MSTAT - C

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MSTAT-C

A Microcomputer Program for the Design, Management, and Analysis of Agronomic Research Experiments

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MICHIGAN STATE UNIVERSITY

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MSTAT DISTRIBUTION PACKAGE CONTAINS:
Program Diskettes [not bootable] and User's Guide

USER'S GUIDE TO MSTAT-C

A Software Program for the Design, Management, and Analysis of Agronomic Research Experiments

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This is a manual to use in learning the MSTAT-C Program

Manual edited and revised by Ms. Betsy Bricker (1989-1993)

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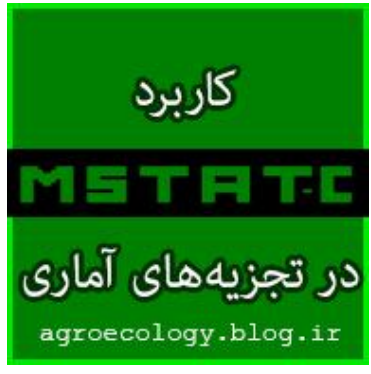
INTRODUCTION

MSTAT-C is a statistical and data management package that is intended to aid the agronomical researcher through all stages of research. The package consists of an executable program that aids in experimental design, and managing, transforming and analyzing data. A User's Manual is included.

You do not need to know much about computers to run MSTAT-C. The programs are accessed through a menu; you highlight the desired program and press **<ENTER>**. Each program presents a series of questions. For example, you might be asked to define the format of your data, list the cases you want analyzed, or select the values you want used in a specific calculation. Your answers to the prompts or questions allow you to tailor the data analysis to your specific needs.

You need to have an IBM compatible computer with a minimum of 512-Kbyte random access memory (RAM), MS-DOS operating system, a hard disk and one floppy disk system.



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HOW TO USE THIS MANUAL

This manual is divided into several sections. You will find basic information in the beginning of the manual, followed by descriptions of the individual programs. Throughout the manual, <ENTER> is used to indicate a specific keystroke; pressing the return key. <F1> indicates a function key; <ESC> is for the escape key. On some keyboards, the <ENTER> key is marked with a hooked arrow or labeled RETURN or ENTER.

The first section discusses how to handle a microcomputer and use operating system commands, how to install the MSTAT program and how to start running the MSTAT program. If this is your first experience with a microcomputer, you should read through this section carefully. The second section covers the basics of using MSTAT; this includes an explanation of terminology used by the programs, descriptions of standard prompts, and the procedure for running the software.

The remaining sections describe the programs; each section describes programs that have similar usage. An example is provided with almost all of the programs so that you will understand how to respond to the prompts; when an example is not provided, the prompts are explained.

Within the manual, the explanatory text is of this print type. Information that the user will see on the screen is presented in a different print type. For example:

```
Enter MSTAT file name (Press F1 for help - ESC to quit)
Default path C:\DATA\
Enter File Name:
Title:
Size:127      Status on Exit of Program ACTIVE
```

Chapter 1: General Information

Chapter 2: Using MSTAT

Chapter 3: Data File Creation, Editing and Sorting

Chapter 6: Plant Breeding

Chapter 7: Economic Analysis

Chapter 8: Descriptive Statistics and Plotting

Chapter 9: Analysis of Variance

Chapter 11: Multivariate Analysis Subprograms

Chapter 12: Accession Series Subprogram

Chapter 13: MGraphics Subprogram

Appendices

1.0 MICROCOMPUTER SAFETY MEASURES

1. Always use a surge and spike voltage suppressor. The worst enemies of microchips are common voltage spikes.

2. Never place a computer disk on a television, near a speaker, telephone, or other electrical equipment such as laboratory instruments that use magnets or magnetic fields. Avoid dust and dusty rooms. Always make a backup copy of your program disk and store in a separate location.

3. Keep the cooling vents of the computer clear to avoid heat buildup.

4. If you use a transformer with reduction coils, always make sure the computer is turned off before you plug it into the transformer. NEVER use a travel transformer designed for large appliances that use circuits to reduce the voltage. Also, never use a travel transformer designed for razors, etc.

5. When traveling by air with a portable computer, always hand-carry it or pack it in foam in a strong box. X-rays will not hurt a computer so it can be run through the X-ray machines in airports. Keep one copy of your disks in your luggage, and hand-carry the other set. Do not carry disks through the body metal detectors in airports since these may affect disks. We also do not know if the airport X-ray scanner affects disks. Hand pass the disks to the attendent to bypass the scanner.

6. Finally, for proper disk management, never use your original Master Sets for anything but making working copies. Clearly label all program and data disks. When you work on a computer, stop every thirty minutes and save your work on the disk. This way, if the power goes off or you lose the information in the RAM (Random Access Memory), then you will only have to repeat a small amount of work.

GENERAL INFORMATION

1.1 OPERATING SYSTEM COMMANDS

You do not need to know very much about computers to run MSTAT. You should know how to use some system commands. Operating system commands are entered beside a drive prompt (i.e., C> or A>).

Specifying Files

To indicate a specific file, the following format is used:

<drive letter>:\<pathname>\<filename>.<ext>

drive letter: This letter refers to the disk drive that contains your file. If your file is on the default drive, the drive letter can be omitted. This could be A:, B:, C: etc.

pathname: This is another name for a directory. It is actually a "path" of directory and subdirectory names that tells the computer the location of your file. Perhaps you have created a specific directory (subdirectory) called "MSTAT" which contains the MSTAT files. This subdirectory would be in the path C:\MSTAT\. Each directory or subdirectory in the pathname is preceded by a \ and followed by \ .

file name: The file name is from one to eight characters long. You can use the letters of the alphabet, numbers and some additional characters. You **cannot** use [,$/\], ", :, |, +, <>, = or a blank space or control codes in a file name.

extension: An extension begins with a period (.) and has one to three characters. The data files created by MSTAT have the extensions ".DAT" and ".TXT".

The MSTAT program allows you to specify a default drive letter and pathname; this is called the default data drive.

Format Disks

Each new floppy disk must be formatted before it can be used. Use the FORMAT command and type **FORMAT B:<ENTER>** to format a disk located in the B: drive. Be sure to read the command entered on the screen. If FORMAT is **not** followed by a drive designation, the program

will format the hard drive and erase everything on the hard drive. Always designate either the A: drive or the B: drive after typing FORMAT.

File Directory

The DIR command is used to list the names of files on a disk or disk drive. To list the file names on a drive, type **DIR <ENTER>.** With more than 25 files, the names will scroll off the screen. Type **DIR/W <ENTER>** and the file names will be displayed in columns. Type **DIR/P <ENTER>** and the file names will be in one column with file size and date information but will pause at the end of a screen full of information.

Erase or Delete Files

The DEL command can be used to erase files. For example, to remove a file, type the DEL command, the filename and extension and then enter the command (**DEL A:CORNYLD.DAT <ENTER>**).

Copy Files

The COPY command can be used to copy files from one location to another. Use **COPY C:<filename>.<extension> A: <ENTER>** to copy files from drive C to drive A.

Backing up the Master Set and Research Data Sets

Using the format command and the copy command, make a backup set of disks. Format as many disks as necessary and copy each disk of the Master Set to a disk. See the above section on formatting disks and copying files. Once data files have been created in MSTAT, format disks to receive copies of all files, copy all research data sets to the "back-up" disks and then store these disks in a location other than the area of the computer, preferable in another building. Use these disks only to restore the data file, not to work with. Always maintain a back up of all research files.

1.2 INSTALLATION OF THE MSTAT PROGRAM

The MSTAT-C program is normally operated from a hard disk. The installation procedure is as follows:

When the screen shows C:\ , insert the first MSTAT-C disk into Drive A:

Make Drive A the active drive by typing **A:<ENTER>**.

Type **INSTALL <ENTER>**.

Follow the prompts on the screen by inserting the remaining disks in the order requested. Reinsert the first disk when prompted. A subdirectory will be created on the C Drive to contain the MSTAT-C program files (C:\MSTATC\). A subdirectory of this directory (C:\MSTATC\DATA\) will be created to contain the MSTAT-C sample data files.

ECON and MSTAT.CFG

Although the current version of MSTAT-C does contain an economic analysis unit written in the C Language, in order to provide the same program (ie. SEASONS) as was contained in previous versions of MSTAT, ECON.EXE has been included from MSTAT-4 and can be run separately from MSTAT-C. This is a stand alone module that can be used with MSTAT-C data files.

Because the MSTAT-4 version can not use the same configuration file, a separate MSTAT.CFG file has to be used with ECON.EXE. To protect the integrity of the MSTAT.CFG file from corruption or editing by the MSTAT-C program, this file must be maintained in a separate subdirectory from MSTAT-C. Changes to the MSTAT.CFG file can be performed within the ECON module.

1.3 RUNNING MSTAT

To run the MSTAT program, turn on the computer, change directory from the root to the MSTAT subdirectory and type MSTATC <ENTER> on the command line.

CD\MSTATC <ENTER>
MSTATC <ENTER>

If the monitor is monochromatic (amber, green or black and white) and the computer has a color board, there may be a problem with reading some of the screen lines.

If you will be using the PLOT or STABIL program, you will need to load GRAPHICS.COM before running MSTATC.

1.3.1 RUNNING SEASONS

To run the ECON module, turn on the computer, change the directory from the root to the MSTATC\DATA subdirectory and type ECON <ENTER> on the command line.

CD\MSTATC\DATA <ENTER>
ECON <ENTER>

Follow the instructions given in Section 7.2 of the manual for the actual operation of SEASONS.

ASCII Format and MSTAT Data File Format

The MSTAT software program uses a specific form of file (random access) that is not ASCII. Before any data can be analysed within the MSTAT program, a data file must be created in the MSTAT format. Within the MSTAT program, the user will be prompted for a file name. This request will always be for a file created within MSTAT. The user can not directly read in a file created in spreadsheets or word processing programs even if they have been saved as an ASCII file. The user can create an MSTAT file and then enter an MSTAT program to transfer the information from an existing ASCII to the MSTAT file.

GENERAL INFORMATION

Initial MSTAT menu

The Initial MSTAT menu contains the list of each routine or function available in the MSTAT program. The highlighted menu choice is described at the top of the screen in the message area. To enter into the next level of the MSTAT program, highlight a choice of one item by moving the cursor on the screen with the arrow keys or typing in the number of the choice. That item will be highlighted and a description of its function will appear in the message area. To continue, press <ENTER>.

FILES - Performs file utility functions for MSTAT data files

Selection: OFF
Data File: NONE
Def. Path: C:\MSTATC\DATA\

1 ACSERIES	11 CONFIG	21 FREQ	31 NEIGHBOR	41 SEDIT
2 ADDON	12 CONTRAST	22 GROUPIT	32 NONORTHO	42 SELECT
3 ANOVA-1	13 CORR	23 HIERARCH	33 NONPARAM	43 SORT
4 ANOVA-2	14 CROSSTAB	24 HOTELLIN	34 PLOT	44 STABIL
5 ANOVALAT	15 CURVES	25 LATINSQ	35 PRINCOMP	45 STAT
6 ASCII	16 DIALLEL	26 LP	36 PRLIST	46 TABLES
7 ASEDIT	17 ECON	27 MEAN	37 PROBABIL	47 TRANSPOS
8 BRSERIES	18 EXPSERIES	28 MISVALEST	38 PROBIT	48 TABTRANS
9 CALC	19 FACTOR	29 MULTIDIS	39 RANGE	49 T-TEST
10 CHISQR	20 FILES	30 MULTIREG	40 REGR	50 VARSERIES

Menu Bars

Menu bars across the top of the screen are used for some of the next levels in MSTAT. The first line of the bar states the name of the progam. The second line of text is a short description of the highlighted option of the third row. The descriptive text changes as the cursor moves the highlight from option to option.

For example, the first highlighted option in the Initial MSTAT Menu is FILES. Press <ENTER> and the message on screen becomes:

```
FILES
Open an existing data file
Open Close Make Path List Erase Name Backup Restore
```

The word Open is highlighted and the descriptive text applies to the operation that will occur if the <ENTER> key is pressed. If the user moves the cursor along the third line with the arrow keys, the descriptive text will change. For example, the descriptions for List and for Backup are:

```
FILES
Get a directory of the MSTAT data files
Open Close Make Path List Erase Name Backup Restore
```

```
FILES
Make a backup of the current MSTAT data file
Open Close Make Path List Erase Name Backup Restore
```

Throughout the MSTAT program, the first line of the menu bars may have an additional message within parentheses such as (Press <F1> for Help), (Press ESC to quit) or (press <F10> to end). These are to remind the user of help screens or to indicate the next step in the program.
If a message is superimposed on the screen, such as a help message or an error message, press the spacebar to remove the message from the screen and to continue.

Direct Start of the Program

Most of the MSTAT programs will immediately present information or message panels when chosen rather than bar menus. Press <ENTER> to move to the next screen.

Exiting MSTAT

If you have entered MSTAT and the Initial MSTAT menu is on screen, to end the session press <Q> or press <ESC>. If you are in a program selected from the Initial MSTAT menu, press <ESC> to be returned to the Initial MSTAT menu. Pressing <ESC> does not guarantee that an analysis had been done or a function performed in the program. <ESC> is sometimes listed as an option on the Bar Menus and its function is stated at that time.

1.4 SUGGESTIONS ON WORKING WITH MSTAT

Each series or program unit is described in greater detail in appropriate sections of the manual.

1. **Design your experiment on paper and create a data file within MSTAT**

Decide if the design is a randomized complete block design, a completely random design, a lattice design, a simple plant breeding program, a plant breeding program using a master accession file or some other statistically accurate design. To create a data file, open each of the separate design series and make the file. See the separate sections in the manual explaining each series in detail.

A. **EXP Series** - Randomized Complete Block or Completely Random Design with up to 5 factors in addition to replication
Order of use: FILES, PLAN, BOOK, MAP, LABEL

B. **VAR Series** - Lattice design or one factor randomized block design. There are two data files; 1) storing names 2) field experiment plan
Order of use: FILES, NAME, PLAN, BOOK, MAP, LABEL

C. **BR Series** - Small plant breeding program
Order of use: FILES, LIST, BOOK, LABEL

D. **AC Series** - Large plant breeding program - master accession file

E. **Other Designs** - Duplicate your past experiments or create new ones - create a new file in the **SEDIT** program then define the variables for data storage and add the data in the **SEDIT** program.

2. **Enter data in MSTAT**

Data can be entered into MSTAT within the program **SEDIT** as soon as it is collected from the field, laboratory or greenhouse. It can be read from a polycorder file, entered in through the keyboard or uploaded from a disk file in ASCII format. The MSTAT program **ASCII** can be used to read data from a **LOTUS** printer-ready file or other spread-sheet programs or word processing programs that save information in the ASCII format. The user

would first enter MSTAT and create a file in the **FILES** program then read the imported data in the **ASCII** program.

3. Data entry from fieldbooks

Use **SEDIT** and load the data file to receive data or enter **SEDIT** and create a data file for data storage then enter the **OPTIONS** mode of **SEDIT** to define the variables and to append cases to the file. Enter the data in the appropriate variables.

4. Look at the data

STAT - lists the high and low values in each variable so stray values can be seen. The STAT print-out can be used to group values in a variable, to find the frequency of occurrance of values and is especially useful if you plan to plot the data.

FREQ - shows distribution of the data values in a variable.

MEAN - stores the mean value of a one factor with reps (or samples)

SORT - organizes the data in non-random order. This is especially helpful if you are planning to import data from another program or export to a word processing program.

5. Transform the data

Some data must be changed from one unit of measurement to another for analysis and/or publication. This can be done in the **CALC** program. "Selection" of data cases based on variable values can be done in the **SELECT** program.

6. Analyze the data

Randomized complete block or completely random design.
One factor and samples within the factor - **ANOVA-1**
One factor and replications - **ANOVA-2**
More than one factor and replications - **FACTOR**
Subsamples within samples - **HIERARCH**
Gaps in your data - **NONORTHO.**

Lattice designs - ANOVALAT will analyse most lattice designs.

After any **ANOVA** procedure, enter **RANGE** for LSD, Duncan's, Tukey's or S-N-K.

Use **CORR, REGR** or **MULTIREG** to run any simple or multiple regression or correlation analyses.

7. Present the results of data manipulations

Within most of the MSTAT programs, there is an option to name the file containing the tables that result from an analysis. This is an ASCII file that can be "read" by word processing programs. This file contains the generated output from the program. This is one way to create complete reports with all the statistical tables generated by MSTAT.

2.0 USING MSTAT

2.1 TERMINOLOGY

There are many software programs available; each with its own terminology. MSTAT also has its own key words and phrases. This section is an attempt to clarify terms and phrases in the MSTAT program.

data file - a file containing the values and text of an experiment. The data are displayed in a two-dimensional table, as shown above. In this table, each row is the description of a single object being observed, such as a plot, a pot or a test tube. Each column is a variable which is an element of the observations, such as plot numbers, yields or nitrogen levels.

case - an object being observed. For example, a case could be a plot within a field experiment; the plot would have distinct characteristics such as plot number, nitrogen level and cultivator identification. In the above table, each row is a case. The number of variables within a case is determined by the file size or file width defined when the file is created.

variable - one recorded data reading within an experiment (e.g., weight, yield or height). In an MSTAT data file, a variable is either numeric (numbers) or text (alphanumeric characters). In the above table, each column is a numeric variable.

DATA FILES

When creating a data file, two files are created. The file ending with ".DAT" contains data. The second file has the same file name, but ends with ".TXT". The TXT file contains the information necessary for the program to read the .DAT file contents.

When creating a data file, the following screen display appears:

```
Enter MSTAT file name (Press F1 for help - ESC to quit)
Default path C:\MSTATC\DATA\
Enter File Name:
Title:
Size:100      Status on Exit of Program ACTIVE
```

2.1 TERMINOLOGY

`Default path C:\DATA\:` The CONFIG program maintains some default settings for the MSTAT program. For data file names, the drive and pathname are stored as a default setting called the default data drive. This default setting saves time and reduces the chance for error (i.e., typos) by allowing only the 8-character file name to be entered.

`Enter File Name:` When defining a file name, use up to eight characters, but do not use the characters [, $ Λ]": | + .<> , = or a blank space. It is best to use letters and numbers for file names. When the program asks for a data file name, enter a descriptive name that has not been previously used.

`Title:` The title of the file can be descriptive of the file and be as long as 65 letters or characters. For files containing experimental designs, include the purpose of the experiment and an experiment number, crop, location, year and season for easier file identification.

`Size:` The "Size" or "file width" is the total number of characters entered for all text and numeric variables as they apply to one case or row of data. The file size or file width is not directly related to the number of cases within a file; only the number of variables that can be defined. A numeric variable can be of varying length, however, the variable is automatically assigned four characters of the file width. The program has a special way of storing a numeric variable that only requires four characters of file width. An alphanumeric or text variable is stored as a 'string' and occupies the same number of characters in the file width as are in the 'string'. For a general rule, set the size of a new file to 100 if you plan to have less than 20 numeric variables in the file. The maximum width or size of the file is 512.

`Status on Exit of Program:` The file being created does not have to be used immediately within MSTAT. If the <SPACEBAR> is pressed, the status will toggle to INACTIVE.

2.2 STANDARD PROMPTS

In an attempt to simplify the operation of the MSTAT programs, many screen prompts have the same wording and mode of operation. Instead of listing and explaining the same screen prompts in several sections of the manual, the standard prompts are explained here.

Variable Prompts

DEFINITION OF VARIABLES

Some of the programs require definition of variables. When defining a variable, the following prompts are presented on screen:

1. A description or title of the variable.
2. The variable type.
3. The display format of the variable.

When defining these attributes, the user is able to cursor through the screen box and edit their responses. Pressing <ENTER> when the cursor is in the last box of the screen will call up the next box for defining another variable. Pressing <ESC> will end the definition of variables. Once the variable definition is stored, you can change only its description (Title) and display format, not the variable type (numeric or text).

```
DEFINE variable 4 [18 bytes free]
Title
Type NUMERIC   Size 4   Display Format (Left) 7 (Right) 1
```

`Title:` To distinguish between variables, a description (Title) of each variable is recommended. The description could contain a treatment name and its represented value (e.g., Nitrogen in lbs/acre) or could indicate raw data such as yield or stand count. The program can store up to 65 characters in this line. Only the number of characters shown in the display format box will be on the screen during editing but all of the title will be printed with the various printed outputs.

`Type:` A variable can either be numeric or text (alphanumeric). If a variable is numeric (all numbers), press <ENTER> when the cursor is highlighting the Type box. All numeric variables are Size: 4. If a variable is text, press the <SPACEBAR> to toggle the Type option to TEXT. The

text variables can be of any size up to the limit of 512. Note that the screen of most computers displays only 78 characters.

`Display Format (Left) 7 (Right) 1:` The default settings for displaying numeric data are 7 to the left of the decimal and 1 to the right.. If the default settings are to be used, press <ENTER> for each setting. To display data differently, enter the desired display values at the above prompts and press <ENTER>. The display format of a variable does not affect the number of digits stored by MSTAT nor does it affect the precision used in a calculation.

