

**RRSTAT v1.05**  
Analysis of Experimental Designs

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# RRSTAT Version 1.05

## REFERENCE DOCUMENT

Topics:

- 1 Introduction
- 2 Getting Started
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*Disclaimer:*

*The software detailed herein has not been tested well under graphical user interface (GUI) environments including Windows. Though no apparent problems have been detected in normal use, in the event of occurrence of any such problems, the author or the institute shall not be responsible for any loss that may occur to the user. The software has not been updated since the issue of the current version, and the user may not communicate with the author regarding its upgradation.*

# Introduction

RRSTAT v 1.00 is a stand alone software designed exclusively for those who are involved in data analysis in agricultural experimentation. Eventhough packages for agricultural data analysis are available, many of them are not freely available or are quite complex in learning and require elaborate system specifications. RRSTAT v 1.00 is designed, on the other hand, taking into consideration of all those who does not have any experience in computer use. The software can virtually run on all IBM-compatible machines with minimum specifications.

The name RRSTAT was designed combining RRST (commonly used abbreviation for Regional Research Station, Tripura of Rubber Research Institute of India) and STAT for statistical package. The package in the present form, however, is not a complete solution in the data analysis in agricultural experimentation. The modules are designed and added in such a way that improvement can be made at any time and to any extent.

The major missing component in the data analysis in the present system is that no provision for testing the significance of the results is given. However, this is not a serious limitation since it can be done manually without much effort. This routines will be added later.

The incorporation of graphical presentation of the data especially in the correlation analysis also will be added later.

## ABOUT THIS MANUAL

This manual is made in simple language and provides orientation to all features of RRSTAT. It is advised that users may take hands on training with a computer and teach themselves the ease of handling the data in RRSTAT. They can use this manual as a guide to understand the organisation of the software. There are important notes provided at different positions in this manual where ever it is found essential. The notes are identified by the symbol

In certain places warning messages are also provided where care should be taken while program execution.

Useful tips are also given.

Wherever screen messages are necessary such messages are provided.

## SYSTEM REQUIREMENTS

Main Processor : 80286 or higher  
Co-processor : not required/optional  
Base memory : 640 KB  
Operating System : DOS 3.3 or higher

RRSTAT v 1.05 can be run either from hard disk or from a floppy disk, preferably from hard disk. The software has four important files.

RRST.EXE - The driver program  
RRSTMAIN.OVL - The master overlay file which calls and executes other modules.  
RRST1.OVL - Overlay file controlling data management.  
RRST2.OVL - Overlay file controlling data analysis.  
UNINSTALL.EXE - Uninstalls the program and directory

All these files run together while the user is navigating through the program menus. Except for the driver program, no overlay file remain in memory all the time while RRSTAT is active. They are accessed from time to time whereby freeing the conventional memory for other operations. Thus it is very important that all these files should be kept together in the same working directory.

Besides these, a file named RRST.CNF is also essential in running RRSTAT. This configuration file contains the user defined input/output (I/O) parameters which specifies the master program where to look for the data files and where to write the result files. This file is always created and modified by the master program.

Two more files, namely INSTALL.BAT and RRST.DOC are also is incorporated in the RRSTAT program disk. INSTALL.BAT contains the routines for harddisk installation of the software from drive A.

For installing the software in drive C:

- \* Insert the RRSTAT disk into drive A:
- \* At the C:\> prompt type A: and press ENTER
- \* A:\> prompt appears
- \* At the A:\> prompt type INSTALL and press ENTER
- \* RRSTAT will be automatically installed in drive C: in a directory called C:\RRST.
- \* A message appears confirming successful installation.

If an error message is flashed while installation probably you may be having some missing files in your disk.

