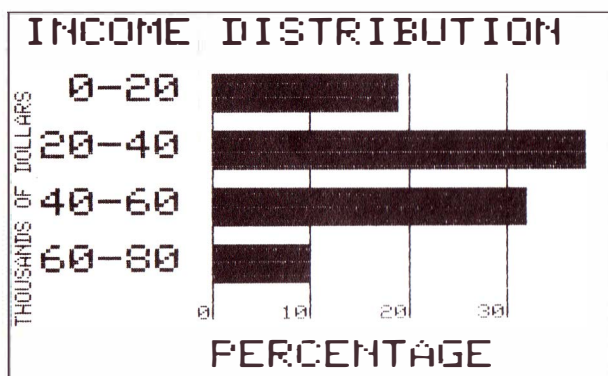
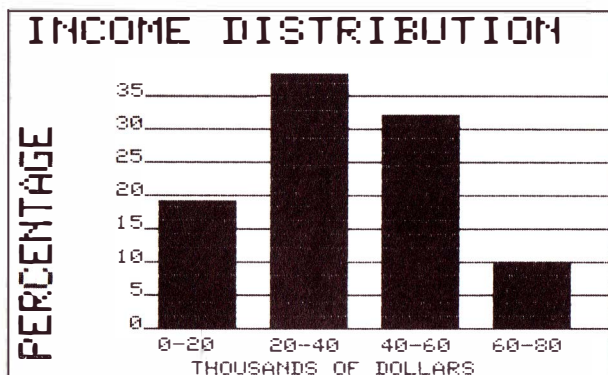
The combination of COLORSTAT and GRAPHIC forms an ideal statistical analysis and reporting system. This appendix illustrates the use of GRAPHIC in preparing charts and graphs from the results of the Frequency Distribution program in COLORSTAT. Although Frequency Distribution lets you display and print a histogram (bar chart) of the distribution, GRAPHIC lets you present the results in several different formats with custom labels.

For our illustration, suppose that you have a data file that consists of annual income figures for 124 systems analysts employed in San Francisco. You can use COLORSTAT to calculate a wide range of statistics on your data. Using the Frequency Distribution option, you can obtain a distribution of the income values. For example:

DISTRIBUTION/HISTOGRAM	
FROM 0	
TO 20000	24 (19.4%)
TO 40000	47 (37.9%)
TO 60000	40 (32.3%)
TO 80000	13 (10.5%)
HISTOGRAM PRINT OR MENU	

You can enter the results into the GRAPHIC program to create detailed charts and graphs that you can display on your screen and print on your black and white or color printer. The following three charts are all created using GRAPHIC. The vertical and horizontal bar charts are similar to the histogram printed by COLORSTAT. However, the GRAPHIC charts contain labels and more detail. The third figure is a pie chart.

GRAPHIC is available in Program Pak (#26-3157) and on Disk (#26-3251).



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