Numeric values are displayed right-justified. To make it easier to read screen presentation of data or a print out of the values in PRLIST, enter one space more than the largest number in the column of data when defining the (Left) display format. Text variables are displayed left-justified. To add blank spaces to the right of text, enter a number greater than the default. For example, if 10 characters will be entered but 2 spaces are desired before each entry, enter 12 in the Display format box for text variables.

GROUP VARIABLE

A group variable is generally an independent variable and the values within the variable are established by the researcher rather than being experimental data.

Group variable or grouping variable is a term used to denote a defined variable in MSTAT that separates out observations into units of similar characteristics. The most common group variable in agronomic research is treatment. Treatments may be in the form of irrigation, fertilizer, specific variety of crop, location or any other independent action.

If the study in progress concerns varietal yield then a variable named 'variety' would be created and the various varieties to be planted would be numbered in ascending 1-2-3 order with each specific variety having a unique value assigned. These would be the group levels of the group variable 'variety'. Another general group variable is replication.

As an example, the data file COMPACT (see page E-4) contains variables that are group variables, information variables and data variables. In this sample file, variables 1, 2 and 9 are the group variables (replication, compaction and variety). Variable 3 is an information variable (the actual

variety entry number that ranges from 6 to 83) and variables 4, 5, 6, 7 and 8 contain the dependent or data values collected from the experiment.

Other group variables can be created and used when appropriate. Some MSTAT programs that utilize a group or grouping variable are AOV's, SORT, SELECT and FREQ.

Data can be separated into groups in the program GROUPIT. In GROUPIT, individual data cases can be assigned a group level directly associated to the value of a different variable. For example, if the data file contains a variable to store the yield data, the user can assign a group level to a range of the yield data (yield1=1-200 units, yield2=201-500 units, etc).

When a program uses the group variable to cluster the data, one of the following prompts may be displayed.

```
Press <F1> for a list of variables
Enter the number of the GROUP variable ( 1 - n )
Enter the lowest and highest values in the GROUP variable
        LOWEST :            HIGHEST :
```

or

```
Enter the number of the first group variable:
   Lowest value:
   Highest value:

Enter the number of the second group variable:
   Lowest value:
   Highest value:
```

These prompts are displayed by programs that use a group variable for transformation or calculation. When the above prompt is displayed, enter the group variable number (i.e. "5" for variable no. 5). It can be selected from a list by pressing <F1> after a value has been entered into the box. The lowest level is the lowest integer and the highest level is the highest integer that 'counts' the different numbers of levels. For example: if variable no. 5 indicates nitrogen levels, with values ranging from 1 to 4 for the various possible levels, enter 5<ENTER>, 1<ENTER>, and 4<ENTER> in the appropriate boxes on screen.

2.2 STANDARD PROMPTS

Press <F1> for a list of variables

Throughout MSTAT-C, the user is able to pull down a list of variables in the active data file when the above prompt is displayed on screen. A value must be in the highlighted box before pressing <F1> or a beep will sound. When the variable menu is on screen, either highlight a choice and press <ENTER> to make a selection or press <ESC> to return to the underlying screen.

CHOOSING A VARIABLE

The following will be presented when the user is questioned as to which variables to be used in calculations or other operations in MSTAT:

On the left-hand side of the screen are the instructions for choosing the variables to be entered into the required space:

```
INSTRUCTIONS
Highlighted items are the variables to be used.
<UP ARROW> and <DOWN ARROW> are used to move the
cursor.
Press the <SPACEBAR> to add highlight
and to remove highlight on item.
Press <A> to highlight all items.
Press <N> to remove all highlights.
Press <ENTER> to continue.
```

On the right-hand side of the screen is the variable list bar menu from which variables can be chosen with a message as to the number of variables that can be highlighted:

```
Choose up to 3 variables (Press ESC to quit)
01    (NUMERIC)  REPLICATION
02    (NUMERIC)  COMPACTION
03    (NUMERIC)  10-POD LENGTH
04    (NUMERIC)  YIELD
```

The variable list bar menu will appear with all highlight lines absent. The user can press the up and down arrows to place the cursor on the variable to

choose and then press <SPACEBAR> to add the highlight. When all highlights are in place, press <ENTER> to continue.

Data Cases

A range of data cases can be used instead of an entire data file. The program will read the number of cases in a data file then ask if all the cases are to be used in the analysis in progress:

```
Get Case Range
The data file contains 135 cases.
Do you wish to use all cases?  Y/N
```

When responding <N>, the following box is displayed. If the user needed information from cases 10 to 25, the responses would be as shown.

```
Case Range 1-135
First selected case   : 10 <ENTER>
Last selected case    : 25 <ENTER>
```

Output options - View/Edit/Print/Save Menu

Instead of only displaying output from a procedure on the screen, a file named ZZZPRINT is created and MSTAT displays the following View/Edit/Print/Save menu of options:

```
View output on screen
Edit output
Print output
Save output to disk
Quit output options
```

Select options either by highlighting the choice and pressing <ENTER> or by entering the first letter of the choice. After the completion of an option, the View/Edit/Print/Save menu is displayed again. Once output has been saved to disk, it can only be viewed, edited or printed in ASCII or edited in ASEDIT within MSTAT-C.

2.2 STANDARD PROMPTS

`View`: The output is presented on screen. The user can scroll through the output by using the cursor keys as explained in the screen header. Press <ESC> to end viewing of the output.

`Edit`: The output is presented on screen. The user can scroll through the output by using the cursor keys as explained in the screen header. Press <F1> for instructions on editing the information on the screen (see ASCII or ASEDIT in Chapter 3 for further instructions). Press <F10> when all editing has been done to save the edited material. To revert back to the original output, do **not** press <F10>, press ESC.

`Print`: After the output is printed, the View/Edit/Print/Save menu is displayed. The printer must be on line when this option is chosen.

`Save`: You are asked for a new file name. Do not specify a drive letter or pathname; the file is written to the default data drive in ASCII file format with printer commands. No extension is appended unless you specify one. Do this operation after viewing and printing the output as the View/Edit/Print choices will not be available after saving the output to disk.

`Quit`: You are returned to the Initial MSTAT menu.

2.3 USING THE MSTAT PROGRAMS

Each program performs a specific function or set of functions. For example, the SEDIT program allows definition of variables for a data file and addition of data. Therefore, to use SEDIT there must be an existing or newly created active data file, with or without variables defined for the file.

The requirements of each program (e.g., an active data file) are listed in the program description in this manual. MSTAT checks that the basic requirements of a program are met before running that program. If a requirement is not met, an error message states what requirement needs to be fulfilled before use of the program.

The following sections of this manual describe the programs. Each program unit is presented using the following format:

Program Name: The program name as it appears on the menu.

Purpose: The general functions performed by the program.

Before starting, you need: This is a short list of the program requirements and any information that should be known before using the program.

Results: Informs of the end result of using the program. For example, when a new file is created, or data are added to the active data file.

Sample Data File: This is a sample data file that either is on the distributed data disk or is a file created in an example. After some general information about the program, the sample data file is used in an example.

PRINTING OUTPUT

Several of the programs generate output which may be printed. When using PRLIST, a listing of the data in the file can be printed. When using any of the statistical programs, an analysis is generated and formatted for printing and temporarily stored in a disk file. This file is accessed to print the output.

If the output generated by a program is 80 columns or less, the output will be printed using normal print. However, if output requires more than 80 columns, the output will be printed using condensed print. The condensed

print codes are stored in the MSTAT Configuration file. If the condensed print code is incorrect, the output will be printed using normal print; if you have an 80-column printer, this will cause some problems.

Several of the programs create tables to display output. Assumptions have been made as to the number of digits that will be needed for a displayed value. If a value has more than the expected number of digits, the printed value will be too wide for the column headings and each following value in a row will be shifted to the right; the values will not be aligned in columns. This does not indicate a problem in a calculation, it only indicates that certain values will not be properly aligned.

DEFAULT SETTINGS

Default settings, such as the default data drive specification and printer command codes, can be changed by selecting the CONFIG program from the menu. These settings are used to help make MSTAT easier to use. The original default settings are:

```
Printer:  EPSON
Default data drive: C:\MSTATC\DATA\
```

Below these items you will see various printer codes for compressed print, double print width and so forth.

The distributed MSTAT files are configured for an EPSON printer and to find data on a subdirectory named DATA. Use the CONFIG program to change the default printer setup if your printer is not similar to Epson and to change the default data drive. Follow the manual instructions for saving a new printer configuration in the CONFIG program.

Default data drive: To change the default data specification from C:\MSTATC\DATA\ , follow the manual instructions in the CONFIG program. If you are planning to store the data files in a subdirectory of the hard disk, this setting will allow the program to always search in the specified subdirectory when a file name is loaded. The user will still be able to use floppy disks as file sources by entering a different path when first opening the MSTAT program.

ERROR CONDITIONS AND ERROR MESSAGES

If you make an error, or if an error occurs, the program stops running and an error message is displayed. Most of the errors are related to the data set and the user responses to the screen prompts (parameters entered).

If an error occurs repeatedly, then it may be a program error. Reinstall MSTAT from the Master disks and try again. If the same error occurs, fill out the supplied error information sheet and mail it to us for clarification. If it is an emergency, call us with the error sheet in hand.

EXITING FROM MSTAT

At the initial menu, the user can press Q or can press <ESC>.

3.1 CONFIG

Purpose: The MSTAT Configuration file is used to maintain a default data specification, various computer codes, and printer specific print codes.

Before starting, you need:

1. The manual for the printer that will be used with the MSTAT program.

Results: Any printed output from MSTAT will appear either in normal, compressed or double width print mode as appropriate for the program. The default data path can be changed as well as the number of beeps used as notification.

MSTAT is distributed with the following default settings:

```
Default data path : C:\MSTATC\DATA\
Printer name :              Epson
   Compress print on code        : 15
   Compress print off code       : 18
   Double width print on code    : 14
   Double width print off code   : 20
   Form feed code                : 12
Number of beeps    : 1
```

To change these default settings, you must highlight CONFIG on the Initial MSTAT menu and press <ENTER>. It is not necessary to have an active data file before reconfiguring MSTAT. CONFIG displays the current default settings and a list of editing options.

`Default path name:` C:\MSTATC\DATA\ - For the fastest operation of a program, the data files should reside on the hard disk. It is best to maintain data files in a separate directory from the MSTAT program files. This directory can be created at the same time that the program is installed.

`Printer Name` - The majority of the printers have the same ASCII print commands as an EPSON. This printer was chosen because of the compatibility with most printers. Try creating some output to see if the hardcopy is formatted correctly. If so, do not change the default settings for compressed, double width or form feed.

Compressed and double width print codes - Some of the programs use the compressed print on and off codes when output will be printed using more than 80 characters across the width of the paper. If the compressed print on code is incorrect, output which requires more than 80 characters will be printed in normal print and will continue to the next line of the paper; if you have an 80 column printer, this will cause some problems. If the compressed print off code is incorrect, then after output is printed in compressed print, all output will be printed using compressed print. These two types of print are not available if you have a laser printer.
Form feed code - This ASCII code instructs the printer to go to the top of the next page during a program.

Number of beeps - The default value is one beep. This beep will alert the user when attention to the screen or program is necessary. The number of beeps can range from none to 500.

Configuring the program to your printer

When you select CONFIG from the Initial MSTAT menu, the following screen of default settings is displayed (your default settings may be different). This will be referred to as the current configuration screen:

```
Printer name :              Epson
   Compress print on code        : 15
   Compress print off code       : 18
   Double width print on code    : 14
   Double width print off code   : 20
   Form feed code                : 12
Number of beeps     : 1
```

Press <ENTER> to bring up the CONFIG Options Menu. Move the highlight bar up and down the menu with the arrow keys or downward with the spacebar. Press <ENTER> when the desired option is highlighted.

```
Config Options Menu
1 Edit current printer configuration
2 Select another printer configuration
3 Add new printer configuration
4 Delete any printer configuration
5 Reset configuration to default
6 Change default data path
7 Change beep duration
8 View current configuration
9 Set laser printer linefeed code
Q Quit
```

Each of these options are described in this chapter.

1 - Edit current printer configuration. CONFIG displays the current print codes in the following menu (printer information screen):

```
Printer name :              Epson
   Compress print on code       : 15
   Compress print off code      : 18
   Double width print on code   : 14
   Double width print off code  : 20
   Form feed code               : 12
Number of beeps    : 1
```

The cursor can be moved from line to line and new ASCII codes entered. If more than one ASCII code is needed for a specific print code these codes are to be entered as decimal numbers separated by blanks.

2 - Select another printer configuration. The current printer name is displayed and a list of any printers currently defined in the configuration file can be shown on the screen by entering a value in the highlighted box then pressing <F1>.

```
Press <F1> for a list of printers
Current printer : 4) EPSON MX/JX/FX
Enter printer number to select :
```

There are currently 14 printers listed in the MSTAT.CGF file. Enter a value

in the highlighted box then press <F1> and a long menu will be onscreen.

```
001 APPLE WRITER
002 CENTRONICS 737
003 C. ITOH
004 EPSON MX/JX/FX
005 GEMINI-10X/15X
006 IBM 80
007 OKIDATA M82A
008 PROWRITER/II
009 THINKJET ALT-MODE
010 THINKJET HP-MODE
011 TI 850/855/865
012 TIGER 460
013 TRS-80 VI
014 HP Laser Series 2
```

Press the spacebar or the arrow keys to place the highlight on the desired printer then press <ENTER>.

If you enter a different printer, its print codes will be displayed as the default settings in the printer information screen. Press <ENTER> to have the printer configuration screen presented.

```
3 - Add a new printer configuration.
```

```
Printer name :
   Compress print on code       :
   Compress print off code      :
   Double width print on code   :
   Double width print off code  :
   Form feed code               :
```

The cursor can be moved from line to line and new ASCII codes entered. If more than one ASCII code is needed for a specific print code these codes are to be entered as decimal numbers separated by blanks.

After entering the new print codes and pressing <ENTER> while the highlight is in the last field, the current configuration screen is displayed.

Press <ENTER> to call up the CONFIG Options Menu. Highlight 2 - Select another printer configuration and press <ENTER>. Enter the number for the new printer.

4 - Delete any printer configuration. The current printer name is displayed and all printers currently defined in the MSTAT.CGF file can be shown on the screen by pressing <F1>.

```
Press <F1> for a list of printers
Current printer : 4) EPSON MX/JX/FX
Enter printer number to delete :
```

There are currently 14 printers listed in the MSTAT.CFG file. Press <F1> and a long menu will show on the screen as in prior option 2. Press the spacebar or the arrow keys to place the highlight on the desired printer. Press <ENTER>. After you enter the number of the printer you want to remove and press <ENTER>, the current configuration screen is displayed. When you remove a printer from the MSTAT.CFG file with the CONFIG program, the printer definition is no longer available.

5 - Reset configuration to default. After you select this option, the current configuration screen is displayed with the configuration settings that were in listed at the beginning of the MSTAT session unless you have deleted the printer configuration that was originally the default value.

6 - Change default data path. You are prompted for the new default data specification:

```
Default data path : C:\MSTATC\DATA\
```

Type in the new path over the one presented then press <ENTER>. Be sure that the last character in the path specification is \. After you enter the desired default data specification, the current Configuration screen is displayed with the new default setting.

7 - Change duration of beep. You are prompted for the number of times the computer will beep when a beep code is used:

```
Enter number of beeps (0 - 500) : 1
```

After you enter the new value and press <ENTER>, the current configuration screen is displayed and the new value is used as the default setting. Press <ENTER> to return to the CONFIG Options menu.

```
8 - View current configuration
```

The current configuration screen is presented on the screen. Press <ENTER> to return to the CONFIG Options menu.

```
9 - Set laser printer linefeed code
```

Most printers will accept a linefeed as both a linefeed and a carriage return. The HP LaserPrinter Series 2 will not. This causes the output to be stepwise down the page. If the user has configured MSTAT-C to Printer 14 - HP Laser Series 2, the codes for Line Feed = Line Feed + Carriage Return has been inserted on the 2nd and 3rd print command lines. There is a decimal code in the printer manual that can be used to set the LaserPrinter to read the linefeed as both a linefeed and a carriage return. Using Option 9 will also send this code to the printer.

```
Printer initialization code (linefeed=linefeed + carriage return)
Initialization Code :
```

For the HP LaserPrinter Series 2 printer, the appropriate code is:

27 38 107 50 71

Be sure that this option is used before printing any program with MSTAT-C. If you plan only to save output to files, it is not necessary to initialize the printer. The values entered for the initialization code will not be saved anywhere within the MSTAT program so we suggest that you make a copy of the screen when the code is entered and before the <ENTER> key is pressed or record the code in a visible place.

Q - Quit. Place the highlight on this line and press <ENTER> to exit to the Initial MSTAT menu. If there have been any changes made such as new default data drive, number of beeps, printer choice, the prompt on screen will be:

```
Current configuration altered, Do you want to save it ? Y/N
```

3.2 FILES

Purpose: Performs file utility functions such as opening, closing or creating files; displaying a directory of data files; making a backup or restoring a data files; or loading a previously created file.

Results: The selected utility program is performed, such as creating a new data file or copying the active data file.

The FILES program is entered before most of the other programs to create or open the data file to be used in analyses. When the Initial MSTAT menu is placed on screen, FILES is highlighted. Press <ENTER> to call up the first FILES screen.

The options available will be listed below in the order shown across the top of the screen. Each option is straight forward. Enter a file name and associated information if a file is to be created, loaded, closed, erased, renamed, backed-up or restored. Enter the desired default path for data retrieval if that option is chosen. If a path and file name are present in a highlighted area and you wish to use a different path or file, press the spacebar to clear the highlighted area or simply type in the new information before pressing the <F1> key.

In order for most activities to be performed within MSTAT, a data file must either be opened (activated), closed (inactivated) or created. The first three options perform those functions:

`Open:` Activate an existing data file. After the highlight is placed on Open and the prompt is presented, press <F1> for a list of data files that are on the current default path or the drive or path established on the prompt. For example, if the data file is located on the A: drive, enter A: at the prompt for file name and then press <F1>. A list of files will be superimposed on the screen and you can scroll up or down the list with the up and down arrow keys as well as the page up and page down keys. Once a file is highlighted, further information on the file can be obtained by again pressing <F1>. Press the enter key to "load" the file.

`Close:` Deactivate the current data file

3.2 FILES

`Make:` Create a new data file

When Make is highlighted, press <ENTER> and the following screen will appear:

```
Enter MSTAT file name (Press F1 for help - ESC to quit)
Default path C:\MSTATC\DATA\
Enter File Name:
Title:
Size:127      Status on Exit of Program ACTIVE
```

`Default path C:\DATA\:` The CONFIG program maintains some default settings for the MSTAT program. For data file names, the drive and pathname are stored as a default setting called the default data drive. This default setting saves time and reduces the chance for error (i.e., typos) by allowing only the 8-character file name to be entered.

`Enter File Name:` When defining a file name, use up to eight characters, but do not use the characters [, $ Λ]": | + .<> , = or a blank space. It is best to use letters and numbers for file names. When the program asks for a data file name, enter a descriptive name that has not been previously used.

`Title:` The title of the file can be descriptive of the file and be as long as 65 letters or characters. For files containing experimental designs, include the purpose of the experiment and an experiment number, crop, location, year and season for easier file identification.

`Size:` The "Size" or "file width" is the total number of characters entered for all text and numeric variables as they apply to one case or row of data. The file size or file width is not directly related to the number of cases within a file; only the number of variables that can be defined. A numeric variable can be of varying length, however, the variable is automatically assigned four characters of the file width. The program has a special way of storing a numeric variable that only requires four characters of file width. An alphanumeric or text variable is stored as a 'string' and occupies the same number of characters in the file width as are in the 'string'. For a general rule, set the size of a new file to 100 if you plan to have less than 20 numeric variables in the file. The maximum width or size of the file is 512.

`Status on Exit of Program:` The file being created does not have to be used immediately within MSTAT. If the <SPACEBAR> is pressed, the status will toggle to INACTIVE.

When operating a program within a hard disk system, paths are necessary to specify the directory or subdirectory that contains the information sought. Within MSTAT, a default path is set by the configuration but can be altered during one session by using the Path option.

`Path:` Change the default path

Often, it is necessary to get a list of MSTAT data files resident on the default data path without exiting the MSTAT program. Use the List option in the Files Program.

`List:` Get a directory of the MSTAT data files by highlighting Files and pressing <ENTER>. A list of data files that are on the current default path or the drive or path established with the path option are superimposed on the screen. The user can scroll or page up or down the listing. Once a file is highlighted, further information on the file can be obtained by pressing <F1>. Press the enter key to return to the main bar menu.

When the files used with the MSTAT program for data storage are no longer necessary or have been copied into another file or made redundant in some fashion, they can be removed from the data storage by the Erase option. This will delete the data file and the companion text file. They can not be restored within MSTAT. Do not use the erase function unless the files are absolutely worthless.