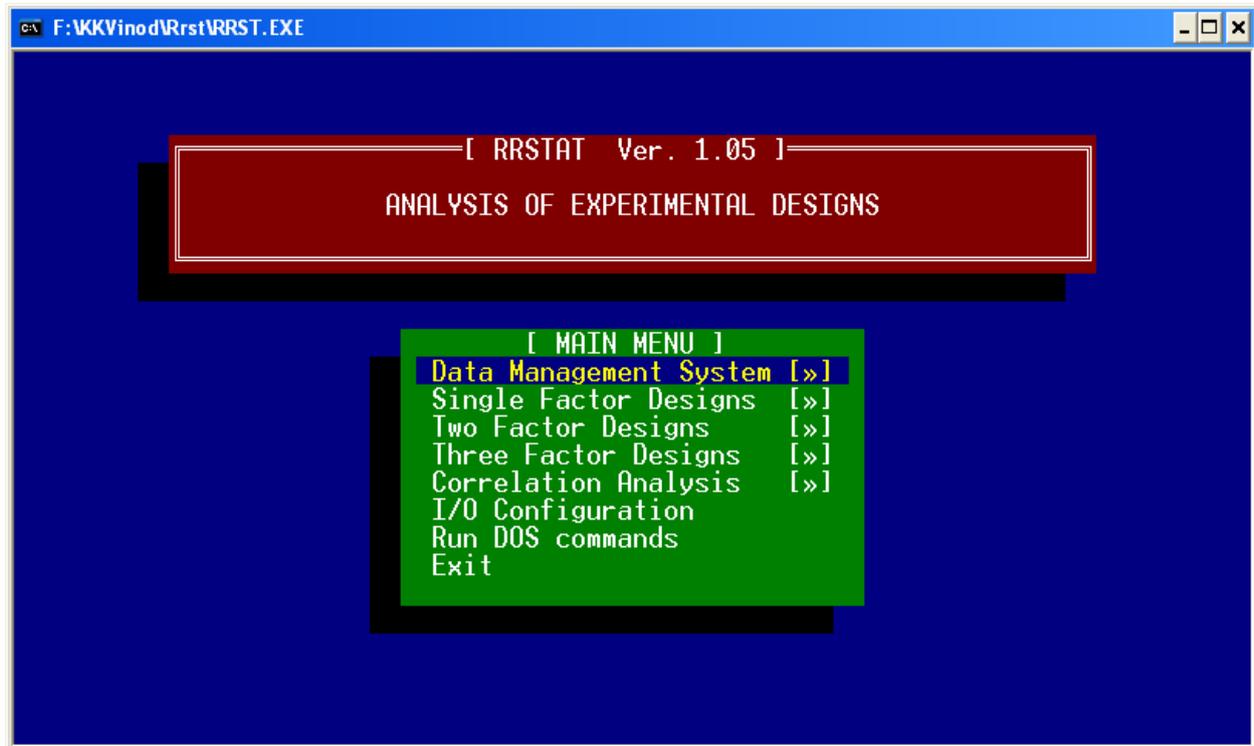
The file RRST.DOC contains the information you are currently reading. To make a hard copy, type PRINT C:\RRST\RRST.DOC and press ENTER. This document will be printed.

After installation,

- type CD RRST at C:\> prompt and press ENTER.
- Type RRST followed by ENTER
- The screen opens with RRSTAT opening messages.

# Getting Started

The opening screen of the RRSTAT displays the MAIN MENU after a moment. The MAIN MENU contains following options:



The highlight bar always remains on the top most option of the menu when started. Selections can be made by navigating the highlight bar through the choices using arrow keys. To select an item highlight it and press ENTER.

The [>>] sign at the right of a choice indicate that a submenu exist for that item. In such cases the selections can be made from the submenus.

### The I/O configuration

As mentioned in the previous topic the input / output parameters are stored in the file called RRST.CNF. While initialising, the program searches for this file in the working directory and if not found gives a warning message. Please refer to the topic **Trouble shooting** for details.

The RRST.CNF contains the information which tells the individual modules where to look for the data and where to write the results. This configuration is always user defined. To make your options highlight the I/O configuration and press ENTER.

The configuration screen appears displaying the current configuration. To make changes type YES or simply Y and press ENTER. The configuration screen prompts you to make changes. Carefully read the syntax and make entries. Otherwise an error may result displaying the warning message.

Syntax for the individual prompts are given below:

For specifying the disk drive(s) in which the data exchange is done just enter the letter specifying the drive and press ENTER. For example, to specify drive A: type in A and press ENTER. For specifying the data path (means the directory or subdirectory in which the actual data files are kept) type in the [Directoryname]\[subdirectoryname]\ and press ENTER. The backslash separators (\) are very important and do not forget to add them in the specified place as given in the syntax.

Following the syntax provided, enter the current working directory of RRSTAT where all the program files are actually kept. Generally, it is the directory called C:\RRST. If the program has already identified the working directory (displayed in the I/O configuration window) it is not necessary to add the working directory every time you make changes for the other parameters. Simply press ENTER to this argument.

The [name] option given in the syntax means any content provided inside the square brackets is user defined and in practice no [] is to be typed in when option is entered. However, the content outside the square brackets are essential.