`Erase:` Delete the current MSTAT data file

If it has been decided that the currently loaded data file should have a different name, use the Name option.

`Name:` Rename the current MSTAT data file

It is strongly recommended that all data files be copied to a disk once data has been entered so that the raw data will be available in the event of a hard disk failure or other calamity. The Backup option is not the same as making a master copy of the file on a separate disk.

3.2 FILES

It is strongly suggested that all MSTAT data files be written to a temporary file before any calculations are performed or any additional data written in to the file. The Backup option writes the active file to a file of the same name in the same default data directory but with the extensions .&DA and .&TX. The Restore option reverses the procedure by copying the contents of the &DA file into the DAT file and the contents of the &TX file into the TXT file thus overwriting the contents of the DAT and TXT file with the information from the last backup.

`Backup:`	Make a backup of the current data file
`Restore:`	Restore the current file from its previous backup

Before starting an analysis, use the Backup option which will create a duplicate of your file in the MSTAT-C default data directory with the extensions of &DA and &TX. If, during the process of using MSTAT-C, an error is made and your data file is completely destroyed even to the point that the file name is removed from the default directory, there is a solution if you have used the Backup option.

To recover a destroyed file, exit from MSTAT-C and change from your MSTATC directory to your default data directory. If your MSTAT-C program was installed as described in Section 2, the proper form would be:

CD\MSTATC\DATA <ENTER>

To ensure that you do not overwrite an existing file, look at a directory listing of the files in the data directory that have the same starting letter or number. For example, if your file name begins with F or 8, type:

DIR F*.* <ENTER>
or **DIR 8*.* <ENTER>**

Name the data files with the &DA and &TX extensions to DAT and TXT where, in this example, the name of the data file is indicated by <FILENAME>:

COPY <FILENAME>.&DA <FILENAME>.DAT <ENTER>
COPY <FILENAME>.&TX <FILENAME>.TXT <ENTER>

To return to the Initial MSTAT menu, either highlight Quit and press <ENTER> or press <Q>.

`Quit:` Return to the main MSTAT menu

3.3 SEDIT

3.3 SEDIT - DATA ENTRY

Purpose: To enter and edit numerical data in new or existing MSTAT data files.

Results: Creation and editing of new and existing MSTAT data.

A file can be either created or opened in the FILES option of the SEDIT program. SEDIT can also be entered from the initial menu of MSTAT with or without an active data file. All data files will be placed in or loaded from the default data drive unless a drive is specified with the file name. Throughout the SEDIT program, the user can either move the cursor by use of the arrow keys to the menu item desired (which highlights it) then press <ENTER> or type the first letter of the word for the item desired.

Opening menu:

```
Files    Options    Enter/Edit       Quit
```

FILES

This option functions in the same manner as the FILES program. The user is prompted to enter a file name to be opened or created for manipulation.

OPTIONS:

This choice can be used to create blank cases, define variables in the current data file, edit text and display formats of existing variables, choose which variables to have on screen to edit or choose a specific variable at a specific case number to start the editing session.

```
Insert Cases Remove Cases Define Newtxt Variables GOTO Quit
```

`Insert Cases / Remove Cases:`
When creating a data file, the user must have blank cases in which to place information. When Insert Cases is chosen, the user is prompted for the number of cases to add to the current data file and the location of this addition if there are existing cases in the file (from case *x* to case *y*). To remove cases, follow the instructions on the screen. Cases not shown on screen can be removed. If all the cases in the data file are removed, cases will have to be inserted to enter any data into that data file.

Define:

For a new data file, the user must define variables before trying to enter data. The default values for the variable type (numeric or text) and the display formats will be shown on the screen. This option can also be used to create new variables in an existing data file.

```
DEFINE Variable  1 [20  bytes free]
Title
Type NUMERIC Size 4  Display Format (Left) 7 (Right) 1
```

After typing in a title for the new variable (up to 65 characters), press <ENTER>. To create a variable for number storage, press <ENTER> to accept the default type of NUMERIC. To create a text variable (alphanumeric information), press the spacebar when Type is highlighted then press <ENTER>. The field for Type will toggle between NUMERIC and TEXT by pressing the spacebar. The display format can be changed by typing in the desired numbers. For ease of reading a printout of the data, it is suggested that the left display format be at least one character larger than the actual data point value.

Newtxt:

In an existing data file, the user is able to modify the file title, the variable title and the display format. When chosen, a list of variables in the active data file is shown on the screen. Move the cursor with the arrow keys to the variable to be changed and press <ENTER>.

```
  Enter NEWTXT for variable __
  File Title :
  Var. Title:
  Display Format (Left) __  (Right) __
```

Move the cursor to the title or display format to be edited and make changes. Press <ENTER> to enter the changed values and to return to the OPTIONS menu. If you press <ESC>, the changes will not be made and the OPTIONS menu will be presented.

Variables:

The user can choose to have only some of the variables in the data file shown on the screen. This is often done to show the independent variable

values while entering the dependent variable values or to prevent accidental editing of other variables. This ability to have only certain variables displayed is very helpful in data files with more than 8 variables. If the user is editing in variables 7, 15 and 20, and if all the variables are shown, he would have to page over (to the right) one screen for each entry within a case. By selecting only to show the variables of interest, all of the data to be edited will be on one screen. To use this option, highlight Variables and press <ENTER>. A list of variables in the active data file will appear in a bar on the screen. To select non-consecutive variables, press <N> then move the cursor to the variable to be edited and press the spacebar. Continue to select variables by highlighting them then pressing the spacebar. Press <ENTER> when finished. Only those variables selected will be on screen for editing. (These instructions are also presented on the screen to assist you.)

GOTO:

When GOTO is chosen, type in the case number and the variable number at which you wish to start editing or entering data. This 'cell' will appear in the uppermost and leftmost position of the editing screen. With a large data file, this will assist you in moving around the file.

ENTER/EDIT:

If the user chooses ENTER/EDIT, the box at the top of the screen will list the data file name, file title, number of cases and number of variables. **There is no other time that the user can edit data.**

B:\COMPACT
Soil Compaction
120 cases 3 variables selected

Case	2 COMPA	5 YIELD	7 1000-s
1	1	227.0	154.0
2	1	355.0	159.0
3	1	229.0	166.0

While in this mode, position the cursor by pressing the arrow keys to the field (case, variable) and type in new information. The cursor moves in the direction of the last arrow used. For example, if the user presses the left arrow key to move to the left in a field (cell), the next time the <ENTER>

key is pressed, the cursor will move to the left. The cursor control procedures used to position the cursor at the various fields (cells) are explained at the end of this document. The various key strokes are also explained in the help screen which can be viewed by pressing <F1> during the editing session. Data can be overwritten if the cursor is placed in a field (cell). When the cursor is located in the last case of the data file, the cursor will not move down to the next field (cell) but will stay in the same field (cell) until more cases are appended. When you are finished editing and viewing your data, press the <ESC> key to return to the menu.

The cursor can be moved around the screen during the EDIT mode of the SEDIT program. While in the EDIT mode, press <F1> for the following information screen. Press any key to return to Edit mode.

CURSOR CONTROLS FOR EDIT OPTION

ENTER	Move cursor to the next field (cell)
HOME	Page LEFT (shift screen left to show other variables)
END	Page RIGHT (shift screen right-display prev. variables)
PGUP	Page UP cases
PGDN	Page DOWN cases
UP ARROW	Move UP one case
DOWN ARROW	Move DOWN one case
LEFT ARROW	Move cursor left in the current field (cell)
RIGHT ARROW	Move cursor right in the current field (cell)
<F5>	Go to cell chosen (case, variable)
CTRL-HOME	Move cursor to first case-first variable
CTRL-END	Move cursor to last case-last variable
CTRL -LEFT ARROW	Move cursor left to next fieldcell)
CTRL - RT ARROW	Move cursor right to next field (cell)
<F1>	Displays a HELP box
<F2>	UNDO-restores the field (cell) to the previous value
INS	Toggle between insert and overwrite mode
DEL	Deletes the current character in a field (cell)
CTRL-L	Erases from current position to end of the field (cell)
ESC	Closes file for data entry, exit screen editor

3.4 PRLIST

Purpose: Prints a listing of your data on the screen or printer, or stores the data in a disk file.

Before starting, you need:

1. An active data file with data cases.
2. A printer loaded with paper if a printed copy is desired at this time.

Results: Data can be displayed on the screen, printed or stored in a file.

Sample Data File: MSTDAT.

PRLIST should be run prior to most programs to obtain a copy of a data file on paper. With an 80 column dot matrix printer, PRLIST will list 80 columns with normal print and up to 132 columns with condensed print. You can specify a range of cases for printing and enter a list of variables.

PRLIST Example

In the following example, data are printed on your printer. Be sure your printer is ready.

```
The data file contains  9 cases
Do you wish to use all cases? Y/N
```

If you respond <N>, you are prompted for a range of cases.

The next prompt is to be filled in with a string of variables to be printed. This string can contain the variables in any oder and a variable can be repeated. The number of variables that can be listed is 2 more than the number of variables in the active data file. The actual number of variables printed depends on paper width. An asterisk can be used to indicate all variables in the current file order.

```
List: *
```

```
Do you want your text variables left justified : Y/N
```

Text variables are stored and presented right justified (last character butted

up to the right default limit) unless the response to the above prompt is yes. This is the only program that allows this output option.

3.4 PRLIST

```
Are you using wide paper in your printer : Y/N
```

If you are using paper that is wider than 8 1/2 inches, press <ENTER> to accept the default of <Y>. Press <N> if you are using standard width paper of 8 1/2 inches.

```
Do you want pagination : Y/N
```

If you press <ENTER> to accept the default value of <Y>, the variable descriptions are printed on the first page and each subsequent page has approximately 55 cases on it. This allows long data files to be printed without the data being printed on the paper perforations.

```
Do you want to print the variable descriptions : Y/N
```

The variable descriptions will be printed at the top of the output if the default value of <Y> is entered.

The view/edit/print/save menu of options is displayed. You may display the data on the screen, edit the output, print it or store it in a disk file. Press <P> to print the data. Your results should be similar to the contents of the data file MSTDAT printed in appendix E of this manual.

3.5 SORT

Purpose: Sorts numeric or alpha data in ascending/descending order.

Before starting, you need:

1. An active data file with data cases.
2. A printout of the data file.
3. A list of variables to be used as sorting keys.

Results: A new data file of sorted data is created.

Sample Data File: SORTEST.

SORT uses the active data file for sorting or creating a new file for data (you provide the file name). Sorting is accomplished through a set of keys. Up to 18 keys are used on an hierarchical basis: key #1 determines the primary sorting order, key #2 determines secondary sorting order, and so forth. This order will become clearer with the example.

When you are prompted for the sorting keys, use a plus sign to sort in ascending order, and use a negative sign to sort in descending order. If the variable is text, a plus sign causes data to be sorted from A to Z; a negative sign reverses this (Z - A).

SORT Example:

The following PRLIST is for data in the SORTEST file:

CASE NO	1	2	3	4	5
1	CORSOY	36.0	56.8	10	91.44
2	CORSOY	36.0	55.0	20	91.44
3	HODGSON7	36.0	54.9	10	91.44
4	EVANS	26.0	48.2	20	66.04
5	VICKERY	37.0	37.3	10	93.98
6	BEESON80	35.0	44.2	20	88.90
7	HARDIN	39.0	50.2	20	99.06
8	CENTURY	37.0	47.3	10	93.98

Variable no.s 2 and 4 will be the sorting keys for this example.

3.5 SORT

The first screen in SORT is called the summary screen:

```
Sort
File Options
Input file  Output file     Cases   Variables Key   Sort  Quit
```

```
Input Summary

File to sort (input):

Sorted file    (output):  ACTIVE..... on exit

Case range to sort:          .. -..

Variable to transfer:   ................

Keys to sort on   (1 = highest priority):

1.            7.            13.
2.            8.            14.
3.            9.            15.
4.           10.            16.
5.           11.            17.
6.           12.            18.
```

While Input file is highlighted, press <ENTER>. Enter the name of the file to be sorted. Press <ENTER>. The chosen file will be entered on screen as "file to sort (input):" and the highlight will move to "Output file". Press <ENTER> and the following box will be superimposed over the main screen.

```
Enter MSTAT file name (Press F1 for help - ESC to quit)

   Default Path C:\MSTATC\DATA\

   Enter File Name:
   C:\MSTATC\DATA\DATFIL1
   Title
   Size 36    Status on Exit of Subprogram    ACTIVE
```

Enter the name of the file to store the sorted data. When the highlight is on ACTIVE (indicating the status of this file on exit of the subprogram), the user can press the spacebar to toggle between INACTIVE and ACTIVE. To edit choices or correct mistakes within the box, use up arrow or down arrow keys. Press <ESC> to close this box when the cursor is anywhere in the box or press <ENTER> when the ACTIVE/INACTIVE area is highlighted.

Enter the range of cases to sort and the variables to be transferred to the new file by moving the cursor to the appropriate option and pressing <ENTER>. Choosing the variables is simplified as the variable list is presented and the spacebar is used to highlight the chosen variables.

Press <ENTER> when KEY is highlighted to enter variables to be used for the sort process. Enter the variable number for the first key (in this example, enter 2). To sort in ascending order, press <ENTER> when the plus sign is highlighted. For this example, enter variable no. 4 for the second key, press <ENTER> then toggle the +/- choice by pressing the spacebar. Press <F10> when the third key line is highlighted to save the key choices and return to the Summary Screen.

```
File Options
Input file Output file Cases Variables Key  Sort  Quit
```

```
Input Summary
File to sort (input):
C:\MSTATC\DATA\SORTEST

Sorted file   (output):  ACTIVE       on exit
C:\MSTATC\DATA\DATFIL1
Case range to sort:                1  -  8
Variable to transfer:  1-5
Keys to sort on  (1 = highest priority):

1.  2       +          7.            13.
2.  4       -          8.            14.
3.                     9.            15.
4.                    10.            16.
5.                    11.            17.
6.                    12.            18.
```

3.5 SORT

Press <ENTER> when SORT is highlighted and the file will be sorted. You can repeat the operation by reentering the various options and changing the input and output files, case range, variable list and keys.

To exit the program, press <ENTER> or <ESC>when Quit is highlighted.

If you use PRLIST to list the data in DATFIL1, the data would be as follows:

CASE NO		1	2	3	4	5
1	EVANS	26.0	48.2	20		66.04
2	BEESON80	35.0	44.2	20		88.90
3	CORSOY	36.0	55.0	20		91.44
4	CORSOY	36.0	56.8	10		91.44
5	HODGSON7	36.0	54.9	10		91.44
6	VICKERY	37.0	37.3	10		93.98
7	CENTURY	37.0	47.3	10		93.98
8	HARDIN	39.0	50.2	20		99.06

3.6 TABTRANS

Purpose: Transforms data from one value to another using a transformation table which you create.

Before starting, you need:

1. An active data file.
2. A PRLIST of your data file.
3. A list of the variables you will use to create new variables.

Results: New variables are created according to the transformation table you devise. You may either overwrite existing variables or create new variables for the new data values.

Sample Data File: MSTFORM.

TABTRANS does not calculate conversions of data; you will use the CALC subprogram to do this. Instead, TABTRANS replaces data values with new data values which are defined in a table. This subprogram is actually more effective when there are repeated values in a variable which must be transformed into new values. For example, you may want to change treatment codes that have been entered as alphanumeric characters into either descriptions (a text variable) or numeric values.

TABTRANS asks for the source variable. Next you are prompted for the variable that will be used for new values. For the variable specified in the variable list, TABTRANS will display the old value and ask for a new value. This process can be repeated for each set of transformations by reentering the TABTRANS program. TABTRANS will prompt you to define new variables for the new values, or you may overwrite existing variables.

TABTRANS Example

The following example transforms a text variable into another text variable. For this example, use all seven cases in the data file.

```
The data file contains 7 cases.
Do you wish to use all cases? Y/N
```

If you respond <N>, you are prompted for a range of cases.

The screen panels explain the process of selecting a variable from the active data file to use as the source (SOURCE Variable) for the value to be transformed. More than one variable can be selected at a time. The variables can only be selected in the 1, 2, 3 order that they are presented in the variable list bar menu. For the variable(s) selected, a corresponding variable must be selected to receive the transformed data (DESTINATION Variable).

```
Select Source:
Highlighted items are the variables to be used as the
SOURCE for TABTRANS.  For each combination of values in
these selected variables in your current data file, you
will be asked to enter the new values which will be
placed in the DESTINATION variables which you will
select next.  Press <uparrow> and <downarrow> to move
the cursor, <SPACEBAR> to select or deselect an item.
```

```
Choose up to 7 variables (Press ESC to quit)
    01    (NUMERIC)        YEAR
    02    (NUMERIC)        FARM NUMBER
    03    (TEXT)           TREATMENT CODE
    04    (NUMERIC)        FIELD YIELD (.1 HCT)
    05    (NUMERIC)        LAND PREPARATION (HOURS)
    06    (NUMERIC)        FERTILIZER LABOR (HOURS)
    07    (NUMERIC)        HARVEST LABOR (HOURS)
```

For this example, highlight variable no. 3 and press <ENTER>.

```
Select Destination
Highlighted items are the variables to be used as the
Destination for TABTRANS
By selecting existing variables, you can place different
values into these variables depending on the values in
the source variable for each case.  This destroys any
values these variables have currently.  By choosing the
last item (DEFINE NEW VARIABLES), you can also define one
or more new variables which will be added to your file.
```

3.6 TABTRANS

```
Choose up to 7 variables (Press ESC to quit)
  01 (NUMERIC)          YEAR
  02 (NUMERIC)          FARM NUMBER
  03 (TEXT)             TREATMENT CODE
  04 (NUMERIC)          FIELD YIELD (.1 HCT)
  05 (NUMERIC)          LAND PREPARATION (HOURS)
  06 (NUMERIC)          FERTILIZER LABOR (HOURS)
  07 (NUMERIC)          HARVEST LABOR (HOURS)
  08 ------             DEFINE NEW VARIABLE
```

Move the cursor to highlight up to seven variables then press <ENTER> to continue. For this example, highlight 08 ----- NEW VARIABLE.

```
How many new variables would you like to create?  1
```

```
DEFINE Variable 8 (25 bytes free) (Press ESC to quit)
Title: TREATMENTS
Type:TEXT  Size 10  Display format (Left) 10  (Right) 0
```

In this example, variable no. 3 is the old variable and variable no. 8 is the new variable. These two variables will be presented on screen as the source and destination variables. Press <ENTER> if they are listed correctly.

```
TABTRANS Parameters

Using File: C:\MSTATC\DATA\MSTFORM
Using Cases: 1-7

              Source Variables      Destination
Variables
              1. TREATMENT CODE        1. TREATMENT

                 Is this correct? Y/N
```

```
TABTRANS: This is the source variable value
              TREATMENT CODE       :  1011A
```

```
TABTRANS: Enter destination variable value
          TREATMENT              :  NITROGEN
```

Continue to enter values as prompted. The responses are:

Source	Destination
1021A	PHOSPHORUS
1031B	2NIT/PHOS
1041B	2PHOS/NIT
1051B	PHOS/NIT

Variable no. 3 contains only five unique values, which are listed above and paired with the new text value. Each old value is equated with a new value.

```
      TABTRANS - Translation Complete
```

The new variable now contains the following information.

```
CASE NO.   3          8
   -------------------------
     1  1011A    NITROGEN
     2  1021A    PHOSPHORUS
     3  1011A    NITROGEN
     4  1031B    2NIT/PHOS
     5  1021A    PHOSPHORUS
     6  1041B    2PHOS/NIT
     7  1051B    PHOS/NIT
```

3.7 ADDON

Purpose: Adds data from an MSTAT data file to the active data file. The user can specify cases and variable placement in the active data file.

Before starting, you need:

1. An active data file with defined variables

Results: Specified cases and variables of an MSTAT data file are added to the end of the active data file.

Sample Data File: HURON1 and EXPTEST

ADDON is a quick way to append data files. The data files do not have to have the same variable order as the user is prompted for variable placement as well as the number of cases to transfer. The user is prompted for the variables in the file to be appended and also the case range.

ADDON Example:

For this example, load the data file HURON1 by highlighting FILES at the Initial MSTAT Menu and opening the file HURON1. Quit the FILES Program and highlight ADDON then press <ENTER>. At any time during the ADDON program, the user can return to the Initial MSTAT Menu by pressing <ESC>. Once ADDON has been selected, the prompts are as follows:

```
Do you want to append the current data file to itself: Y/N
```

Often, a data file contains a design that is repeated in other locations. Rather then try to recreated the same randomization, the file is appended to itself and a new variable is created that contains a value to indicate location. In this example, the response is <N> and the next prompt is presented.

```
Do you want to add other files: Y/N
```

With a <N> response, the user is returned to the Initial MSTAT Menu. With a <Y> response, the user is prompted for the name of the file that the data will be copied from (file to be added).

```
Enter the name of the file to be added
Open an existing MSTAT data file
For reading    Quit
```

Press <ENTER> when `For reading` is highlighted and then enter the name of the file. If the <F1> key is pressed, the data file bar menu will list the files in the default path. Move the cursor to highlight one file (EXPTEST) and press <ENTER>. The file EXPTEST has similar information to the HURON1 file but in a different order.