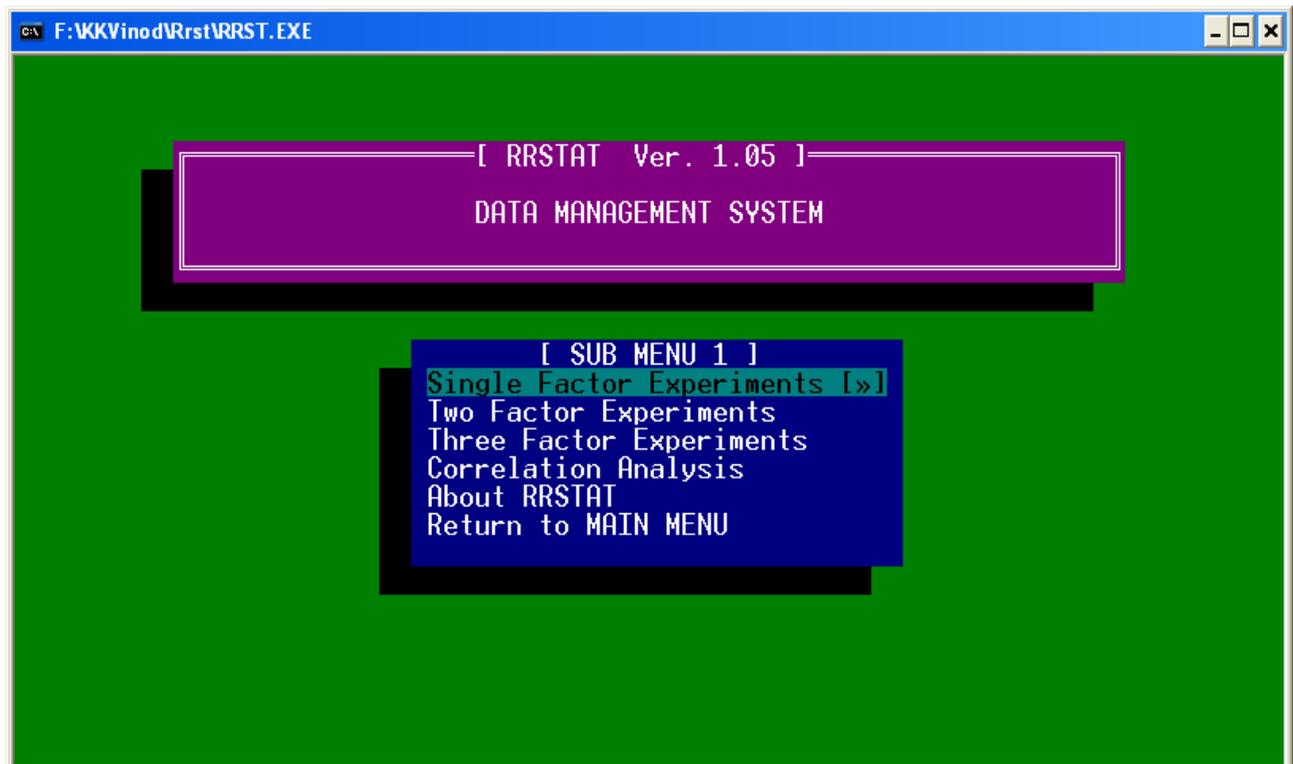
After making the entries, choose the option Save current configuration by pressing ENTER key. The new configuration will be stored in the file RRST.CNF.

# Data Management System

There are many ways to create a data file for RRSTAT. All RRSTAT data files and result files are written in ASCII format and hence you can use any ASCII editor to create or modify a file created by RRSTAT. However, RRSTAT requires parameter variables and names in addition to the actual data for computations using individual program modules. This file format is different for different modules. To avoid confusion in understanding the data file format of RRSTAT, a userfriendly routine provided with RRSTAT will help you to create the data file with ease for all programs included in the RRSTAT system. This is called the Data Management System.

To start with the Data Management System highlight it from the MAIN MENU and press ENTER.

The submenu opens with following options:

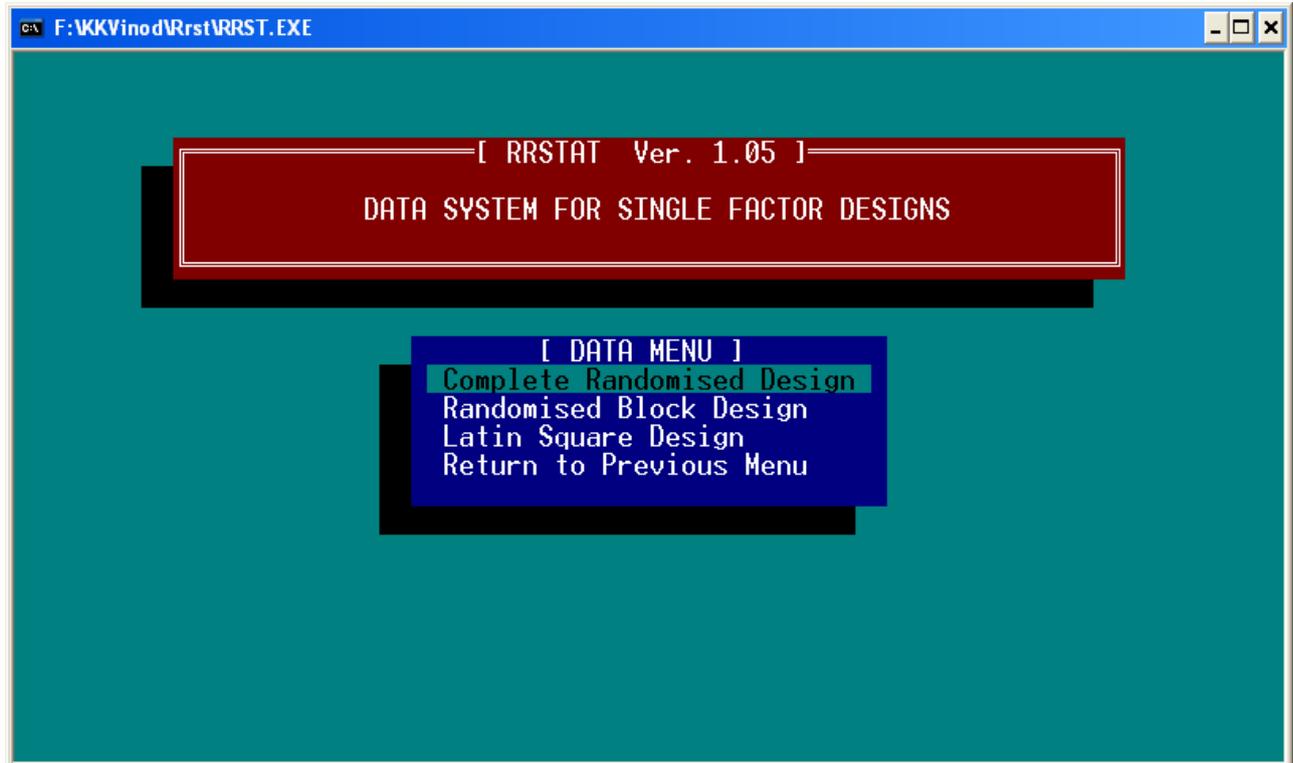


Use arrow keys to highlight an item and press ENTER to select it.

## Single Factor Designs

This option helps to create data files for all the single factor experiments incorporated in RRSTAT. The designs are Complete Randomized Design, Randomized Block Design and Latin Square Design.

The opening screen gives a message confirming the utility of this option.



Follow the instructions on the screen to create the data file. The program will prompt you to provide the levels of treatments and replications and data. Always press ENTER key to register an entry.

RRSTAT does not have the provision to correct the entered data while data inputting if the ENTER key is pressed after a wrong data. In such cases proceed with the data entry and do the necessary corrections at the Check Data option. The data file will be created only after crossing the correct data option.

After data entry is completed a Check Data option will flash. Press Yes to list the data. The data is always listed in rows and columns. Rows are always replications and columns are treatments. And if any correction is to be done proceed with the correction routines by providing the number of treatment and corresponding replication where the data is to be corrected.

After all the corrections are finished provide a file name to store the data.

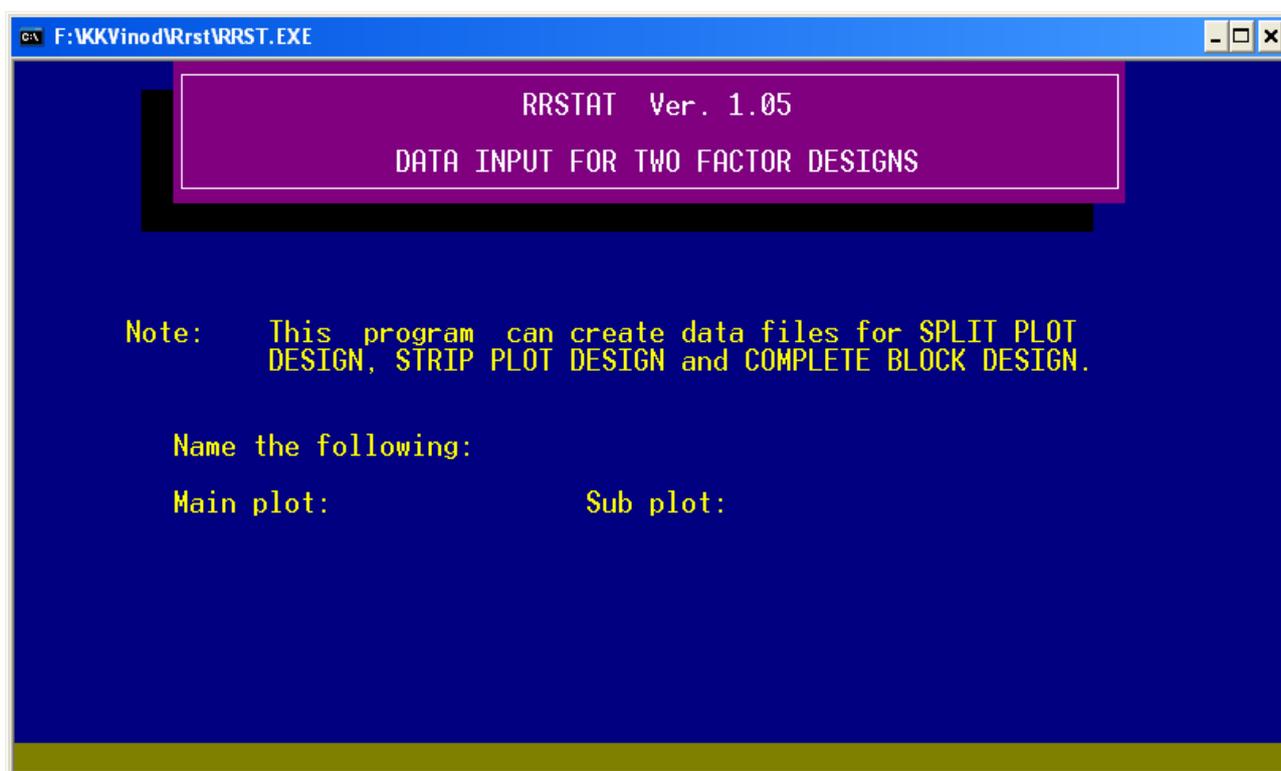
Use only a valid DOS filename (with maximum eight character name and three character extension). Invalid filenames can cause **File Access Errors**. In such cases all the data entered are normally lost. For more information about the valid DOS filenames consult your DOS manual.