A list of variables in the file EXPTEST will be placed on the screen. Move the cursor to variable no. 1 (Replication) and press the spacebar to highlight that choice. Move the cursor to variable no. 3 (Dry Bean) and press the spacebar to highlight that variable also. Press <ENTER> when both variable no.s 1 and 3 are highlighted. Only these two variables of the three will be appended to the data file HURON1. The program will prompt for the location of variable no. 1 of EXPTEST in the receiving file (HURON1). For this example, the information in variable no. 1 of EXPTEST will be placed in variable no. 2 of HURON1. The information in variable no. 3 of EXPTEST will be placed in variable no. 1 of HURON1. Only the last 60 cases will be transferred.

```
Press <F1> for a list of variables

Enter the variable number (1-4) in the original file that
you wish variable 1 of the new file to be appended
Title of variable in new file : REPLICATION
Variable in original file : 2
```

If the user wants to see the variables in the original file, press <F1>. The list of variables will be shown on the screen and the user can move the cursor to highlight the variable to receive the information from the new file. Repeat this process until all the variables in the new file that are to be transferred are assigned to a destination variable in the active (original) file.

```
Enter the variable number (1-4) in the original file that you wish
variable 3 of the new file to be appended
Title of variable in new file : DRY BEAN
Variable in original file : 1
```

The data file contains 120 cases. When prompted, respond <N> to the question about using all cases. The first selected case for this example is 61 and the last selected case is 120.

After the desired variables and cases have been appended to the active data file, the program continues. By responding <N> to both questions, the user will exit to the Initial MSTAT menu and the data file will have an additional 60 cases located at the end of the data file:

```
Do you want to transfer more cases from the same data file:
Y/N
```

```
Do you want to add other files : Y/N
```

3.8 CALC

Purpose: Create a file that contains mathematical equations which transform current data values into a new variable or overwrites an existing variable. CALC also performs these transformations.

Before starting, you need:

1. If mathematical equations will be performed, you need an active data file with defined variables and cases.
2. A list of the equations you want to enter.

Results: Depending on which CALC options you use, a transformation file may be created or edited, or transformation file equations may be performed on the active data file so that new variable values are created.

Sample Data File: MSTDAT. In addition, a transformation file called CALCTST will be created in the CALC example.

CALC is usually used to create new variables from existing variables. Therefore, if you want to put the transformed values in a new variable, your data file should be wide enough to allow you to define new variables.

When you choose CALC from the Initial MSTAT menu, the active data file is copied to a new file with the same name and an extension of @DA and @TX. These are the backup files of the original data file and are restored if <ESC> is pressed during the operation of the CALC program before any calculations are performed. They can not be accessed after the CALC program has been completed.

Within the CALC program, the variable selection bar menu lists all the variables in the active data file as well as the option to define a new variable to contain the calculated results. If the active data file does not have any space for a new variable (all the file width is used or less than 4 characters remain unused of the file width), the user will have to overwrite an existing variable. All values currently in a destination variable will be overwritten for the cases selected when the calculation occurs. After the destination variable has been chosen, the following message is presented on the screen:

```
CALC: Enter Transformation Formula
Enter the mathematical formula to be used to generate
new values in Variable 5 from existing values in your
data file.  Your formula may extend over multiple lines
if necessary.  Press F1 for a general help message, F2
for a description of the available functions, F3 to
save the current function, F4 to load a function from
disk, and F10 to finish entering and start calculating.
```

The message will be followed by a six line highlighted block. The cursor will be located in the upper left-hand corner of the highlighted area. Type in the equation to be applied. The up and down arrow keys as well as the <DEL>, <INS> and <BKSP> keys can be used to move around in the defined area and edit the typed material. When finished with the equation for that destination variable, press <F10> to start the calculation process. The calculated values will be placed in the previously chosen data file variable.

If the user presses <F1>, the following general help screen will be presented:

```
CALC: Help (Press any key to continue)
You are now entering a formula to be used in your variable
transformation.  When you are finished, this program will go through
your data file and apply this formula to each case, resulting
(hopefully) in a number which will be placed in the variable which you
selected (variable 5).
```

Remember that anything in parentheses gets evaluated first, then the functions (if any) get evaluated, then the operators get evaluated in the following order: first, exponentiation (^), then multiplication, division and remainder (*, /, %), then addition and subtraction (+ and -), then the logical operators (<,=,>).

If the data for a particular case causes a formula to be meaningless (such as taking the square root of a negative number) the case will be ignored.

3.8 CALC

At the bottom of the screen is a list of currently supported functions:

```
ABS   ACOS   ACOT   ACSC   ASEC   ASIN   ATAN   ATAN2   AVE
BESS0  BESS1  COS   COT   CSC   EXP   FRACT   FACT   INT   LAG
LEAD   LN   LOG   MAX   MIN   RAND   ROUND   RNORM   SEC   SIN
SQRT   TAN
```

If the user presses <F2>, the following reference page will be presented which shows the proper form for using the function listed. When a description is followed by `(radians)`, the values in the variable have to be radians. Any function with 'ARC' prefix or 'A' prefix must be used with a variable that contains values that are in the correct trigonometric range. For example, to calculate the ARCSINE of variable 5, the values contained in variable 5 must be in the range of -1 to +1. The notation `Vx` or `Vy` indicates a variable number such as V5 or V20. The notation `a, b, c,` and `m` indicates numeric values, not data variables.

```
ABS(Vx)                 Absolute Value
ATAN2(Vy,Vx)            Inverse tangent of Vy/Vx
AVE(a,b,c,..z)          Average value of values entered
BESS0(n,Vx) Bessel      Function of the First Kind, order n
BESS1(n,Vx) Bessel      Function of the Second Kind, order n
COS(Vx) ACOS(Vx)        Cosine (radians)/Arccosine of Vx COT(Vx)
ACOT(Vx) Cotangent      (radians)/Arccotangent of Vx
CSC(Vx) ACSC(Vx)        Cosecant (radians)/Arccosecant of Vx
EXP(Vx)                 Exponential (e to the Vx)
FRACT(Vx)               Fraction part of Vx (12 part of 94.12)
FACT(Vx)                Factorial (Vx!)
INT(Vx)                 Round Down to Next Highest Integer
LEAD(Vn,m) LAG(Vn,m)    Lead or Lag variable Vn by m cases
LN(Vx)                  Natural Logarithm (base e)
LOG(Vx)                 Common Logarithm (base 10)
MAX(a,b,c,..z)          Maximum value of values entered
MIN(a,b,c,..z)          Minimum value of values entered
RAND(x)                 Completely Random Real Number - 1 to x
RNORM(x,y)              Random, Normal Dist.
ROUND(Vx)               Round off to the nearest integer
SEC(Vx) ASEC(Vx)        Secant (radians)/Arcsecant of Vx
SIN(Vx) ASIN(Vx)        Sine (radians)/Arcsine of Vx
SQRT(Vx)                Square root of Vx
TAN(Vx) ATAN(Vx)        Tangent (radians)/Arctangent of Vx
# or MB                 Case number
```

After a calculation or function has been entered, the user can save the operation by pressing the <F3> key. The file will be saved in the default data drive unless specified otherwise. The file will have an extension appended (.FNC) by the program.

Enter a file name that is indicative of the contents of the calculation. For example, if the calculation generates the common log of variable 3, a suggested file name would be LOGV3.

To recall a previously created calculation, press <F4>. If <F1> is pressed after the prompt is presented, a bar menu containing the names of the currently available .FNC files will pop onto the screen. Move the up and down arrow keys to place the highlight on the file desired and press <ENTER>. The function will be loaded into the editing screen.

If you have used previous versions of MSTAT, please note these differences.

1. There is only one variable to receive the results of the calculation. Therefore, you will have to reenter CALC for each newly created or overwritten variable.

2. Referencing a variable number is now in the form V*n* rather than W(*n*). If you type in W(*n*), the program will still accept the variable as part of the function.

3. Text variables are not used in this program.

4. Missing values can not be assigned in this program. Use SEDIT to edit the data as necessary.

5. IF..THEN statements are not possible. To screen out data values such as Missing Data, the user must first SELECT the cases without missing values in the variables to be used then enter CALC to perform the calculation.

6. If logical operators are used, the program will insert a 1 in the data file if the statement is true and a 0 (zero) if the statement is false. For example, if the calculation statement is V4 = V1 then the destination variable will contain a 1 if variable 4 is equal to variable 1 and a 0 (zero) if it is not equal.

7. The resultant variable is not given in the equation. For example, in previous versions the equation to do a calculation would be W(5) = W(2) * 2.56. If you entered this specific statement, this CALC program would multiple the value of variable 2 by 2.56 then check the result of this calculation against the value of variable 5. If the value of the calculation was equal to variable 5 then a 1 would be inserted into the destination variable. If not equal, a 0 (zero) would be entered into the destination variable. (See 6 above)

8. The user can use the delete key, the insert key as well as the destructive backspace key to edit the calculations being entered.

9. A file containing the calculations will not be created unless the <F3> key is pressed. It will have an extension of .FNC rather than .CAL. Previously created .CAL files can not be used with MSTAT-C.

Examples of Transformation Equations

To write an equation, you should know the following:

Refer to variables using array V.

Relational Operators:	=	equal to	<=	less than and equal to
	<	less than	>=	greater than and equal to
	>	greater than	<>	not equal to

Results of a calculation using relational operators is either a 1 or a 0 (zero). If the relationship is true, a 1 is inserted into the destination variable. If the relationship is false, a 0 (zero) is entered into the destination variable.

Algebraic Operators:	+	Addition	*	Multiplication
	-	Subtraction	^	Exponentiation
	/	Division	%	Remainder

Once a destination variable has been chosen, these are some of the possible equations and their results. Assume that variable no. 2 is the destination variable in these examples.

SQRT(V4) The value of variable no. 2 is the square root of variable no. 4.

LOG(V4) *1000 The value of variable no. 2 is the common logarithm (base 10) of variable no. 4 times 1000.

(1/V4)*1000 The value of variable no. 2 is 1000 times the reciprocal of variable no. 4.

V4* 0.405 This equation converts variable no. 4 from acres to hectares and puts the calculated value into var. no. 2.

V4*9.35 This equation converts variable no. 4 from gallons per acre to liters per hectare and puts the calculated value into variable no. 2.

V4*1.12 This equation converts variable no. 4 from pounds per acre to kilograms per hectare and puts the calculated value into variable no.2.

V4-V2/V3 Variable no. 2 is equal to variable no. 4 minus (variable no. 2 divided by variable no. 3).

LEAD(4,4) Variable no. 2 will contain the contents of variable no. 4 but shifted up 4 cases. The last 4 cases in the range chosen will be assigned as missing values. (This can be used to eliminate a replication within the middle of a data range).

LAG(4,4) Variable no. 2 will contain the contents of variable no. 4 but shifted down 4 cases. The first 4 cases in the range chosen will be assigned as missing values.

CALC performs the calculation when the user presses <F10> and generates

the new variable. When the calculation is complete, the Initial MSTAT menu is again displayed.

CALC Example

At the Initial MSTAT menu, highlight FILES and open the file MSTDAT. Quit the FILES program and highlight the CALC program. The data file MSTDAT will be copied to backup files as soon as CALC is entered. They will reside in the same default data directory as the original data file. The data file contains 9 data cases and all cases will be used. The first prompt is:

```
Get Case Range
The data file contains 9 cases
Do you wish to use all cases ? Y/N
```

Once a calculation has been performed, the new value is stored in the current data file under a destination variable. Only one variable can be designated as the destination variable at a time. It will receive the calculated results.

```
CALC : Select Destination Variable

Select the variable into which the results
of the calculation should be placed.

The contents of this variable will be destroyed ! ! !
```

```
Choose one variable (Press ESC to quit)
01    (TEXT)      SOYBEAN VARIETIES
02    (NUMERIC)   PLANT HEIGHT IN INCHES
03    (NUMERIC)   YIELD IN BU/ACRE
04    (NUMERIC)   ROW WIDTH IN INCHES
05    -------- Define New Variable
```

The variable selection bar menu lists all the variables in the active data file as well as the option to define a new variable to contain the calculated results. If the active data file does not have any space for a new variable (all the file width is used or less than 4 characters remain unused of the file width), the user will have to overwrite an existing variable.

Move the up and down arrow keys to highlight the variable to receive the calculated results. Press the <SPACEBAR> to place the highlight on 05 - Define New Variable. Press <ENTER> to continue. This is called the destination variable. All values currently in the destination variable will be destroyed when the calculation occurs as the new values will overwrite the file contents of the cases used. For this example, the destination variable will be a newly created variable (No. 5). As it has not previously been defined, the user is prompted for the following information.

```
DEFINE variable 5 [35 bytes free]
Title: Plant height in centimeters
Type: NUMERIC  Size: 4  Display Format (Left) 6 (Right)
1
```

To enter the calculation, type in the statement starting at the upper left-hand corner of the highlighted screen.

```
V2 * 2.54
```

To save this formula, press <F3>.

```
CALC:Enter Filename
Enter the filename that you wish to save to:
C:\MSTATC\DATA\ CALCTST
```

Enter the name of the file to contain the statements then press <ENTER>. To perform the calculations, press <F10>. The transformation will be performed on the range of data cases selected and the screen will present the Initial MSTAT Menu. To do more calculations on the same data file, highlight CALC and press <ENTER>. To verify that the calculations have been completed correctly, highlight PRLIST on the Initial MSTAT Menu and list the variables involved in the calculations.

To recall a previously created calculation, press <F4> after entering the case range and the destination variable. If <F1> is pressed after the prompt shown below is presented, a bar menu containing the names of the currently available .FNC files will pop onto the screen. Move the up and down arrow keys to place the highlight on the file desired and press <ENTER>. The function will be loaded into the editing screen.

3.8 CALC

```
CALC:Enter Filename
Enter the filename that you wish to load:
C:\MSTATC\DATA\ MIXMODE
```

When the statement has been entered and checked for errors, press <F10> to perform the calculation. The Initial MSTAT menu will be presented. To see if the calculation has been correctly performed, enter PRLIST and look at the data and the data cases involved.

By working in combination with the SELECT program, a variety of calculations and transformations can be performed within the MSTAT program.

3.9 SELECT

Purpose: Creates and edits a file containing statements that select data values. The subprogram is also used to activate the selection file into MSTAT for use with other programs.

Before you start, you need:

1. An outline of the statements you want to enter in a selection file.

Results: Depending on which SELECT options you use, a selection file may be created, edited, activated or deactivated.

Sample Data File: A file (SELTST) will be created for HURON1.

It is important to distinguish between creating/editing a selection file and activating a selection file into the MSTAT program. When you create/edit a selection file, **the file is not activated into the MSTAT program.** You can activate the selection file into the MSTAT program by choosing activate from the SELECT main menu. Then, when the Initial MSTAT menu is displayed, you will notice `Selection:ON` at the top of your screen. After you activate the selection statements, the statements are only stored temporarily. When you exit from MSTAT, the statements are not stored in the MSTAT program. However, the statements are stored on disk under the selection file name if that option is chosen.

When SELECT prompts you for a selection file name, enter a valid name using up to 8 characters, but omit an extension; ".SEL" is appended to the file name. If a drive letter is omitted, the file is created or searched for on the default data specification.

SELECT is basically menu-driven. When you choose SELECT from the Initial MSTAT menu, the following bar menu is displayed.

```
SELECT : Main Menu
Choose a selection file for use with the other subprograms
Activate  Deactivate  Edit  Test  Quit          Selection: OFF
```

To create a selection statement, move the cursor to highlight EDIT and press <ENTER>. The first program screen will appear requesting file name of the selection file. If you enter a name of a file that does not exist, the

program will create a new file and issue a warning to that effect. Press <ENTER> to continue. Help is available by pressing the <F1> key.

EXAMPLES OF SELECTION STATEMENTS

To write selection statements, you must know the following items:

V*n*	This means variable number. Variable no. 3 is referred to as V3.
x	This means data case number (e.g., $x = 1$ means data case 1).
N	N is an integer (0, 1, 2, 3, 4 ... etc.)
MISSING VALUE	This represents a missing value for a variable.

Relational Operators:	=	equal to	<=	less than and equal to
	<	less than	>=	greater than and equal to
	>	greater than	<>	not equal to

Algebraic Operators:	+	Addition	*	Multiplication
	-	Subtraction	^	Exponentiation
	/	Division		

With SELECT, you are able to write a selection file which will choose which cases to use from your data file. When selection is activated, each MSTAT program will consult the selection file when it reads each case to determine whether or not to use (activate) that particular case. If a case is not used (activated) by the selection file or is specifically deactivated, it is ignored by the MSTAT program, which goes on to read the next case. Within each selection file, the user can not activate or deactivate a group of variables by stating an "and" relationship. (i. e. V3 and V4 and V5). Each variable has to be separately activated or deactivated.

By default, all of the cases are activated. This means that if your file does not have any statements pertaining to a certain case, it will be activated.

Your selection file is therefore able to either choose specific cases to deactivate, or else begin with a DEACTIVATE ALL statement and then choose specific cases to activate. Your particular application will determine which approach would be easiest for you.

When a case is read, the selection statements are executed in order, so if statement 3 activates a case and statement 5 deactivates it, the result will be that the case is deactivated (the last thing done to it).

Each statement must begin with either ACTIVATE or DEACTIVATE. These words may be abbreviated to **A** and **D** (the first letter). This tells what the statement will do with the cases that are affected by it. For example, **ACTIVATE ALL** can be typed in as **A All** and deactivate all as **D ALL.**

The additional information is presented on help screens that can be overlaid on the select screen by pressing <F1> after EDIT has been chosen from the initial SELECT bar menu.

After the ACTIVATE or DEACTIVATE part of the statement, one of several qualifiers may appear.

QUALIFIER	Cases which are affected by the statement
1. ALL	Every case (Ex: ACTIVATE ALL or DEACTIVATE ALL)
2. *x*	Just case number x (Ex. ACTIVATE 47 or DEACTIVATE 12)
3. *x* TO *y*	Cases from x to y (Ex. ACTIVATE 12 TO 42)
4. *x*N + *y*	Case y, x+y, 2x+y, 3x+y, 4x+y, 5x+y etc, (Ex. ACTIVATE 4N+1)
5. V*n* (rel)* V*m*	Cases where variable *n* is related in a certain way to variable *m* (Ex. DEACTIVATE V6<V8)
6. V*n* (rel) Y	Cases where numeric variable *n* is related in a certain way to the number Y (Ex. DEACTIVATE V4<=12.0)
7. V*n* (rel) "S"	Cases where text variable *n* is related in a certain way to the word (string) S (Ex. ACTIVATE V2 = "Sanilac")

* Relations can be any of =, <>, <, <=, >, >=

Selection Statement Examples	ACTION Generated
DEACTIVATE ALL	Deactivates every case in the data file

For the following, the first statement would be DEACTIVATE ALL. The second statement would perform the action indicated.

ACTIVATE 53	Activates case number 53

3.9 SELECT

ACTIVATE 72 TO 120	Activates cases from case 72 up to case 120
ACTIVATE 4N+1	Activates cases 1, 5, 9, 13, etc
ACTIVATE 5N	Activates cases 5, 10, 15, 20, etc
ACTIVATE 6N+3	Activates cases 3, 9, 15, 21, 27, etc
ACTIVATE V5=6.0	Activates cases where variable 5 is equal to a value of 6.0
ACTIVATE V3<V5	Activates cases where the value of variable 3 is less than the value of variable 5
ACTIVATE V4>=V2	Activates cases where the value of variable 4 is greater than or equal to the value of variable 2
ACTIVATE V4<>MISSING VALUE	Activates all cases where variable 4 is not a missing value
ACTIVATE V5=1 ACTIVATE V5=3 DEACTIVATE 101 TO 150	Activates those cases where variable 5 is either 1 or 3 and excludes all cases between 101 and 150

When working within the SELECT program you can 1) deactivate certain cases or 2) deactivate all the cases and then activate only those cases that fit the criteria entered. For the following statements, the user is to remember that all cases are activated when the selection program is requested.