The data will be stored in the data input directory you have provided in the I/O configuration. After completion of file creation a confirmation message is flashed. To continue or to go back to the MAIN MENU press any key.

Latin Square Design also follow the similar procedure as that of the above. The difference is that along with the row and column data the program will prompt you to specify the corresponding treatment number.

## Two Factor Designs

To open this choice highlight it using arrow keys from the SUB MENU 1 and press ENTER. This routine helps you to create data files for Complete Block Design, Split Plot Design and Strip Plot Design.



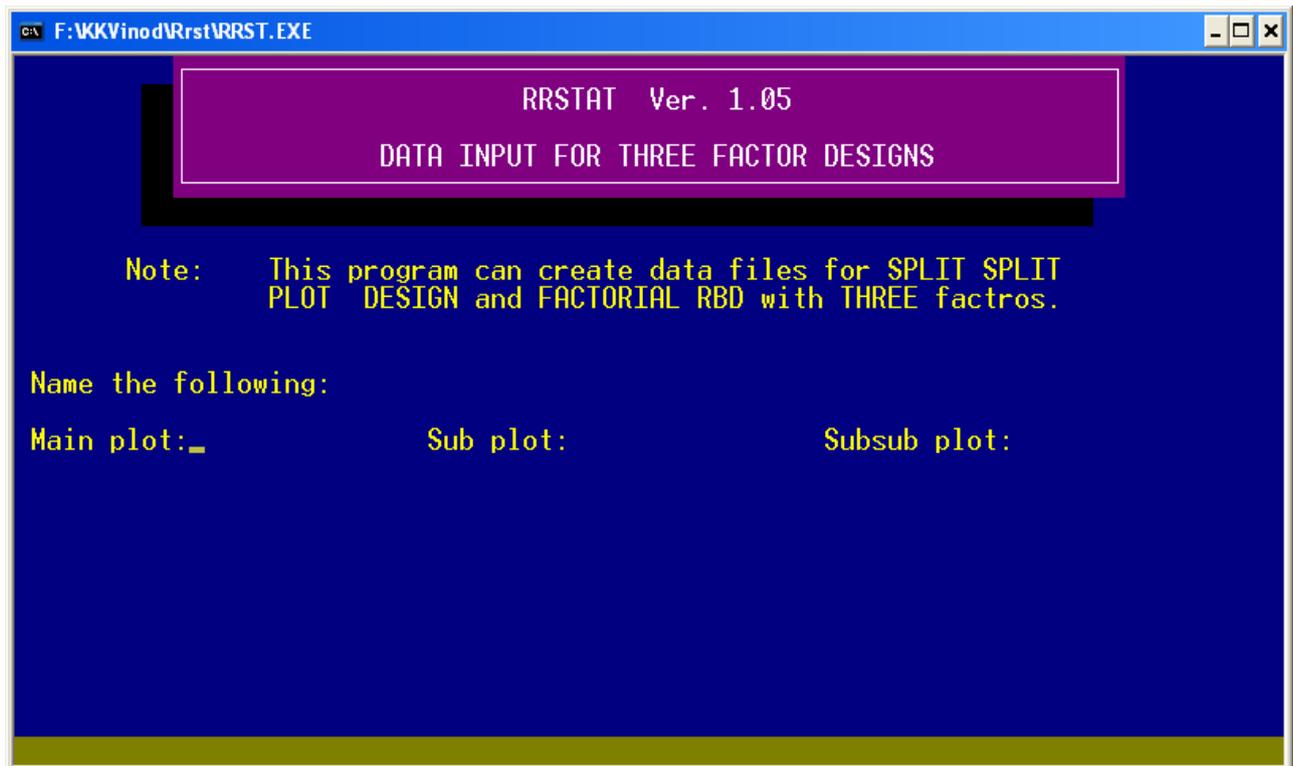
This module also works similar to the previous one, but provides the opportunity to name your Main factor and Sub factor. These names are printed in the ANOVA table of the result file. Provide only brief names, for instance, upto ten characters long for convenience.