DEACTIVATE V1<>V2	Deactivates all cases where the value of variable 1 is not the same as the value of variable 2
DEACTIVATE V4=MISSING VALUE	Deactivates all cases where variable 4 is a missing value

DEACTIVATE V2<51
DEACTIVATE V2>99

Activates those cases where variable 2 is greater than 50 and less than 100

SELECT PROCEDURE

When SELECT is chosen, the main menu options are presented.

```
SELECT : Main Menu
Choose a selection file to create or modify
Activate   Deactivate   Edit Test Quit Selection: OFF
```

Move the cursor to highlight the EDIT option then press <ENTER>. Enter a name for either a new or existing selection file (.SEL extension) and press <ENTER>. If not sure of current selection files, press <F1> for a menu of file names. Move the cursor with the arrow keys to highlight the desired file and press <ENTER> twice. For this example, work with the data file HURON1 and create a selection file named SELTST.

```
SELECT: Edit Selection File
Enter the filename of the selection file to edit:
SELTST
```

File must be either in the current directory or in your data directory or you must include the entire path name. Press <F1> to view a list of selection files.

```
SELECT: Edit Menu
Add Change Delete Explain Help Rename Quit
```

The Edit menu has options that can be highlighted. The functions of the various options are:

Add - Add new selection statements after current position in file
Change - Modify the currently selected statement
Delete - Delete the currently selected statement
Explain - See a detailed explanation of the currently selected statement
Help - View a help screen explaining the various selection statements
Rename - Rename an existing selection file
Quit - Stop editing this file and return to the main SELECT menu

Add: To enter statements in a new file, highlight Add and press <ENTER>. The cursor will appear in the second box preceded by a statement line number (1.). Type in the statement and press <ENTER> to finish that statement. A second line will be presented for an additional statement. When all statements have been entered, press <ESC> to leave the insert mode.

Change: To change a statement, use the up and down arrow keys to highlight the line to be changed, use the right and left arrow keys to highlight Change and press <ENTER>. Type in the changes and press <ENTER> to save the adjusted line. If it is decided not to make the change at that time, press <ESC> to return to the Edit menu and retain the original statement.

Delete: To delete a statement, use the up and down arrow keys to highlight the line to be deleted, use the right and left arrow keys to highlight Delete and press <ENTER>. The line will be removed from the screen.

Explain: Once a statement has been entered, the user can see the action to be taken by highlighting the Explain option while a statement is highlighted. A box will appear describing the action expected. For example, if the highlighted statement is Deactivate 3, the Select: Explain line would be:

```
This statement deactivates only case number 3.
```

Quit: After all the desired statements have been entered and checked, press <Q> or highlight Quit and press <ENTER>. If you have entered new statements or edited statements loaded from an existing ".SEL" file, the program will query:

```
You have changed your file. Would you like to save
those changes? Y/N
```

```
The selection file has been successfully updated.
```

In order to use the newly created or edited selection statements, highlight ACTIVATE and press <ENTER>.

```
SELECT: Activate Selection File
Enter the filename of the selection file to activate:
SELTST
```

Type in a file name that will contain the statements and press <ENTER>.

To observe the affected cases in the modified data file, highlight Test and press <ENTER>. The print/view option menu will be presented. The cases that are activated by the selection statements can be printed, viewed or saved.

SELECT EXAMPLE

For this example, enter the following selection statements in the EDIT mode of the program. On the opening menu for SELECT, highlight EDIT and press <ENTER>. Type in the name of the selection file to edit and press <ENTER>. If this is a new filename, the screen will present a warning message. Press <ENTER> to continue.

```
SELECT : Main Menu
Choose a selection file to create or modify
Activate   Deactivate   Edit Test Quit Selection: OFF
```

```
Enter the filename of the selection file to edit:
SELTST
```

At the Edit Menu, highlight Add and press <ENTER>. Type in the three statements as shown then press <ESC>.

```
SELECT: Edit Menu
Add new selection statements after the current position
in the file
Add Change Delete Explain Help Rename Quit
```

```
1. D ALL
2. A V2=1
3. A V2=3
```

3.9 SELECT

The desired operation is to activate those cases where the replication level is equal to 1 or to 3 in the data file HURON1. Because the SELECT program does not recognize the AND operator, the above statements can not be given in a combined form (i. e. 2) D V2=1 and V2=3.

```
SELECT: Edit Menu
See a detailed explanation of the  selected statement
Add Change Delete Explain Help Rename Quit
```

To verify the action of each statement, highlight Explain on the Edit menu when one of the statements is highlighted and press <ENTER>. An explanation of the action entered (A V2=1) will be given in a box on the lower half of the screen. Press <ENTER> to return to the Edit menu and move the highlighted bar to a different statement. Press <ENTER> while Explain is highlighted on the Edit Menu and the explanation of the newly highlighted statement will be given.

For this example where the statement is A V2 = 3, the explanation box states:

```
This statement activates every case in which variable 2
is equal to 3.000.  If variable 2 in your file happens
to be a text variable, this statement will do nothing.
```

If there is a typing error or if a different statement is desired, highlight Change and edit the existing statement using the arrow keys, delete key and destructive backspace key as necessary. When all the statements are correct and the explanation is accurate, highlight Quit and press <ENTER>. The message on screen will be:

```
You have changed your file. Would you like to save
those changes? Y/N
```

Press <ENTER> to save the statements into the file named SELTST. The program will state that the changes were successfully saved and the Main Select Menu will be presented. The Edit option will be highlighted. If the statement on the upper right of the screen is Selection: On, move the highlight with the cursor keys to Test and press <ENTER>. If the statement on the upper right of the screen is Selection: OFF, move the highlight with the cursor keys to Activate and press <ENTER>.

Once the selection file has been activated, move the highlight to Test with the cursor keys. Press <ENTER>. When prompted, enter the name of the selection file or accept the default name. Press <ENTER> to continue.

Type in the case range to be used in the selection operation. For this example, use the lowest and highest ranges show in the prompts (1 to 120). Press <ENTER> then press <ENTER> again when the View prompt is highlighted or move the highlighted bar to Print if a printed copy is desired. The output will consists of the data file name and title, the cases involved and the selection statements applied to the file.

For the example (Variable 2 at levels 1 and 3 only), the output would be:
Data File: HURON1
Title: Bean Experiment
Function: SELECT (Testing a selection file)
Selection File: C:\MSTATC\DATA\SELTST
Using data cases 1 through 120.

This is your Selection File:

1. Deactivate ALL
2. Activate V2 = 1.000
3. Activate V2 = 3.000

These are the cases which were selected:

Case No	Case No	Case No	Case No
1	16	61	76
2	17	62	77
3	18	63	78
4	19	64	79
5	20	65	80
6	21	66	81
7	22	67	82
8	23	68	83
9	24	69	84
10	25	70	85
11	26	71	86
12	27	72	87
13	28	73	88
14	29	74	89
15	30	75	90

Return to the subprogram and exit to the Initial MSTAT Menu by highlighting Quit and pressing <ENTER>. Note that the word SELECTION on the left hand side of the Initial MSTAT Menu is followed by ON rather than OFF. If any analyses are performed at this time, only the data cases 1-30, and 61 to 90 will be used. To reset the SELECTION: ON to SELECTION: OFF, reenter SELECT and deactivate the selection file.

There are some programs within MSTAT where SELECTION will not be active even if the SELECTION: ON is shown at the Main Menu. SEDIT will not access the selection file so if you want to edit a file with only selected cases, use SORT to create a new file while the SELECTION: ON is active at the Main Menu.

3.10 ASCII

Purpose: To enter numeric and text data in the ASCII format to MSTAT data files in new or existing data file variables. This program is used to interface with other software packages as data can be transferred from MSTAT random access format to ASCII format and also from ASCII format to the MSTAT random access format. An ASCII file containing data is not an MSTAT data file. It can not be read directly within MSTAT. It must be read into an MSTAT data file within the MSTAT program ASCII.

Results: ASCII files can be viewed, edited, printed, copied, deleted and renamed as well as converted to the MSTAT random access format. An MSTAT file can be converted to ASCII format and a list of ASCII files in the default path can be viewed.

Not every software program could offer all the options users desired so each program had to be programmed to create files that could be used with other programs. The common basis for most software programs in the United States is ASCII format. This is a file that contains no tab commands, no special formatting and is readable in some fashion by the majority of the software on the market.

Within the MSTAT program, the ability to "read" ASCII files into active MSTAT data files allows the user to transfer data to and from data loggers, scales, spreadsheets and other data collection or graphic software. The "data" file created by other software is not a data file that can be used directly by MSTAT. The contents of the ASCII "data" file must be read into an MSTAT data file.

The user does not have to enter Files at the Initial MSTAT menu and open a data file to access the ASCII program. Highlight ASCII on the Initial MSTAT menu and press <ENTER>.

```
1 - Convert an MSTAT file to an ASCII file
2 - Convert an ASCII file to an MSTAT file
3 - View an ASCII file
4 - Edit an ASCII file
5 - Print an ASCII file
6 - Directory of ASCII files
7 - Copy an ASCII file
8 - Delete an ASCII file
9 - Rename an ASCII file
Q - Quit
```

3.10 ASCII

```
1 - Convert an MSTAT file to an ASCII file
```

This option can be used to transfer data from the MSTAT file format to ASCII format. If data is to be transferred from one data file to another, the cases and variables can be placed in ASCII format then entered into the new file.

```
Enter the name of the MSTAT file to convert to ASCII
file
CORN
```

```
Enter the name of the ASCII file to be written
NEWASCII
```

A list of variables in the MSTAT file is shown on screen. Use the arrow keys to highlight the variable or variables to be written to the ASCII file. If all variables are to be written to the ASCII file, press <A> to highlight all the variables then press <ENTER>.

For this example, the data file contains 91 cases. The next screen prompt is:

```
The data file contains  91 cases.
Do you wish to use all cases? Y/N
```

Press <ENTER> to accept the default of <Y>.

```
Enter the display format for the following variable:
1  TREATMENT CODE - 1ST THREE DIG

Left :  6  Right:     1  Separating Spaces: 0
```

The left value controls the minimum number of characters to be printed to the left of the decimal point for numeric variables or the total number of characters for a text variable. The right value is the number of characters allowed to be printed to the right of the decimal point (the number of significant digits). Note that this value can cause the number to be rounded when the left value is greater than 0. The separating spaces are the number of blank spaces following the number or text before the delimiting comma.

For ease in reading the ASCII file, set the left display format at least one character larger than the actual data point. All variables in a case will be separated by a comma. If separating spaces are set, these spaces will appear after the number or text but before the comma.

If all the variables to be transferred have the same display formats, press <ESC> when the above panel is on the screen and all of the remaining variables will have the same format.

2 - Convert an ASCII file to an MSTAT file

Choose this option to read information into an MSTAT data file. All the ASCII file data must be delimited by commas. Use the Edit option to insert commas if they are not already in the ASCII file.

```
Enter the name of the ASCII file to be read
```

The user can press <F1> for a list of files in ASCII format in the default directory then highlight a file and press <ENTER> or can type in the path and file name of an ASCII file.

```
Enter the name of the MSTAT file to be written
```

The user can press <F1> for a list of MSTAT data files in the default directory then highlight a file and press <ENTER> or can type in the path and file name of an MSTAT data file.

```
List:
```

Enter the variables in the MSTAT data file to be used. They must be entered in the order that they will be filled. For example, if the MSTAT file contains 10 variables and the ASCII file contains 3 columns of data then only three variables can be listed to receive the data from the ASCII file. They can be listed in any order (i. e. 5,2,10 or 3-5)

The user can enter data from the ASCII file into the MSTAT file starting with any of the existing cases or the incoming data can be appended to the end of the existing data file. If the incoming data is to be appended to the end of the MSTAT data file, respond <Y> to the prompt:

```
Do you want to add cases to the end of the file : Y/N
```

If the response is <N>, the user will be prompted for the starting case number to begin data transfer.

Information on the screen is as follows:
An ASCII file may come from a data logging device such as a DATAMYTE or POLYCORDER. The first few lines of these files usually contain label information which should be skipped. If your file is from a data logger, respond yes to the following question. Then, as the file is read, each line will be displayed and you will have the option to include it or ignore it. Once you decide to include a line, the remaining lines will be included without prompting.

```
Is the ASCII file from a data logger : Y/N
```

```
Include This Line ?: 1, 1, 1, 74, 227, 7, 154, 21 : Y/N
120 cases have been transferred
```

```
3 - View an ASCII file
4 - Edit an ASCII file
5 - Print an ASCII file
```

```
Enter the name of the file you wish to (view, edit, print):
NEWASCII
```

When editing an ASCII file, the instructions for cursor movement are presented in a header across the top of the screen. Further instructions are given when the <F1> key is pressed.

Text limit	: 4095 lines x 255 char or max available memory
Arrow keys	: cursor movement
Pgup,Pgdn	: move up or down in file a screen at a time
Home	: move to top line of current screen
End	: move to bottom line of current screen
Tab	: move to next screen tab setting (every 8 characters)
Ctrl-Home	: move to beginning of first line of file
Ctrl-PgDn	: move to end of last line of file
Ctrl-Left	: move to beginning of current line of file
Ctrl-Right	: move to end of current line of file
Ctrl-End	: delete from cursor position to end of line

Ctrl-	: same as Ctrl-End
Backspace	: delete character to left of cursor position
Delete	: delete character at current cursor position
Insert	: insert a space at current cursor position
Enter	: insert blank line below current line, move to new line
F1	: display this help screen
F3	: globally convert all commas in file to spaces
F4	: insert a column of commas at current cursor position
F5	: delete current line, move following lines up
F10	: exit and save changes (if in edit mode)
Esc	: exit without saving changes

```
6 - Directory of ASCII files
```

Enter the name of the directory (end with \) and then press <F1> or just press <F1> to use the current default path. A list of files in the chosen directory will be given on the screen.

```
7 - Copy an ASCII file
8 - Delete an ASCII file
9 - Rename an ASCII file
```

If options 7, 8 or 9 are selected, the user is prompted for the file name. When deleting a file, the user is asked to verify the deletion before it occurs.

3.11 TRANSPOS

3.11 TRANSPOS

Purpose: TRANSPOS allows you to make changes in your data files through transfer and conversion of values.

Before starting, you need:

1. An active data file
2. A PRLIST of your active data file
3. A list of the variables to be altered

Results: TRANSPOS transfers variables and cases intact, converts variables to cases, cases to variables, and fills cases of variables with values from a current file. TRANSPOS allows you to save or delete any changes.

Sample Data File: HURON1

You may use any data file to run TRANSPOS. Create or attach a destination file to hold your transposed data before each run of the TRANSPOS program. When transferring variables and cases intact and filling cases of a variable with a value from the current file, make sure that the variables are of the same type - text variables into text variables and numeric into numeric.

To view or print the contents of the destination file, it must be the active data file. When you have completed your transformation, return to the Initial MSTAT Menu and select FILES. Replace the active data file name with the name of your destination file. Return to the Initial MSTAT Menu and select SEDIT or PRLIST and view the destination file.

TRANSPOS Example

```
Transpos Options Menu

1 ATTACH a destination file for saving changes
2 TRANSFER variables and cases intact
3 CONVERT a variable to a case
4 CONVERT a case to a variable
5 FILL cases of a variable with value from a current file
6 SAVE the changes to the destination file
7 DELETE all changes made since the last save
Q Quit
```

```
1 ATTACH a destination file for saving changes
```

The destination file will hold the transformations done by TRANSPOS. NOTE: you must attach a destination file each time you run TRANSPOS. One destination file, DFILE, is used for each operation in this example. All of the changes to this file are cumulative.

```
Enter the name of the destination file
Open a (new or old) MSTAT data file
for Writing   Quit
```

```
Enter MSTAT file name (Press F1 for help - ESC to quit)
Default Path C:\MSTATC\DATA\
Enter File Name :
DFILE
Title: Test file for Transpose
Size  512  Status on Exit of Subroutine INACTIVE
```

If the chosen data file does not exist, it will be created. To make changes, use the arrow keys to move the cursor to the field to be corrected and re-enter the correct data before pressing <ENTER>. For this example, create six numeric variables using the default display formats.

```
TRANSPOS
You must create the variables in your destination file
that you wish to use in TRANSPOS
Enter the number of new variables that you wish to
create:  6
```

Variable definition screens will be presented for each variable. Editing of the variable description can be done by using the arrow keys to move around the box and entering the correct data before pressing <ENTER>.

```
DEFINE variable 1 [509 bytes free]
Title
Type NUMERIC Size 4  Display Format (Left) 7 (Right) 1
```

If all the variables will be defined with the same type, size and display format, press <F10> after entering variable title to call up the next variable

for definition. The user is returned to the Transpos Options Menu after the variables have been defined.

```
2 TRANSFER variables and cases intact
```

This option allows you to move blocks of variables and cases from the active data file to the destination file. You may assign them in the variable-case order as in the source file or put them in a new range of variables and cases in the destination file.

```
Get Case Range
The data file contains  120 cases
Do you wish to use all cases? Y/N
```

```
Your destination file has no cases so TRANSPOS will
start with case number 1
```

A list of the variables in the source file will be shown on the screen. To choose all variables, press <A> to highlight all the variables then press <ENTER>. To select only certain variables, press the arrow keys to place the cursor bar on the variable to highlight then press the spacebar. Continue to move the cursor bar and pressing the spacebar to place the highlights. Press <ENTER> when completed.

```
Choose up to 4 variables (Press ESC to quit)
01    numeric ENTRY
02    numeric REPLICATION
03    numeric    YIELD IN GRAMS PER PLOT
04    numeric    YIELD IN GROUP LEVELS
```

```
Enter the variable number (1-6) in the destination file that will
contain variable 1 in the active MSTAT data file
Please keep in mind that the variable types must match
Title of variable in active file :ENTRY
Variable in destination file: 1
```

```
Enter the variable number (1-6) in the destination file that will
contain variable 2 in the active MSTAT data file
Please keep in mind that the variable types must match
Title of variable in active file :REPLICATION
Variable in destination file: 2
```

The destination file, DFILE will now contain 120 cases and has data in variables 1 and 2.

```
3 CONVERT a variable to a case
4 CONVERT a case to a variable
```

The next two options, 3 and 4, allow you to rotate your data sets so that cases become variables and variables become cases. The following is an example of option 3. Option 4 is basically the same and will not be shown.

```
Press <F1> for a list of variables
You may transpose cases of any variable in the active
MSTAT data file to make them variables in the destination
file.  The variable you transpose must be in the range
from variable number 1 to variable number 4

Enter the variable number you wish to transpose in the
active file : 3
```

```
You may transpose a range of cases which is less than or equal to the
number of  variables in the destination file which are the same type
as the variable number you wish to transpose in the active MSTAT data
file

Enter the first case number and the last case number
First case :  1      Last case:    4
```

```
You must specify a case in the destination file to be the destination
case for variable number 1 of the active MSTAT data file
The destination case may be any case from case number 1
to case number 120
Enter the case number you wish to begin with in the
destination file :1

Give the variable numbers
List : 3,4,5,6
```

```
Enter the 4 variables you wish to be the destination variables in the
destination file
Please keep in mind that the variables must all be of
type NUMERIC
```

You must specify a case in the destination file to be the destination case for variable no. 1 of the active MSTAT data file. The destination case may

be any case in the range from case number 1 to case number 120 .

TRANSPOS now performs the transposition. To see the results, exit TRANSPOS and return to the Initial MSTAT menu. Open the Destination file DFILE within the program FILES. Select SEDIT or PRLIST to view the destination file

```
5 FILL cases of a variable with a value from current
file
```

Option 5 copies a variable value from the active data file into a variable in the destination file. You may wish to do this to set up group variables for a regression.

Determine the variable number and cases to fill in the destination file:

```
You may fill any variable in the destination file from variable number
1 to variable number 6.
Enter the variable number you wish to fill in the
destination file: 2
You may fill any number of cases of your variable
beginning with any case from case number 1 to case number
1
Enter the first case number and the last case number
   First case :1        Last case :6
```

Determine the variable number and case to use for the fill value:

```
You may fill variable 2 of the destination file with a value from the
active MSTAT data file

You may use any variable from variable number 1 to
variable number 3 and any case from case number 1 to case
number 8
Keep in mind, however, that the type of the destination
variable and the fill value much match
Enter the variable number from which you wish to get the
fill value:3
Enter the case number from which you wish to get the fill
value:6
```

You may fill variable 2 with a value from the active MSTAT data file. The starting case number may be any number from 1 to the highest case number plus one, and the variable number may be any number from 1 to 4 . Keep

in mind, however, that the type of the destination variable and the fill value must match!

```
6 SAVE the changes to the destination file
7 DELETE all changes made since the last save
```

The last two choices in the TRANSPOS menu are SAVE changes and DELETE changes. These two items save or delete changes made since the last time data was entered. It is a good idea to save changes after each operation in the TRANSPOS program. To save or delete changes, answer "yes" to the prompt. TRANSPOS will save changes to the destination file.

3.12 ASEDIT

Purpose: To edit numeric and text data presented in the ASCII format. This program is used to assist in the interface with other software packages so that data can be more easily read into an MSTAT data file or into other software from MSTAT. This function is also available in the ASCII program of MSTAT. This program can also be used to edit the MSTAT output before printing if not done within the Output Option at the time of the output (ASCII) file creation.

Results: ASCII files can be edited.

Not every software program could offer all the options users desired so each program had to be written to create files that could be used with other programs. The common basis for most software programs in the United States is ASCII format. This is a file that contains no tab commands, no special formatting and is readable in some fashion by the majority of the software on the market.

An ASCII file containing data is **not** an MSTAT data file. It can not be read directly within MSTAT so it can not be edited within the SEDIT program.