If you do not enter any name for the main and sub factors the corresponding columns in the ANOVA table will be printed blank.

The further entries are prompted one after the other. After completion the Check Data option will help you to make any corrections in the input data. Specify the filename at the corresponding prompt to store the data.

### Three Factor Designs:

To choose this item highlight it and press ENTER.

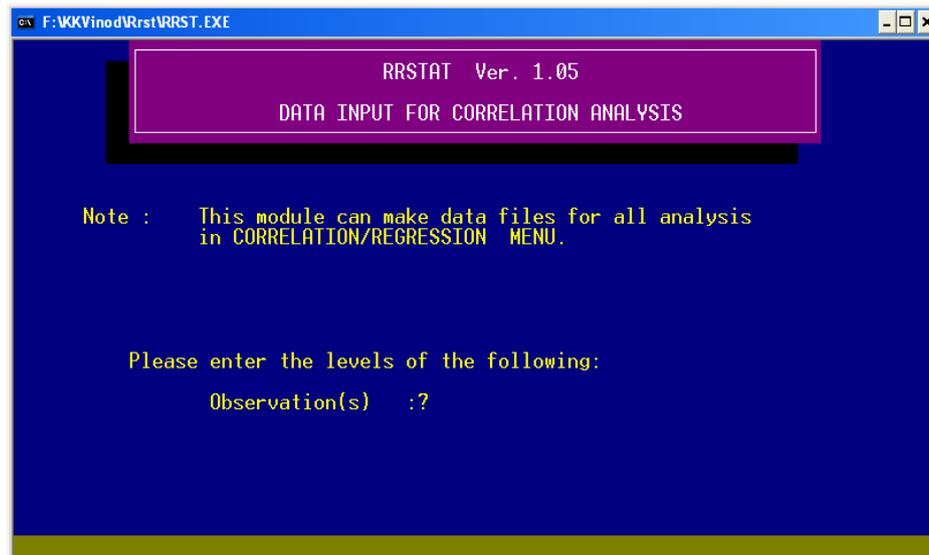


This routine will help you to create data files for Factorial RBD with three factors and Split Split Plot Design. Here also option of naming the Main factor, Sub factor and Sub sub factor is provided. Enter brief names (upto ten characters) and proceed as in the case of other modules. After completion make any correction with the Check Data option and create the data file.

### Correlation Analysis

To choose this option highlight it and press ENTER.

This module help you to create data files for all analysis included in the Correlation Analysis option. The rows represent the variables and the columns represent the number of data items (observations). This common format is valid for all the analyses.

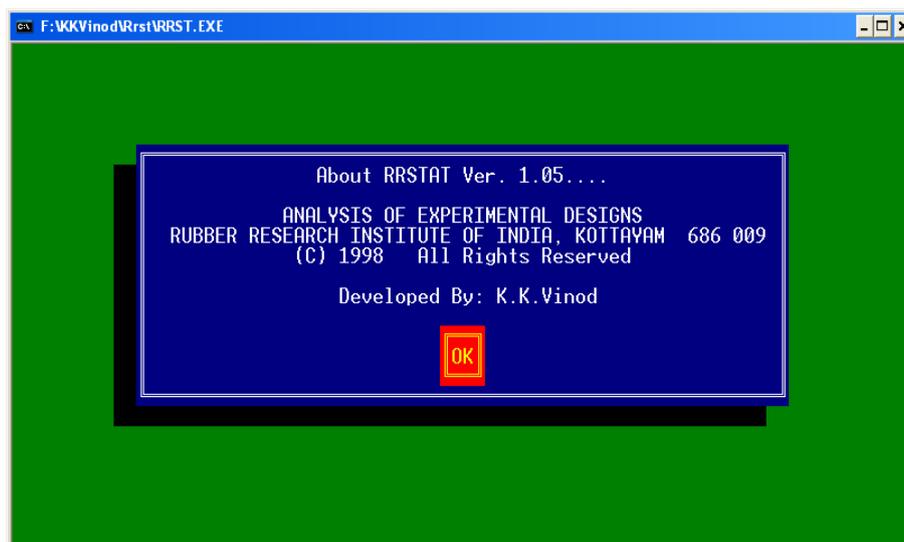


The common data format in the correlation analysis is the most convenient format that could be used by all the programs. There may be certain instances where you may not be able to do multitasking with the same data file due to format problem. In such instances create a new data file for the specific tasks. This can be easily made by any ASCII editor or you can use the Data Management System to key in the data.

After the data entry make any corrections using the Check Data option and store the data in file.

## About RRSTAT

About RRSTAT tells you about the details about its origin and the copyright particulars. The last option Return to MAIN MENU takes you one step back. This can also be achieved by pressing ESC key. The window contains the following:



# Program Execution

Program execution in RRSTAT is very simple. For this select the analysis you want to do from MAIN MENU. The MAIN MENU contains broad categories of choices in which the individual programs are available as submenu items. Navigate through the menus using arrows keys and ENTER key to select the item of your choice and continue. To go back either you can use the option Return to Menu or press ESC key. Every press of ESC key take you one step backwards.