Files that have been created during the operation of MSTAT with the Save Output Option can be edited in ASEDIT before being copied to a printer. For example, if a field book is created in VAR Series or EXP Series, the book output can be saved then edited in ASEDIT to include the title of the actual data being collected. The user can also edit the output before printing within the output options menu.

To access the ASEDIT program, highlight ASEDIT on the Initial MSTAT menu and press <ENTER>.

```
EDIT AN ASCII FILE
Enter the name of the file you wish to edit
NEWASCII
```

If the user needs a list of ASCII files in the default drive, press <F1> for a menu. Move the cursor to highlight the file to use and press <ENTER>. To access files in other path locations, type in the path (or drive) ending with \ then press <F1>.

After an ASCII file has been chosen, press <ENTER>.

The instructions for moving the cursor around in the ASCII file are given in a bar across the top of the screen.

```
Press Arrow keys, PgUp, PgDn, Home, End to move.  Press
<F1> for instructions. Press <F10> to end View/Edit.
Press <ESC> to exit with no changes.
```

Further instructions are given when the <F1> key is pressed.

Text limit	: 4095 lines x 255 char or max available memory
Arrow keys	: cursor movement
PgUp,Pgdn	: move up or down in file a screen at a time
Home	: move to top line of current screen
End	: move to bottom line of current screen
Tab	: move to next screen tab setting (every 8 characters)
Ctrl-Home	: move to beginning of first line of file
Ctrl-PgDn	: move to end of last line of file
Ctrl-Left	: move to beginning of current line of file
Ctrl-Right	: move to end of current line of file
Ctrl-End	: delete from cursor position to end of line
Ctrl-Backspace	: same as Ctrl-End
Delete	: delete character to left of cursor position
Insert	: delete character at current cursor position
Enter	: insert a space at current cursor position
F1	: insert a blank line below current line and move to it
F3	: display this help screen
F4	: globally convert all commas in file to spaces
F5	: insert a column of commas at current cursor position
F10	: delete current line, move following lines up
Esc	: exit and save changes (when in deit mode)
	: exit without saving changes

To clear the help screen, press the spacebar or <ENTER>.

3.13 MACRO

Purpose: To store a specific series of keystrokes from session to session.

Results: Program operation time is enhanced.

Many users will run the same routine on a variety of data files that contain the same information in the same order. The MACRO function will "learn" the keystrokes necessary to go from one section in a program to another section. By pressing the ALT key at the same time as one of the number keys, the programmed sequence of keystrokes will be initiated.

Usually, the MSTAT user will call up MSTAT and open a data file on the default data directory. This procedure takes three keystrokes:

1. Press <ENTER> to access the highlighted program FILES
2. Press <ENTER> to open a file
3. Press <F1> to get a list of files on the screen

A simple MACRO can be used to replace this sequence of keying.

While the Initial MSTAT Menu Screen is presented, press <ALT>-D (hold down the ALT key while pressing the D key) to begin the definition of a MACRO.

```
Enter the number of the macro which you wish to define (0-9):
0
```

Press <ENTER> to start the creation of MACRO 0.

Use the same keystrokes that would be used to perform the function of opening a file.

1. Press <ENTER> to access the highlighted program FILES
2. Press <ENTER> to open a file
3. Press <F1> to get a list of files on the screen

This will be the extent of MACRO 0. To end definition, press <ALT>-D.

```
Terminating definition.  To invoke it, press ALT-0
```

Press any key to clear the screen. The MACRO has been created and can

be initiated by pressing <ALT>-0.

To use the MACRO, exit FILES to the Initial MSTAT Menu Screen then press <ALT>-0. The stored keystrokes will move the program to the point where the user can cursor through the file names and select a file to open.

There can be up to 10 MACROs that are defined at any one time. They can be defined across subprograms as long as the keystrokes are sequential. If a pause is desired to enter specific information, a new MACRO will have to be defined to continue the program after the user inputs the information.

4.0 EXPERIMENTAL DESIGN SERIES

The EXP SERIES of programs were created to assist the researcher in setting up field and laboratory experiments by assigning plot numbers in a random order to specified experimental designs such as two factor randomized block or completely random design. The EXP SERIES will create files that contain experimental designs with up to 5 factors and up to four splits within those factors. Each factor can have up to 99 levels. Each factor combination can have up to 99 replications After a design has been made, the user can print field books, maps and labels for ease in data collection.

4.1 EXP SERIES - PLAN

Purpose: Generates randomized block designs with one to five factors and zero to four splits.

Before starting, you need/should know:

1. Either an active data file with variables defined by PLAN, or NO file (PLAN is used to create the file and define the variables).
2. An outline of the desired experimental design, including such information as the number of treatments and the number of replications.
3. A list of treatment names and variables.

Results: If you use a newly created data file then PLAN defines the variables before you enter data. If you use a previously created data file, then you may add data for another experiment to the end of the file.

Sample Data File: EXPDAT. To create this file, select FILES from the EXP Series menu. Enter EXPDAT as the file name. This file will be used throughout the EXP series of subprograms.

PLAN can generate a design with up to 99 replications, up to 5 factors, and 4 split levels. There is a limit on the number of digits it will print, in the books, maps and labels, that is dependent on the width of your paper. Each factor can have from 2 to 99 levels. In a split plot experiment, the factor on the largest plot (Factor A) should be given first followed by the second, third and fourth plot sizes.

4.1 EXP PLAN

All factor and replication variables must be given as integers (i.e., numbers without decimal places). When you create a new file to be used by PLAN, estimate the file width by including the following variables as well as the data collection variables (each numeric variable uses 4 characters of the file width):

Variable no. 1: numeric, Replication number.

Variable no. 2: numeric, Plot number.

Variable no. 3, up to 7 are factors; each factor is a numeric variable. If your experiment uses two different factors, such as nitrogen level and phosphorus level, then variable no.s 3 and 4 are the two factors.

If you generate more than one design for a single active data file, the plots and randomization scheme for each additional plan are added to the end of the active data file.

PLAN Example

This is an example of generating an experimental design:

```
More than one plan (experiment) can be in one data
file.
In a Split plot experiment the factors on the largest
plots should be given first.
The first 7 variables are used in this way:
   Var 1: replication
   Var 2: Plot Number
   Var 3: Factors in the order given
      "
      "
   Var 7:  "
```

Factors can be such treatment types as nitrogen levels, phosphorous levels, varieties or irrigation. Each factor can have 99 levels.

The PLAN Input Panel presents blanks for the user to fill - number of replications, number of splits, number of factors and randomization in Replication 1. Each factor is then defined by name, lowest factor level and number of levels (or treatments).

```
Number of Reps:    4          Number of Factors:      1
Number of Splits:  0          Randomize Rep 1:        Y/N
          Randomization Seed : 1
```

```
Factor 1, Var #3 (enter levels consecutively)
Name:  DRY BEAN VARIETIES
Lowest Level:   1     No. of Levels:  30
```

After all the factors have been defined, lowest plot number for each replication is established (101, 201, 301, etc.) and the user is prompted for EXP SERIES - BOOK from the EXP SERIES Menu.

4.2 EXP BOOK

4.2 EXP SERIES - BOOK

Purpose: Generates field books from an PLAN design.

Before starting, you need/should know:

1. An active data file containing a design generated by PLAN. If you have several files with PLAN designs, make sure you have selected the proper file.
2. In a file containing designs for several experiments, you should know the case numbers of each experiment that needs books.
3. A printer loaded with paper and on line.

Results: A field book from a PLAN design is printed.

Sample Data File: EXPTEST.

The field book created by BOOK contains variables established by PLAN, including plot numbers, replication numbers and factor(s) levels. The book also provides you with at least nine blank columns into which data may be entered for each plot.

The book may be 80 or 130 columns wide. If the MSTAT Configuration file has the condensed code properly set, the 130-column field book is printed using condensed print. If the condensed code is not set in the MSTAT Configuration file, then normal print is used; you will need wide paper to print the field book.

If more than one experiment is present in the active file, be sure to enter only the case numbers for the experiment requiring a field book.

BOOK Example

The following is an example of generating a field book for replication 1 (data cases 1 through 30) of the EXPTEST file.

Enter the range of data cases to use then the number of plots per page.

Choose a number that will allow complete blocks or replications to be printed on a page; if the number of plots per replication is less than 30, then

enter the number of plots/replication. This number will depend on the number of treatments in your design.

The book format is either 80 column or 130 columns. If you use the 80 column option, then normal print is used. If you press the spacebar to toggle to the 130 columns, then either condensed or normal print may be used; the print type depends on the condensed code setting in the MSTAT Configuration file.

```
EXPBOOK Input Panel
Case Range :          1  - 30
Plots per Page:    30
Book Format :      80 columns
Horiz dividers:    Y/N
Standard headers:  Y/N
```

BOOK prints a field book similar to that shown if your printer is properly configured. If the printer stops printing or if the printout is garbled, check to see that the printer is configured properly.

An example of a field book is shown below. The first four lines of the field book can be edited prior to book creation using the book template method described on page 4-11. If you respond N to the prompt Standard Headers, you will be prompted for a template file.

```
EXP.EXPTEST RCB DESIGN EXPT TO TEST EXPBOOK LABEL

          Factor      Planted   /   /     Harvested   /   /
PLOT  R  A     1     2     3     4     5     6     7      PLOT
101   1  9     :     :     :     :     :     :     :      101

102   1  8     :     :     :     :     :     :     :      102

103   1  16    :     :     :     :     :     :     :      103

104   1  11    :     :     :     :     :     :     :      104

105   1  21    :     :     :     :     :     :     :      105
```

BOOK will actually print 30 plots on the page.

4.3 EXP LABEL

4.3 EXP SERIES - LABEL

Purpose: Prints labels for envelopes and field tags from an PLAN design.

Before starting, you need/should know:

1. An active data file containing a design generated by PLAN. If you have several files with PLAN designs, make sure you have selected the proper file.
2. Printer loaded with labels or paper and on line if planning to print the labels at this time.

Results: Prints labels from a PLAN file or stores labels to printer ready file for editing or printing..

Sample Data File: EXPTEST.

You may find it useful to use the SORT subprogram to reorganize your PLAN file before using LABEL. To facilitate filling seed envelopes, preparing fertilizer experiments or distributing multi-environment trials, you can sort by plot number, replication, or any other ranking.

If labels are unavailable, you can print the labels on normal printer paper and cut them out with a paper cutter. Since the paper for labels and printer paper is not as durable as tag paper, we suggest coating the paper with paraffin. If the experimental area is infested with rats or mice, mix a deterrent with the paraffin to discourage these pests.

LABEL Example

The following is an example of printing labels from the sample data file EXPTEST. One factor (nitrogen level) is defined in the file.

```
EXPLABEL ( 1 Factors in file)

   The data file contains 120 cases.
   Do you wish to use all cases ? Y/N
```

If you want to print all cases, answer <Y>. If you want to print only a certain range of cases, respond <N> and fill in the appropriate case values in the boxes presented.

```
EXPLABEL ( 1 Factors in file)
Case Range : 1 - 120
Labels Across:  1
Print Label Pattern : Y/N
```

Enter the number of labels to print across the page. The range available is 1 to 5 labels of 3 1/2 inches in length. For this example, enter 1 and press <ENTER>. To adjust the labels in the printer, respond <Y> to label pattern and one set of labels will be printed.

```
Please correct label alignment by adjusting the paper
in the printer.  When done, enter YES to continue or NO
to print another alignment pattern.

                    Y/N
```

This test is to assure that the paper is properly aligned and that the labels are being printed as required. If the paper is not properly aligned, adjust the paper in the printer either up or to one side or the other then respond <N> and the alignment pattern will print again.

The following sample labels are printed as a test of paper alignment:

```
START    LINE 1           END   START    LINE 1          END
*                          *   *                          *
*        LABEL TEST        *   *      LABEL TEST          *
*                          *   *                          *
START    LINE 5           END   START    LINE 5          END
```

If the labels are not aligned, realign them before responding <N>. When you respond <N>, the sample labels are printed again.

Once the paper in the printer is aligned, respond <Y> and the labels will be stored to an ascii file. The output options panel will allow the user to view the labels, edit the labels, print or store the labels.

4.3 EXP LABEL

The following are example labels.

```
*101(PLOT)   1(REP)  EXPFILE(EXP) *
*                                 *
*FACTOR:                          *
*                                 *
*A=   9                           *

*103(PLOT)   1(REP)  EXPFILE(EXP) *
*                                 *
*FACTOR:                          *
*                                 *
*A=  16                           *
```

4.4 EXP SERIES - MAP

Purpose: Generates a map of your experimental field using the information in the file from PLAN.

What you need/should know:

1. An active data file containing a design generated by PLAN. If you have several files with PLAN designs, make sure you are using the desired file.
2. A printer loaded with paper and on line.
3. A sketch of the plot layout.
4. BOOK field book printout.

Results: A printed map of your experimental field is printed.

Sample Data File: EXPTEST.

MAP can be used to print maps for any combination of plots in a block, in almost any plot, row and block arrangement. Since you must know the exact design of your field experiment, we recommend that you visit your field(s) before generating a map. Determine the width and length of the field. Record the plot layout and the location of the border areas and filler plots for each range.

MAP asks for the number of rows in your map, the columns of plots, and the number of replications and treatments. The subprogram then asks you to define your field by rows. After each row is defined, the row layout is displayed and you are asked to verify that the information is correct before defining the next row. After you respond to the prompts that are used to generated the field map, MAP prints the map.

MAP Example

```
MAP Input Panel (<F10> when done)

Paper Width (80/132):      Narrow      First Case                1
Type of Print              Normal      No. of Replications:      4
Rows of Plots on Map:      12          No. of Treatments:        30
Cols of Plots on Map:      10          No. of Factors:           1
Paper Width (80/132):      Narrow
```

4.4 EXP MAP

A map will be generated for the following diagram of a field.

```
                              |<-   col. 1 - 10 ->    |
Rep 4    Plots 421-430    | 421              430   | Row 1
         Plots 411-420    | 411              420   | Row 2
         Plots 401-410    | 401              410   | Row 3
Rep 3    Plots 321-330    | 321              330   | Row 4
         Plots 311-320    | 311              320   | Row 5
         Plots 301-310    | 301              310   | Row 6
Rep 2    Plots 221-230    | 221              230   | Row 7
         Plots 211-220    | 211              220   | Row 8
         Plots 201-210    | 201              210   | Row 9
Rep 1    Plots 121-130    | 121              130   | Row 10
         Plots 111-120    | 111              120   | Row 11
         Plots 101-110    | 101              110   | Row 12
```

Paper width and type of print are selected based on the paper loaded in the printer and the number of plots (columns) to be printed across a page. The options available can be toggled by pressing the space bar. With a paper width of 80 and with normal print, up to 15 columns of plots can be printed across a page.

```
Rows of Plots on Map: 12
```

This is the actual number of rows of plots. In this example, there are 10 plots in each row, 3 rows in each replication and 4 replications. Therefore, the answer is 12 (4 reps x 3 rows per rep).

```
Columns of Plots on Map:? 10
```

Again, do not confuse columns of data with this number which is the columns of plots; include borders if you want them included on the map. In this example, there are 10 plots in each row, making 10 columns of plots.

```
First Case:  1
```

As a data file can contain more than one experiment, this question is necessary to the program.

```
Number of Replications:     4
Number of Treatments:      30
No. of Factors :            1
```

In this example, variety is the only factor.

```
Replication  1    Plot number  101
Replication  2    Plot number  201
Replication  3    Plot number  301
Replication  4    Plot number  401
Is This Correct ? Y/N
```

Instructions for entering information into the map program are given on screen as well as here in the manual.

```
Give the replication and plot number for each plot in the map starting
in the upper-left hand corner of the map.
Replications are entered as 1, 2, 3, etc.

If the plot numbers are successive within a row, only the
first and the last plot number have to be given, the
latter with a minus sign (e.g. 201, -209 to indicate all
plot numbers from 201 to 209, inclusive))

Filler plot numbers to the left or within a row are
entered as plot number 0 (zero). Filler plot numbers to
the right are automatically provided. Each row is
automatically terminated if all columns are entered, or
press <ESC> to end a row early (using filler plots to the
right).
```

You must have field layout information (such as the sample given at the beginning of this example) to continue. You can build any orientation into your map by keeping track of the corner plots in each range of plots and following the above displayed instructions.

The following prompts allow you to design the exact layout of your experimental field. You will define the field by rows. In this example, there are 12 rows of plots which must be defined (3 rows of plots for each replication). When you define one row, the subprogram displays your design and asks: `IS THIS CORRECT? Y/N`. If the plot number order is incorrect, you may respond "no" and you will be prompted again for the row layout.

4.4 EXP MAP

```
Row 1/Col 1   rep ? 4    plot ? 421
Row 1/Col 2   rep ? 4    plot ? -430
```

When all columns of one row are filled, the following prompt will be on the screen:

```
The data are :

Rep=4 Plot=421
Rep=4 Plot=422
Rep=4 Plot=423
Rep=4 Plot=424
Rep=4 Plot=425
Rep=4 Plot=426
Rep=4 Plot=427        Check Data
Rep=4 Plot=428
Rep=4 Plot=429        Is this correct? Y/N
Rep=4 Plot=430
```

Continue this process until the entire field is defined. For this example, the rest of the entries would be:

Row 2:	**Rep 4**	**Plot 411**	**Rep 4**	**Plot -420**
Row 3:	**Rep 4**	**Plot 401**	**Rep 4**	**Plot -410**
Row 4:	**Rep 3**	**Plot 321**	**Rep 3**	**Plot -330**
Row 5:	**Rep 3**	**Plot 311**	**Rep 3**	**Plot -320**
Row 6:	**Rep 3**	**Plot 301**	**Rep 3**	**Plot -310**
Row 7:	**Rep 2**	**Plot 221**	**Rep 2**	**Plot -230**
Row 8:	**Rep 2**	**Plot 211**	**Rep 2**	**Plot -220**
Row 9:	**Rep 2**	**Plot 201**	**Rep 2**	**Plot -210**
Row 10:	**Rep 1**	**Plot 121**	**Rep 1**	**Plot -130**
Row 11:	**Rep 1**	**Plot 111**	**Rep 1**	**Plot -120**
Row 12:	**Rep 1**	**Plot 101**	**Rep 1**	**Plot -110**

It is possible to enter plot numbers from a high to a low number (e.g., 410 and -401) to create serpentine patterns.

When the last row has been defined (in this example, row 12), the map is printed. The map for replication 4 of this example would look like this.

```
| Rep| Rep| Rep| Rep| Rep| Rep| Rep| Rep| Rep| Rep|
|  4 |  4 |  4 |  4 |  4 |  4 |  4 |  4 |  4 |  4 |
|Plot|Plot|Plot|Plot|Plot|Plot|Plot|Plot|Plot|Plot|
| 421| 422| 423| 424| 425| 426| 427| 428| 429| 430|
|A=14|A=30|A=16|A=06|A=22|A=25|A=10|A=08|A=13|A=23|
-------------------------------------------------
| Rep| Rep| Rep| Rep| Rep| Rep| Rep| Rep| Rep| Rep|
|  4 |  4 |  4 |  4 |  4 |  4 |  4 |  4 |  4 |  4 |
|Plot|Plot|Plot|Plot|Plot|Plot|Plot|Plot|Plot|Plot|
| 411| 412| 413| 414| 415| 416| 417| 418| 419| 420|
|A=03|A=09|A=15|A=19|A=20|A=05|A=27|A=21|A=07|A=11|
-------------------------------------------------
| Rep| Rep| Rep| Rep| Rep| Rep| Rep| Rep| Rep| Rep|
|  4 |  4 |  4 |  4 |  4 |  4 |  4 |  4 |  4 |  4 |
|Plot|Plot|Plot|Plot|Plot|Plot|Plot|Plot|Plot|Plot|
| 401| 402| 403| 404| 405| 406| 407| 408| 409| 410|
|A=24|A=17|A=02|A=28|A=12|A=26|A=01|A=29|A=18|A=04|
```

4.5 Book Header Template for EXP Book

With the new template option, the user can edit the first four lines that will be printed at the top of each book page and the changes will be saved to a file that can be used whenever new books are created. Before entering the EXP Series Program, .TPL files can be created in the ASCII Program.

Master template files have been included in the data directory for each type of book (EXP 80 columns and EXP 130 columns). To create a template file, follow these steps:

1. Select the ASCII Program from the Main MSTAT Menu.
2. Select the option to copy an ASCII File.
3. Copy the appropriate master template for the book to be created.
   a) **TPLEX80** - EXP Book with normal print.
   b) **TPLEX130** - EXP Book with compressed print.

* When naming the new file, you must have a .TPL extension (ie. EXPREG.TPL or EXPCOMP.TPL).
* The master template files can not be used in the EXP Book program. They must be copied to another file with a TPL extension.
* Do Not Edit the master template files.

The following restrictions apply to the edited file:

1) The first portion of the initial line of the template file must NOT be edited. Any editing done on the first line must occur after the '*' mark. Any information entered on this line is for descriptive purposes and will not appear on the book when viewed or printed within the EXP Book Program. If any editing has been done on the first portion of this line, exit ASCII Edit and recopy the template as the EXP Book program will not recognize the tampered template file.

2) The second and third lines are for your comments and any information entered between the first character and the word "Plot" (on the 4th line) can be viewed and edited and will be printed if the print option is chosen.

3) The fourth line consists of both programmed text and individualized column headings. The first portion of the fourth line of the template file must NOT be edited. Any editing done on the fourth line must

occur after the '*' mark. Each column heading can consist of alphabetic or numeric characters. The portion of the fourth line that is printed is specific for the book type and there are programmed column starting and ending positions.

4) The fifth line is included in the template file to be used as a ruler for the other lines. Each column is indicated so that entered text can be aligned with each column.

5) Use the arrow keys to move around the file. Pressing the ENTER Key while editing will insert a blank line. These new lines must be deleted before saving the file. Press <F5> while the cursor is in the blank line and the blank line will be removed.

After the new template file is completed, the file can be used in the EXP Book Program. There is no method where by the EXP Series can identify a .TPL file as being specifically edited for the particular book type so it is recommended that the .TPL file name be indicative of the type of book header to be replaced (ie. EXPREG.TPL or EXPCOMP.TPL).

To use the template file, enter the EXP Book program and respond to the prompts.

```
EXPBOOK Input Panel
Case Range:          1 - 30
Plots per Page:      30
Book Format :        80 columns
Horiz dividers:      Y/N
Standard Header:     Y/N
```

```
File:
```

Press <F1> and a list of .TPL files will appear on the screen. Highlight the file that contains the header to be used and press <ENTER>. The book will be created and you will be able to view, edit, print or save the book.

5.0 VARIETAL SERIES - LATTICE DESIGNS FOR VARIETAL TESTING

The VAR Series is used to design and manage large scale varietal testing programs based upon lattice design experiments (you may also use one factor Randomized Complete Block designs). There are five subprograms in the VAR Series, which are used in the order that they are listed: NAME, PLAN, BOOK, LABEL and MAP. You should have a working knowledge of the principles behind lattice designs to use these subprograms.

Lattice designs are a type of incomplete block design. These designs are used to minimize the possibility of error which may occur when you have field variation in experiments with large replications and a large number of treatments. A variety of lattice designs are possible, however, the MSTAT VAR Series limits the designs to square or rectangular lattices with only two or three replications.

Rectangular lattices - You may use from 12 to 90 treatments for this design. The VAR Series abbreviates treatments as "t".

Square Lattices - The following information will acquaint you with the symbols used in some of the prompts and review square lattice design:

1. Each replication contains an arrangement.

2. The number of blocks within a replication is equal to the square root of the total number of treatments. If you have 9 treatments, each replication contains 3 blocks.

3. Each block within a replication contains a number of plots equal to the square root of the total number of treatments. Therefore, each block is "incomplete". If you have 9 treatments, each block contains 3 plots.

Formulae can be used to express this design:

r = replication rt = total experimental plots
t = treatments (t1, t2, t3) rk = total blocks in experiment
k = the number of blocks per replication (square root of t)

5.0 VARIETAL SERIES

The VAR Series uses two data files. The NAME file contains your variety information and is used with PLAN to generate your field experiments. Book, Label and Map of the VAR Series require that a PLAN file has been selected by highlighting Files and pressing <ENTER> before entering the Book, Label or Map level.

At the main menu, choose VARSERIES
The following will appear on screen:

```
Files   Name    Plan    Book    Label   Map   Quit
```

FILES

Either a NAME or a PLAN file can be opened before selecting VARSERIES from the Initial MSTAT menu. If a NAME file is opened, it will become the active NAME file. If a PLAN file is opened, it will be the active PLAN file. If no files have been opened before selecting VARSERIES, the user must use the Files option of VAR Series to open a NAME or PLAN file before entering any of the other levels of the VAR Series.

```
Open a VARNAME file

Name  Plan  Change  Path  Quit

Active VAR files

VARNAME  :  C:\MSTATC\DATA\
VARPLAN  :  C:\MSTATC\DATA\
```

Highlight FILES on the initial VAR Series screen and press <ENTER>. If you are entering varietal information into a NAME file, highlight NAME and press <ENTER>. If you are ready to enter information into a PLAN file, highlight PLAN and press <ENTER>. You must have both a NAME and a PLAN file if you are initializing a field experiment. If you are only going to print books, labels or maps from an existing PLAN file, only a PLAN file is necessary. Once the appropriate file or files have been loaded or created, highlight Quit and press <ENTER>.

5.1 VAR SERIES - NAME

Purpose: Creates a file of variety names, accession numbers and source information for use in the PLAN level of VAR Series.

Before starting, you need/should know:

1. An active data file. The variables in this file must have been defined by NAME; in this case, you are adding varietal information to the file to a newly created data file (with a minimum file width of 35). You may open an existing NAME file and add more varietal information to that file.
2. A list of variety names, accession numbers and source information.

Results: If you use a newly created data file, the variables are defined in the file and varietal information is stored in the file. If you use an existing NAME file, then varietal information is appended to the end of the file.

Sample Data File: LATTNAME. To create this file, highlight FILES and press <ENTER>. Highlight NAME and press <ENTER>. Enter LATTNAME for the file name, 'testing variety series' for the file title and press <ENTER> to accept the default file width .

If the active data file is newly created, NAME defines the following variables:

```
Var   1   text   15 char   Variety name
Var   2   text    6 char   Accession number
Var   3   text    7 char   Last years exp. designation
Var   4   text    6 char   Last years plot (or variety)
number
```

Therefore, you must define the file width as at least 35 characters.

NAME prompts you for each variable. The information entered in this file is used by PLAN to generate the design for a lattice or RCB experiment.

5.1 VAR NAME

The following varietal information will be entered into the newly created NAME data file LATTNAME:

Variety Name	Accession number	Last years exp designation	Last years plot number
TRUMBULL	M0001	I09	101
KNOX62	M0002	I09	102
OASIS	M0003	I09	103
CALDWELL	M0004	I09	104
AUBURN	M0005	I09	105
IN6525A1-9-7	M0006	I09	106
IN72463C1-3-1-5	M0007	I09	107
IN72483C1-3-1-6	M0008	I09	108
OH188	M0009	99	109

There are nine varietal entries listed above. This information will be used to generate a square lattice experimental design. NAME prompts you for this information as follows:

```
VARNAME Input Panel  (Press <ESC> after last variety is
entered)
                     Accession      Last Year's     Last
Year's
Case  Variety Name      Number   Exp Designation   Plot
Number

  1  TRUMBULL          M0001          I09            101
```

Enter variety name, accession no. and last year's experiment designation (if any) to be used in PLAN. Press <ENTER> to move from block to block. Press <ENTER> when in the last highlighted block to change to the next case. The screen information will be updated to the next case number and the next plot number. If some of the information is the same as the previous entry, press <ENTER> to accept the choice on the screen or edit the choice by using the arrow keys to position the cursor in the portion of the highlighted area that is to be changed. If the information in the highlighted blocks is not to be edited, press <F10> to bring up the next case.

To finish this test file, continue entering the varietal information until all nine varieties are entered. When finished entering varietal information, press <ESC> after all the information on the last variety has been entered.

5.2 VAR SERIES - PLAN

Purpose: Creates a square or rectangular lattice design (or an RCB design - Randomized Complete Block) using the information in a NAME file.

Before starting, you need/should know:

1. An active data file. Use the FILES option to load a new file or an existing one.
2. The related NAME file should be on the data diskette.
3. An outline of your experimental plan.

Results: If you are using a newly created data file, then variables are defined and cases are added to the file. If this file was previously used for PLAN, then cases are added to the file.

Sample Data File: PLANTST. To create this next file, select FILES then PLAN. Enter PLANTST as the file name and define the file width as 80 characters. The NEWLATT data file is also used as the NAME file. Both PLANTST and NEWLATT are to be loaded before entering the PLAN level of the VAR Series.

PLAN generates research designs for varietal testing trials using incomplete block lattices (square or rectangular), or RCB designs. If a lattice design is used then the program only allows two or three replications. If only one replication or more than three replications are used, then the program automatically generates an RCB design. An RCB design is also generated if you ask for treatment numbers not compatible with lattice designs.

Square lattice designs may have treatment numbers that are perfect squares from nine on up. Rectangular lattices must have the following treatment numbers: 12, 20, 30, 42, 56, 72, or 90 which is the maximum number for rectangular designs generated by PLAN.

Press <ENTER> when PLAN is highlighted (be sure both a NAME and a PLAN file have been loaded or created).

VARPLAN Instructions

For rectanglular lattice the minimum number of treatments is 9, the maximum number of treatments is 90. For square lattice there is no maximum number of treatments. It is also possible to make Randomized

5.2 VAR PLAN

Complete Blocks with any number of treatments (except those which are used in lattices) and with 1 to 9 replications.
More than one plan (experiment) can be in one data file.

The first eight variables are used in this way:

Var	1:	Replication
Var	2:	Block no. within replication
Var	3:	Treatment (variety) number (from 1 to t)
Var	4:	Plot number
Var	5:	Variety (treatment) name (15 characters)
Var	6:	Accession number (6 characters)
Var	7:	Last years experiment (7 characters)
Var	8:	Last years plot number (6 characters)

The last four variables (variable no.s 5 through 8) are taken from the NAME file associatied with this PLAN file.

This example will use the newly created data file PLANTST (this is the active PLAN data file) and the active NAME data file NEWLATT. A square lattice plan will be generated (3 x 3) with 3 replications and 9 treatments.

```
VARPLAN Input Panel (Press <F10> when done)

Number of Reps: 3                Lowest Plot No. in Rep 1: 101
                                 Lowest Plot No. in Rep 2: 201
Input Case Range: 1-9            Lowest Plot No. in Rep 3: 301
                                 Lowest Plot No. in Rep 4: 401
Randomize Rep 1: Y/N             Lowest Plot No. in Rep 5: 501
                                 Lowest Plot No. in Rep 6: 601
                                 Lowest Plot No. in Rep 7: 701
NOTE:Ignore Plot No entries      Lowest Plot No. in Rep 8: 801
greater than Number of Reps      Lowest Plot No. in Rep 9: 901
```

In the above Input Panel, enter the number of replications for the field trial in the highlighted block, type in the first and last case number in the NAME file that is to be included in the PLAN file (the number of cases in the NAME file is shown on screen - enter the values if other than all cases are desired) and respond either <Y> or <N> to randomization in the first replication. The plot numbers for each replication (presented as defaults) can be changed by typing in a different number or all the default values can be accepted by pressing <F10>.

If the number of cases that have been transferred in from the NAME file is not the correct number for a lattice design, the following will appear on screen:

```
This is NOT A LATTICE.  Is this correct ? Y/N
```

If a lattice design is required, respond <N> and the Input Panel will be presented for editing. Respond <Y> and the program will complete.

5.3 VAR BOOK

5.3 VAR SERIES - BOOK

Purpose: Generates and prints field books from PLAN files.

Before starting, you need:

1. An active data file generated by PLAN. If you will only be using a portion of the file for a field book, you should know which data cases you want to use.
2. A printer loaded with paper and online if you desire to print the book at this time.

Results: Depending on which print/list options you choose, the field book may be displayed on the screen, printed or stored in a disk file.

Sample Data File: VARTEST. Press <ENTER> when FILES is highlighted then again when PLAN is highlighted. Enter the file name VARTEST. It is not necessary to have a NAME file active when printing books.

You may print a field book that is either 1 page with 132 columns or 2 pages with 80 columns on each page. For an 80-column field book, normal print is used. For a 132-column field book, the print type can be normal or condensed. If the MSTAT Configuration file has the condensed code properly set, the 132-column field book is printed using condensed print. If the condensed code is not set, then normal print is used; in which case wide paper should be used.

The BOOK Input Panel has highlighted blocks for case range to print, the number of plots you want printed on a page, whether you want a one or two page book and if you want to use a custom header on the top of each book page. The default values are shown below.

```
VARBOOK Input Panel

Case Range: 1 - 27
Plots per Page: 30
Book Format: 1 Page
Standard header: Y/N
```

The Case Range block indicates the first and last case in the PLAN file.

Change those values if only a few plots are necessary at this printing (ie: only rep 1).

The default value of 30 plots per page can be changed to more accurately separate units within your experiment. If you have designed an experiment with 3 replications and 24 entries in each replication, it is suggested that you enter 24 as the number of plots per page and then each of the three replicates will be on a separate page in the resultant book.

There are two book formats available: one page with 132 columns (spaces) or 2 pages with 80 columns. Press the spacebar when the Book Format block is highlighted and the choice offered will change between 1 page and 2 page.

An example of a two page field book is shown below. The first four lines of the field book can be edited prior to book creation using the book template method described on page 5-15. If you respond N to the prompt Standard Headers, you will be prompted for a template file.

Press <ENTER> to accept the values entered. You may now view, print or save the generated book or return to the VAR Series menu. In this example, the top half of the page is the first page of the two page format and the bottom half is the second page of the two page format.

5.3 VAR BOOK

Exp VARTEST

Planted ___/___/____ Harvested ___/___/____

Plot	Trt	R	Blk	Acc	Name	Plot
101	8	1	3	M0008	IN72483C1-3-1-6	101
102	9	1	3	M0009	OH188	102
103	7	1	3	M0007	IN72463C1-3-1-5	103
104	3	1	1	M0003	OASIS	104
105	1	1	1	M0001	TRUMBULL	105
106	2	1	1	M0002	KNOX62	106
107	6	1	2	M0006	IN6525A1-9-7	107

Exp VARTEST

Planted ___/___/____ Harvested ___/___/____

Plot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Plot
101	:	:	:	:	:	:	:	:	:	:	:	:	:	:	101
102	:	:	:	:	:	:	:	:	:	:	:	:	:	:	102
103	:	:	:	:	:	:	:	:	:	:	:	:	:	:	103
104	:	:	:	:	:	:	:	:	:	:	:	:	:	:	104
105	:	:	:	:	:	:	:	:	:	:	:	:	:	:	105
106	:	:	:	:	:	:	:	:	:	:	:	:	:	:	106
107	:	:	:	:	:	:	:	:	:	:	:	:	:	:	107
108	:	:	:	:	:	:	:	:	:	:	:	:	:	:	108
109	:	:	:	:	:	:	:	:	:	:	:	:	:	:	109

5.4 VAR SERIES - LABEL

Purpose: Prints labels for experimental designs generated using VARPLAN.

Before starting, you need:

1. An active PLAN data file
2. A printer loaded with labels or paper and online.

Results: Labels are printed for the active PLAN data file.

Sample Data File: VARTEST.

If labels are unavailable, you can print the labels on normal printer paper and cut them out with a paper cutter. Since the paper for labels and printer paper is not as durable as tag paper, we suggest coating the paper with paraffin. If the experimental area is infested with rats or mice, mix a deterrent with the paraffin to discourage these pests.

You may print three different types of labels using LABEL: planting labels, labels for harvesting or stakes, or labels for samples.

The following example uses the VARTEST file to create labels.

```
VARLABEL Input Panel (<F10> when done)

Number of Replications:       First Case: 1
Number of Treatments:            Labels Across
Label Type: Planting          Align Labels: Y/N
```

Most of the input blocks have a helpful message which can be seen by placing the cursor into the area and pressing <F1>.

Number of Replications: you may desire to print all the replicates in your experiment or only one; this is the block used to enter the number of replicationa to print.

Number of Treatments: Replications * Treatments = total number of cases to use in printing labels.

5.4 VAR LABEL

First Case: the data file contains ___ cases

Labels Across: number of labels to print across the page (1-5). Each label is 3 1/2 x 15/16 inches.

Label Type: Planting / Harvesting / Stakes / Harvesting & Stakes / or Samples. Press the spacebar to find the label format then press <ENTER> to select that format.

Align Labels: If labels are to be printed immediately, select <Y> and a sample label will be printed. If the sample pattern does not print on the label correctly, adjust the paper in the printer either upward or sideways then enter <N> at the following screen to have another alignment pattern printed.

```
Please correct label alignment by adjusting the paper
in the printer.  When done, enter YES to continue or NO
to print another alignment pattern.

                    Y/N
```

The following sample labels are printed as a test of paper alignment:

```
START    LINE 1          END   START    LINE 1          END
*                          *   *                          *
*        LABEL TEST        *   *      LABEL TEST          *
*                          *   *                          *
START    LINE 5          END   START    LINE 5          END
```

Once the paper in the printer is aligned, respond <Y> and the labels will be stored to an ascii file. The output options panel will allow the user to view the labels, edit the labels, print or store the labels.

If your VARPLAN file contains more than one experimental plan, then you may want to print labels for only one of your experiments. VARLABEL expects to print a complete set of labels for an experiment (it multiplies the number of replications times the number of treatments to estimate the number of data cases which should be used).

The following is a planting label:

```
****************************************
*105(Plot)       1(Entry)       VARTEST(Exp)*
*                                          *
* M0001  (Acc)TRUMBULL                        *
*                                          *
* Seed source I09  (Exp )         101      *
****************************************
```

If creating sampling labels, an additional screen will prompt for the number of sample labels per entry.

5.5 VAR MAP

5.5 VAR SERIES - MAP

Purpose: Creates field maps of designs generated by VARPLAN.

Before starting, you need:

1. An active data file; this file should have been created using VARPLAN.
2. A printer loaded with paper and on line.if you desire to print the map at this time.

Results: A map of your experimental field is created. The field map may be displayed on the screen, printed or stored in a disk file.

Sample Data File: VARTEST.

MAP can be used to print maps for experiments designed using PLAN. Since PLAN may generate plans for lattice designs as well as Random Complete Block designs, you must know the exact design of your experimental field. Therefore, we recommend that you visit your field(s) before generating a map. Record the plot layout and the size of the border areas and filler plots. Also mark the borders and corner plot numbers for each range.

MAP asks for the number of rows in your map, the columns of plots, and the number of replications and treatments. The subprogram then asks you to define your field by rows. After each row is defined, the row layout is displayed and you are asked to verify that the information is correct before defining the next row. After you respond to the prompts that are used to generate the field map, MAP displays the print/list menu of options.

MAP Example

The following is a diagram of the experimental field defined in this example.

```
Block 1/  | 101 102 103 |  |201 202 203 |  |301 302 303 |  Row 1

Block 2/  | 104 105 106 |  |204 205 206 |  |304 305 306 |  Row 2

Block 3/  | 107 108 109 |  |207 208 209 |  |307 308 309 |  Row 3
            Rep     1        Rep     2          Rep     3
```

```
VARMAP Input Panel (<F10> when done)

Paper Width (80/132): Narrow    First Case            1

Type of Print         Normal    No. of Replications: 3

Rows of Plots on Map: 3         No. of Treatments:   9

Cols of Plots on Map: 9
```

Paper width and type of print are selected based on the paper loaded in the printer and the number of plots (columns) to be printed across a page. The options available can be toggled by pressing the spacebar. With a paper width of 80 and with normal print, up to 15 columns of plots can be printed across a page.

Rows of Plots on Map: **3**

This is the actual number of rows of plots. In this example, there are 9 plots in each row; 1 row in each replication. Therefore, the answer is 3.

Columns of Plots on Map: **9**

Again, do not confuse columns of data with this number which is the columns of plots; include borders if you want them included on the map. In this example, there are 9 plots in each row, making 9 columns of plots.

First Case: **1**

As a data file can contain more than one experiment, this question is necessary to the program. If you have more than one experimental design in a PLAN file, you must know the first and last case number of the design for which you want a map.

Number of Replications: **3**
Number of Treatments: **9**

5.5 VAR MAP

```
First plot number in each replication is:
Replication    1    Plot Number   101
Replication    2    Plot Number   201
Replication    3    Plot Number   301

Is This Correct ? Y/N
```

Instructions for entering information into the map program are given on screen as well as here in the manual.

```
Give the replication and plot number for each plot in the map starting
in the upper-left hand corner of the map.
Replications are entered as 1, 2, 3, etc.

If the plot numbers are successive within a row, only the
first and the last plot number have to be given, the
latter with a minus sign (e.g. 201, -209 to indicate all
plot numbers from 201 to 209, inclusive)

Filler plot numbers to the left or within a row are
entered as plot number 0 (zero). Filler plot numbers to
the right are automatically provided. Each row is
automatically terminated if all columns are entered, or
press <<ESC>> to end a row early (using filler plots to
the right).
```

You must have field layout information (such as the sample given at the beginning of this example) to continue. You can build any orientation into your map by keeping track of the corner plots in each range of plots and following the above displayed instructions.

The following prompts allow you to design the exact layout of your experimental field. You will define the field by rows. In this example, there are 3 rows of plots which must be defined (1 row of plots for each replication). When you define one row, the subprogram displays your design and asks: IS THIS CORRECT? Y/N. If the plot number order is incorrect, you may respond <N> and you will be prompted again for the row layout.