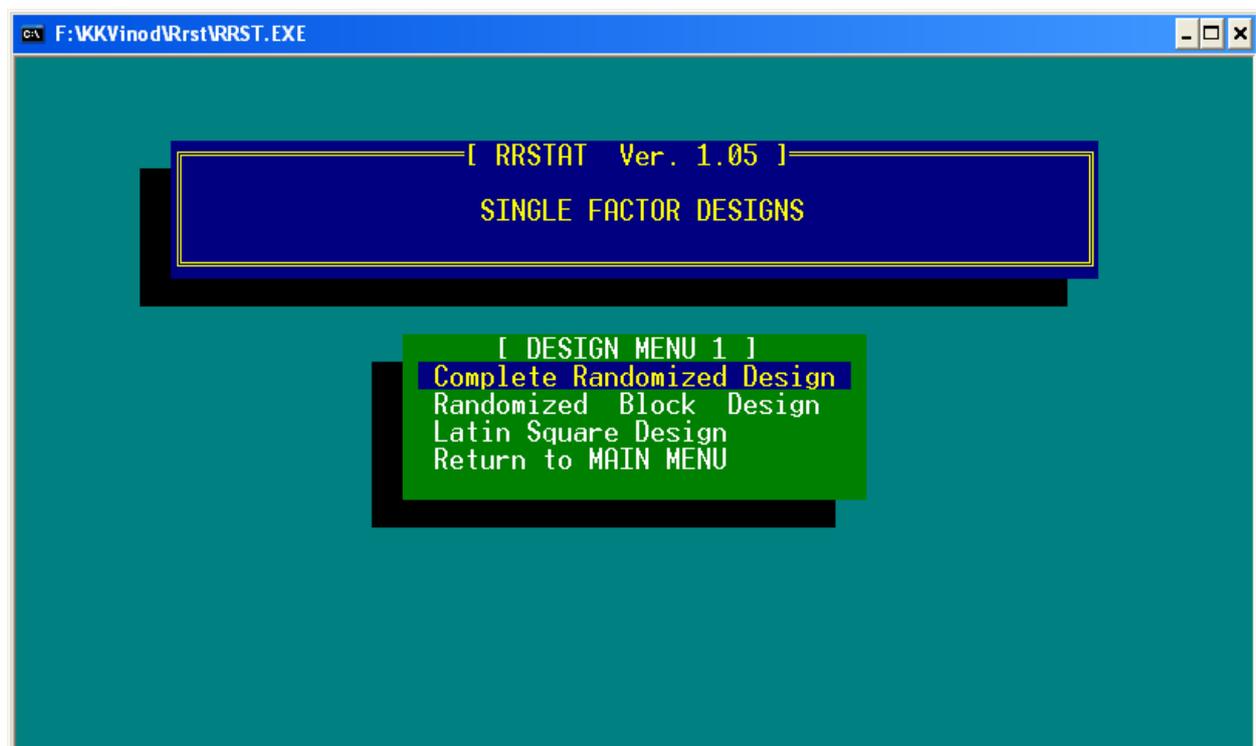
While on execution individual program will prompt for two information, input file name and output file name. Input file name is the name of the data file you have created and output file name is the name of the result file to be created after data processing.

Use only a valid DOS file name ( with maximum eight characters name and three characters extension).