Row 1	rep ? 1	plot ? 101
Row 1	rep ? 1	plot ? -103
Row 1	rep ? 2	plot ? 201
Row 1	rep ? 2	plot ? -203
Row 1	rep ? 3	plot ? 301
Row 1	rep ? 3	plot ? -303

```
The data are :
Rep= 1 Plot= 101
Rep= 1 Plot= 102
Rep= 1 Plot= 103
Rep= 2 Plot= 201
Rep= 2 Plot= 202
Rep= 2 Plot= 203
Rep= 3 Plot= 301
Rep= 3 Plot= 302   Is this correct? (Y/N)
Rep= 3 Plot= 303
```

In this example, each row is actually a block of plots in each replication.

Continue defining this map as follows:

Row 2:	Rep 1	Plot 104	Plot -106
	Rep 2	Plot 204	Plot -206
	Rep 3	Plot 304	Plot -306
Row 3:	Rep 1	Plot 107	Plot -109
	Rep 2	Plot 207	Plot -209
	Rep 3	Plot 307	Plot -309

When all rows are defined, MAP displays the print/list menu of options. This allows you to display the map on the screen, print it or store it in a disk file.

5.5 VAR MAP

The following map would be created from this example:

B:VARTEST

LATTICE EXPERIMENT TO TEST VARLABEL & VARMAP

Rep 1	Rep 1	Rep 1	Rep 2	Rep 2	Rep 2	Rep 3	Rep 3	Rep 3
Plot 101	Plot 102	Plot 103	Plot 201	Plot 202	Plot 203	Plot 301	Plot 302	Plot 303
IN72 483C 1-3- 1-6	OH18 8	IN72 463C 1-3- 1-5	OASI S	IN65 25A1 -9-7	OH18 8	IN72 483C 1-3- 1-6	OASI S	CALD WELL

Rep 1	Rep 1	Rep 1	Rep 2	Rep 2	Rep 2	Rep 3	Rep 3	Rep 3
Plot 104	Plot 105	Plot 106	Plot 204	Plot 205	Plot 206	Plot 304	Plot 305	Plot 306
OASI S	TRUM BULL	KNOX 62	IN72 483C 1-3- 1-6	KNOX 62	AUBU RN	IN72 463C 1-3- 1-5	KNOX 62	IN65 25A1 -9-7

Rep 1	Rep 1	Rep 1	Rep 2	Rep 2	Rep 2	Rep 3	Rep 3	Rep 3
Plot 107	Plot 108	Plot 109	Plot 207	Plot 208	Plot 209	Plot 307	Plot 308	Plot 309
IN65 25A1 -9-7	AUBU RN	CALD WELL	TRUM BULL	CALD WELL	IN72 463C 1-3- 1-5	AUBU RN	TRUM BULL	OH18 8

5.5 VAR Book Template

5.5 Book Header Template for VAR Book

With the new template option, the user can edit the first four lines that will be printed at the top of each book page and the changes will be saved to a file that can be used whenever new books are created. Before entering the VAR Series Programs, .TPL files can be created in the ASCII Program.

Master template files have been included in the data directory for each type of books (VAR 1 page and Var 2 pages). To create a template file, follow these steps:

1. Select the ASCII Program from the Main MSTAT Menu.
2. Select the option to copy an ASCII File.
3. Copy the appropriate master template for the book to be created.
   a) **TPLVARP1** - VAR Book with one page format.
   b) **TPLVARP2** - VAR Book with two page format.

* When naming the new file, you must have a .TPL extension (ie. 2PGVAR.TPL or VAR2.TPL).
* The master template files can not be used in theVAR Book programs. They must be copied to another file with a TPL extension.
* Do Not Edit the master template files.

The following restrictions apply to the edited file:

1) The first portion of the initial line of the template file must NOT be edited. Any editing done on the first line must occur after the '*' mark. Any information entered on this line is for descriptive purposes and will not appear on the book when viewed or printed within the VAR Book Program. If any editing has been done on the first portion of this line, exit ASCII Edit and recopy the template as the VAR Book program will not recognize the tampered template file.

2) The second and third lines are for your comments and any information entered between the first character and the word "Plot" (on the 4th line) can be viewed and edited and will be printed if the print option is chosen.

3) The fourth line consists of both programmed text and individualized column headings. The first portion of the fourth line of the template file must NOT be edited. Any editing done on the fourth line must occur after the '*' mark. Each column heading can consist of

alphabetic or numeric characters. The portion of the fourth line that is printed is specific for the book type and there are programmed column starting and ending positions.

4) The fifth line is included in the template file to be used as a ruler for the other lines. Each column is indicated so that entered text can be aligned with each column.

5) Use the arrow keys to move around the file. Pressing the ENTER Key while editing will insert a blank line. These new lines must be deleted before saving the file. Press <F5> while the cursor is in the blank line and the blank line will be removed.

After the new template file is completed, the file can be used in the VAR Book program. There is no method where by the VAR Series can identify a .TPL file as being specifically edited for the particular series so it is recommended that the .TPL file name be indicative of the type of book header to be replaced (ie. 2PGVAR.TPL or VAR2.TPL).

To use the template file, enter the Var Book program and respond to the prompts.

```
VARBOOK Input Panel
Case Range: 1 - 27
Plots per Page:          30
Book Format:             1 Page
Standard Header:         Y/N
```

```
File:
```

Press <F1> and a list of .TPL files will appear on the screen. Highlight the file that contains the header to be used and press <ENTER>. The book will be created and you will be able to view, edit, print or save the book.

6.0 PLANT BREEDING PROGRAM

The BR programs are used for managing information in a plant breeding program. The LIST program generates a new file of plant breeding information, either by using an existing breeding file or by defining the variables for a new file. The BOOK program prints books and the LABEL program prints labels from the plant breeding file.

The variables defined and used by the BR Series of programs are:

Var No	Variable Type		Variable Description
1	TEXT	8 characters	Last years experiment designation
2	NUMERIC		Last years plot number
3	NUMERIC		Number of plots to be planted
4	NUMERIC		Lowest plot number (given by BOOK)
5	NUMERIC		Highest plot number (given by BOOK)
6	TEXT	7 characters	Cross number
7	NUMERIC		Generation
8	TEXT	36 characters	Parents
9	TEXT	6 characters	Code - character index

Of the variables listed, values for variable no.s 3, 6 and 8 are essential to using the BR series of programs. The variables are described below.

Variable no. 1 - Last years experiment designation. When you use LIST to generate a new breeding file from an existing file, LIST asks you for the name of the existing breeding file; this file name is entered in this variable.

Variable no. 2 - Last years plot number. When you use LIST to generate a new breeding file, it uses the plot number from the existing breeding file as this variable value. Last year's plot number may represent a parental variety, a pot in a greenhouse, a population, a headrow, a preliminary yield trial plot or a seed multiplication plot. 5 character plot numbers can range from 1 to 32765.

Variable no. 3 - Number of plots to be planted. This is the number of selections harvested which are to be planted in the next generation.

Variable no. 4 - Lowest Plot Number. This number is assigned by the BOOK program.

Variable no. 5 - Highest Plot Number. This number is assigned by the BOOK program.

6.0 BR SERIES

Variable no. 6 - Cross Number. The cross number may consist of a letter indicating the genus (e.g., T=Triticum, H=Hordeum, A=Avena), two digits for the year the cross was made and a 4-digit consecutive number.

Variable no. 7 - Generation. This is a generation number.

Variable no. 8 - Parents. It is recommended that the parentage be given by the method described by Purdy (the book is referenced in Appendix H). In this method a single slash / designates the first cross and a double slash // designates the second cross. For later crosses, two slashes with a number in-between is used. As an example, single crosses were made between cultivars Morex and Robust, and between Glenn and Larker. Descendants from these two crosses were put into a double cross, and a line from this double cross was finally crossed to the cultivar Bowers. The final pedigree is written as Morex/Robust//Glen/Larker/3/Bowers. A backcross is written as A/4*B, which means that the cultivar A was crossed to cultivar B and the progeny was backcrossed to B four times.

Variable no. 9 - Code (character index). A 6-digit character code may be given for each cross indicating major characters in the parents. This code can be used for other identification purposes later in the breeding program.

From the Initial MSTAT menu, highlight BRSERIES and press <ENTER>.

If you do not already have a plant breeding file, you will need to enter some of the above information in a file. Highlight FILES from the BRSeries menu and press <ENTER>. When the FILES menu is displayed, press <ENTER> when `for Writing` is highlighted. Enter a file name and define the file width as 80 characters. You may then use LIST to define the nine variables before using SEDIT to enter variable values.

```
BRseries
File options
Files  1List  Book  2Label  Quit
```

```
Open a (new or old) MSTAT data file
for Writing  Path  Quit
```

6.1 LIST

Purpose: Generates a breeding file.

Before starting, you need/should know:

1. Newly created data file with a file width of at least 80 characters. Enter BRSERIES then highlight FILES and create the file.
2. Last season's file name(s) and the number of plots to be planted from last season's plots.
3. If you have new material, information on contents of variable no.s 1, 2, 3, 6, 7, 8 and 9 is given in page 8-1. Variable no.s 3, 6 and 8 are essential.

Results: If a new breeding file is generated from an existing breeding file then a breeding file is created which includes new information and/or information from a previous year. For new breeding files not generated from existing files, the file variables are defined and data can be entered for number of plots, cross number, generation number, parents and code.

Sample Data File: 85HT01. To create this file, select FILES from the BRSERIES menu. When the FILES menu is displayed, press <ENTER> to open or create an MSTAT data file. Enter 85HT01 as the file name and define the file width as 80 characters. The example will also use the file 84HT01 as last year's experiment file.

The breeding file has nine variables, including parentage, generation, character index, cross number, number of plots to be planted, and plot numbers.

LIST asks if you are using data from a previous year's list and then asks for that file's name. LIST also asks for the number of plots, the lowest and highest plot numbers, and the number of selections you will use from the previous experiment data file.

If not using an existing data file list of previous years, LIST defines the variables then the user will record information on the new breeding material (number of plots, cross number, generation number, parents and code).

6.1 BR LIST

LIST Example

The following is an example of creating a breeding file.

```
BRLIST Input Panel
Prev yr file:
(leave blank and press <F10> if no previous year file)

Lowest Plot Number : 0
Highest Plot Number: 0
Check Variety Cycle: 0
```

When the above screen is shown, press <F10> if you only have new material. LIST will define the file variables and then display the following screen. To enter new breeding information, fill in values for number of plots to be planted, the cross number to assign, the generation number, the parents and the code associated with the variety. To retain the same information from case to case for parents and code, press <F10> to present the next case for data entry. When all the breeding information has been entered, press <ESC>. Print out your data using BOOK.

```
      No of    Cross    Gen.                          Code
Case  plots    Number   No.   Parents                 _____
   1    0                 1
```

If you are using a file from a previous year, enter the name of the file in the highlighted area and press <ENTER>. Using a hard copy of the previous year data file and referring to variables 4 and 5, enter the plot number of the lowest plot from the previous year file to include in the current year breeding file then press <ENTER>. If, in the previous year, a check plot was planted, the user will have to start with a plot number for a check as the lowest plot number so that the internal counting of plots to be presented for selection will be accurate. This plot number will not be in the data file but the gaps in plot numbers recorded in variables 4 and 5 of the previous year data file will indicate the check variety cycle pattern.

Enter the highest plot number from the previous year to include in the current year breeding file and press <ENTER>. Enter the value for the check variety cycle of the previous year. The same check variety cycle will be used for the current (new) file.

```
BRLIST Input Panel

Prev yr file: 84HT01
Lowest Plot Number : 101
Highest Plot Number: 110
Check Variety Cycle: 5
```

Note: In the previous year file, variables 4 and 5 define the range of plots planted into a specific variety. If a check variety was included, it was not listed in the data file and the plot number assigned in the field was not included in the data file. In this example, a Check Variety Cycle of 5 was used. Plots 101 and 106 were check plots and not entered into the book for that data file. The user will have to note the check variety frequency as this value is not recorded in the BR Series data files.

The sample data file from a previous year (84HT01) is listed below:

```
CASE   1  2 3   4    5        6    7                              8          9
NO.
 ------------------------------------------------------------------------------
1 83GH01  4 2 102  103  T830001   01   FRANKENMUTH/AUGUSTA            PMHFLR
2 83GH01  6 2 104  105  T830002   01   CALDWELL/AUGUSTA/HOUSER          LRPM
3 83GH01  2 2 107  108  T830003   01   YORKSTAR//REDCOAT/3/AUGUSTA      PMLR
4 83GH01  3 2 109  110  T830004   01   FRANKENMUTH/SCOTT                LGLR
```

The user is prompted for the number of plots to be planted in the current season from each plot (seed source) in the previous year.

```
BRLIST
Number of Selections from 84HT01 Plot 102:0
Number of Selections from 84HT01 Plot 103:1
Number of Selections from 84HT01 Plot 104:3
```

If you do not want to plant any selections from plot 102, press <ENTER> or enter the value zero and press <ENTER>. If you do want to plant rows in the next season from plot 102, enter the number of selections and press <ENTER>. Either enter a number or press <ENTER> for rows 103 through 110.

The example below shows a printout in which 1 selection was made for plot 103, 3 for 104, 3 for 107, and 1 for 109. There are no plot numbers in variable no.s 4 or 5 as these are assigned in the BOOK program. As you

see, variable no. 7 (generation) has been increased from 1 (in the 84HT01 file) to 2.

```
Date file    85HT01
Title: 1985 WHEAT HEADROWS TUSCOLA CO
CASE
 NO.      1     2    3  4  5       6   7                                  8       9
-------------------------------------------------------------------------------------
   1  84HT01   103    1        T830001   2 FRANKENMUTH/AUGUSTA                PMHFLR
   2  84HT01   104    3        T830002   2 CALDWELL/AUGUSTA/HOUSER              LRPM
   3  84HT01   107    3        T830003   2 YORKSTAR//REDCOAT/3/AUGUSTA          PMLR
   4  84HT01   109    1        T830004   2 FRANKENMUTH/SCOTT                    LGLR
```

6.2 BOOK

Purpose: Prints field breeding books from files produced by LIST.

Before starting, you need/should know:

1. An active data file; this is a file produced by LIST in which you have defined the number of plots to be planted (variable no. 3).
2. A printer loaded with paper and on line.

Results: Creates a field book from the breeding file created using LIST. Depending on which option you select from the print/list menu, the book may be viewed, printed or stored as a disk file.

Sample Data File: 84HT01

Each field book contains both the current and last year's experiment designations and plot numbers. This makes it easy to retrace the history of a line or a population. BOOK assigns plot numbers when it prints the field book.

BOOK Example

Highlight BOOK on the BR Series Menu and press <ENTER>. Fill in the highlighted boxes by moving through the fields with the arrow keys and entering information requested. The Book Format field has three options which can be changed or toggled by pressing the spacebar when the cursor is in that field.

The initial screen is reproduced below:

```
BRBOOK Input Panel
Lowest Plot Number:101   Plots per Page:  28
Check Variety Cycle:0        Book Format :        80 Col 1-pg
Check Variety Name:      Horiz Blank Lines:   Y/N
```

Lowest Plot Number: Enter the starting plot number desired in the current experiment. If the user uses a check variety, the first plot will contain the check variety.

6.2 BR BOOK

Check Variety Cycle: To insert a check variety in a set pattern, enter the frequency of check plot planting. If 5 is entered, every fifth plot will be assigned the check variety. (101, 106, 111, 116, etc.)

Check Variety Name: Enter the name of the check variety. That name will be printed in the book for each check plot. The variety name can contain up to 14 characters.

Plots per Page: To group the plots more effectively, the user can assign up to 28 plots per page if there is one blank horizontal line between each printed plot or there can be 56 plots printed on a page if there are no blank horizontal lines between each plot.

Book Format: There are three formats available for the BR Series books. When the book format field is highlighted, the user can toggle the book format selection by pressing the spacebar.

1. 80 Col 1-pg This book is useful in the early generations of developing a variety. The information included in the book will help the researcher observe the passage of traits from each generation forward. There is not an established area in this book for recording plot data.

2. 80 Col 2-pg This book contains the same information as the 80 column one page book but an additional page is printed which lists plot numbers and spaces for recording plot data. This book can be placed in a notebook as facing pages.

3. 132 Col 1-pg This book contains the plot information as well as spaces for recording plot data. The book is printed at 17 characters per inch (compressed).

Horiz Blank Lines: Y/N To insert blank lines between each plot listed on the book, press <ENTER> when the cursor is in the highlighted area. If more plots per page are desired, press <N> and then press <ENTER> to eliminate the blank horizontal lines between the plots.

```
BRBOOK Input Panel
Lowest Plot Number:101          Plots per Page:  28
Check Variety Cycle:5           Book Format:  80 Col 1-pg
Check Variety Name: SCOTT       Horiz Blank Lines Y/N
```

After all the choices have been entered in the highlighted areas, press <ENTER> to continue.

The print/list menu of options is presented. You may view the breeding book on your screen, print it or store it in a disk file.

The 80 Column one page breeding book with horizontal blank lines and a check variety every five plots will look similar to the sample shown below.

```
   Exp.Number   84HT01    1984 WHEAT HEADROWS AT EAST LANSING
 Seed Source  Cross Gen Parent Lines                          Code Plot No
-------------------------------------------------------------------------

       Check variety =  FRANKENMUTH                          ******** 101

83GH01     4 T830001  F1 FRANKENMUTH/AUGUSTA                  PMHPLR 102

83GH01     4                                                         103


83GH01     6 T830002  F1 CALDWELL/AUGUSTA//HOUSER             LRPM   104

83GH01     6                                                         105


       Check variety =  FRANKENMUTH                          ******** 106

83GH01     2 T830003  F1 YORKSTAR/GENESEE//REDCOAT/3/AUGUSTA PMLR   107

83GH01     2                                                         108


83GH01     3 T830004  F1 FRANKENMUTH/SCOTT                    LGLR   109

83GH01     3                                                         110
```

6.3 BR LABEL

6.3 LABEL

Purpose: Prints labels from a breeding file produced by LIST.

Before starting, you need/should have:

1. An active data file; this is the Breeding file produced by LIST.
2. Breeding book produced by BOOK.
3. Printer loaded with labels or paper and on line.

Results: Creates and updates labels for breeding files created by LIST.

Sample Data File: 84HT01.

The labels will include current file name, plot number to be planted or harvested, previous year data file name, plot number of the seed from the previous year data file, generation of the current file, and parentage. You may find it useful to use the SORT program to reorganize your LIST file before using LABEL.

If labels are unavailable, you can print the labels on normal printer paper and cut them out with a paper cutter. Since the paper for labels and printer paper is not as durable as tag paper, we suggest coating the paper with paraffin. If the experimental area is infested with rats or mice, mix a deterrent with the paraffin to discourage these pests.

LABEL Example

The following is an example of printing labels from a breeding file. The initial screen presented is:

```
BRLABEL
Labels Across Page : 1
Lowest Plot Number : 101
Check Variety Cycle: 0
Check Variety Name:
```

`Labels Across Page:` enter the number of labels across the page of your label stock. The program will print up to 5 labels wide of 3 1/2 by 15/16ths inches.

`Lowest Plot Number:` enter the lowest plot number in the data file

including any check plot.

`Check Variety Cycle:` If check plots were established in the BOOK program for this breeding file, enter the check variety cycle.

`Check Variety Name:` If checks were included, type in the name of the check variety.

```
Specify the plot numbers to be used
List:
```

If all of the labels for a plot are to be printed, type an * to indicate all items. If only certain plot labels are needed at this time, enter a list of the plot numbers to print. For example, if 101, 103-105 are entered in the highlighted area following List, only plots 101, 103, 104 and 105 will be printed.

For this example, the following information was typed into the highlighted area.

```
BRLABEL
Labels Across Page : 2
Lowest Plot Number : 101
Check Variety Cycle: 5
Check Variety Name: FRANKENMUTH
List :101, 102, 104-105 <ENTER>
```

An alignment pattern is sent to the printer. Look at the labels printed and decide if the paper needs to be shifted or moved to better center the labels. Move the paper and press <N>. The program will print the test labels again. Once the printed label is correctly aligned., press <Y> for the chosen labels to be printed.

```
Test of label alignment

START**********LINE 1**********END  START**********LINE 1**********END
*                                 *  *                                 *
*          LABEL TEST             *  *          LABEL TEST             *
*                                 *  *                                 *
START**********LINE 5**********END  START**********LINE 5**********END
```

6.3 BR LABEL

```
Check the alignment of the labels.
Label Alignment
Please check Label Alignment:
Enter YES to go ahead and print the labels.
Enter NO for another alignment test.
Press <ESC> to abort printing labels: Y/N
```

```
**********************************
* 85HT01                  101    *
*                                *
* FRANKENMUTH     Check variety  *
*          **********            *
**********************************
```

```
**********************************
* 85HT01                  102    *
*                                *
* 84HT01    103           F1     *
* FRANKENMUTH/AUGUSTA            *
**********************************
```

```
**********************************
* 85HT01                  104    *
*                                *
*84HT01              104   F1     *
* CALDWELL/AUGUSTA//HOUSER       *
**********************************
```

```
**********************************
* 85HT01                  105    *
*                                *
* 84HT01    104           F1     *
*CALDWELL/AUGUSTA//HOUSER        *
**********************************
```