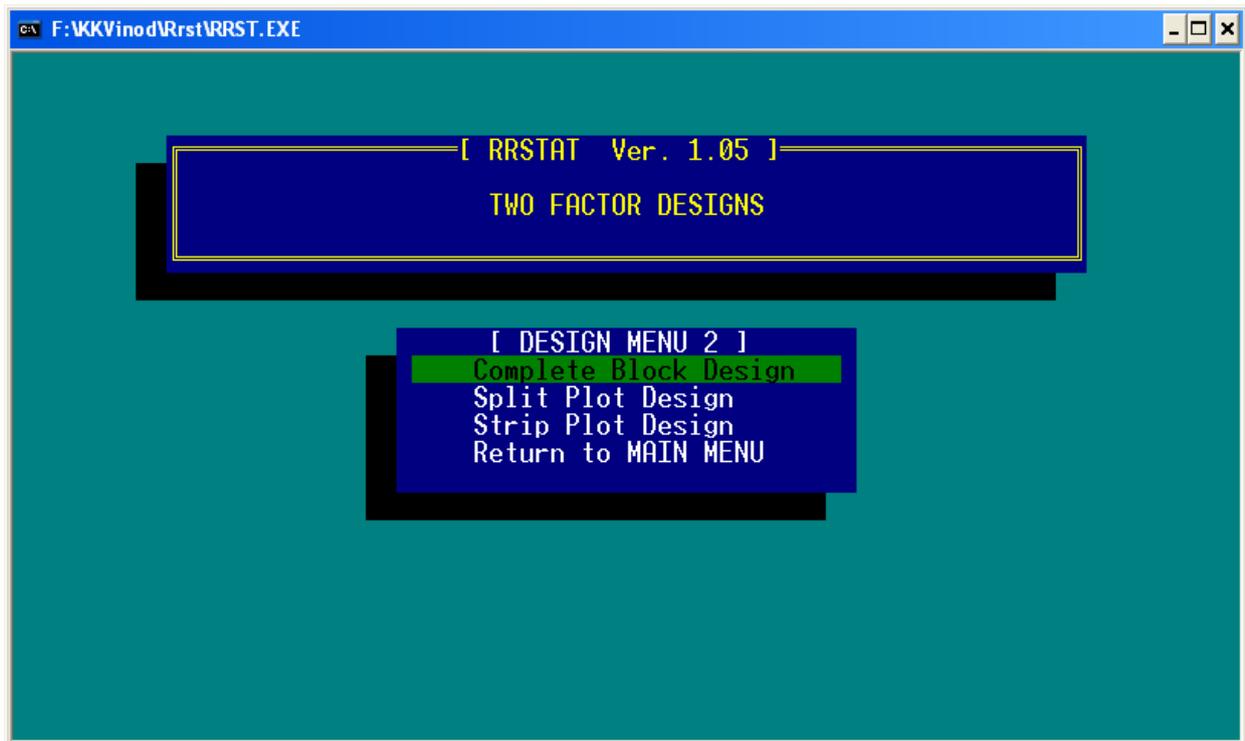
Invalid file names can cause File Access Errors. For more information about the valid DOS file names consult your DOS manual.

The submenus for the program options included in the MAIN MENU are given below:

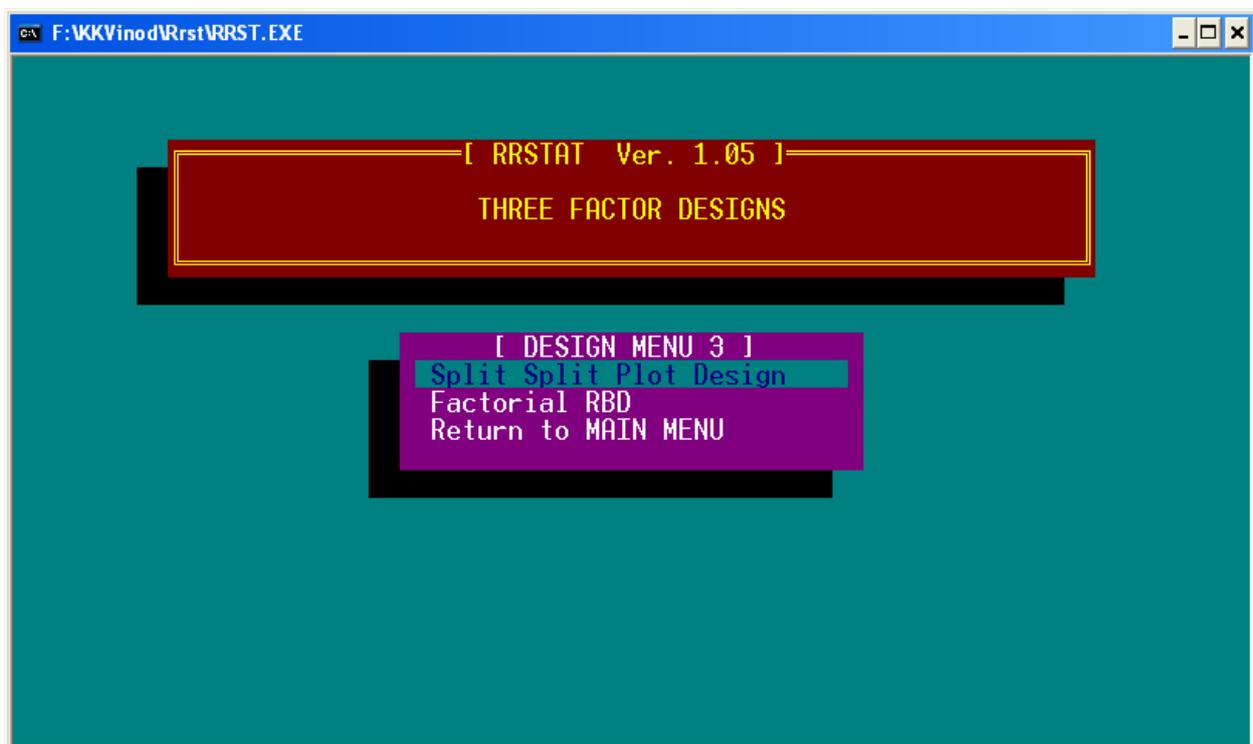
## *Single Factor Designs*



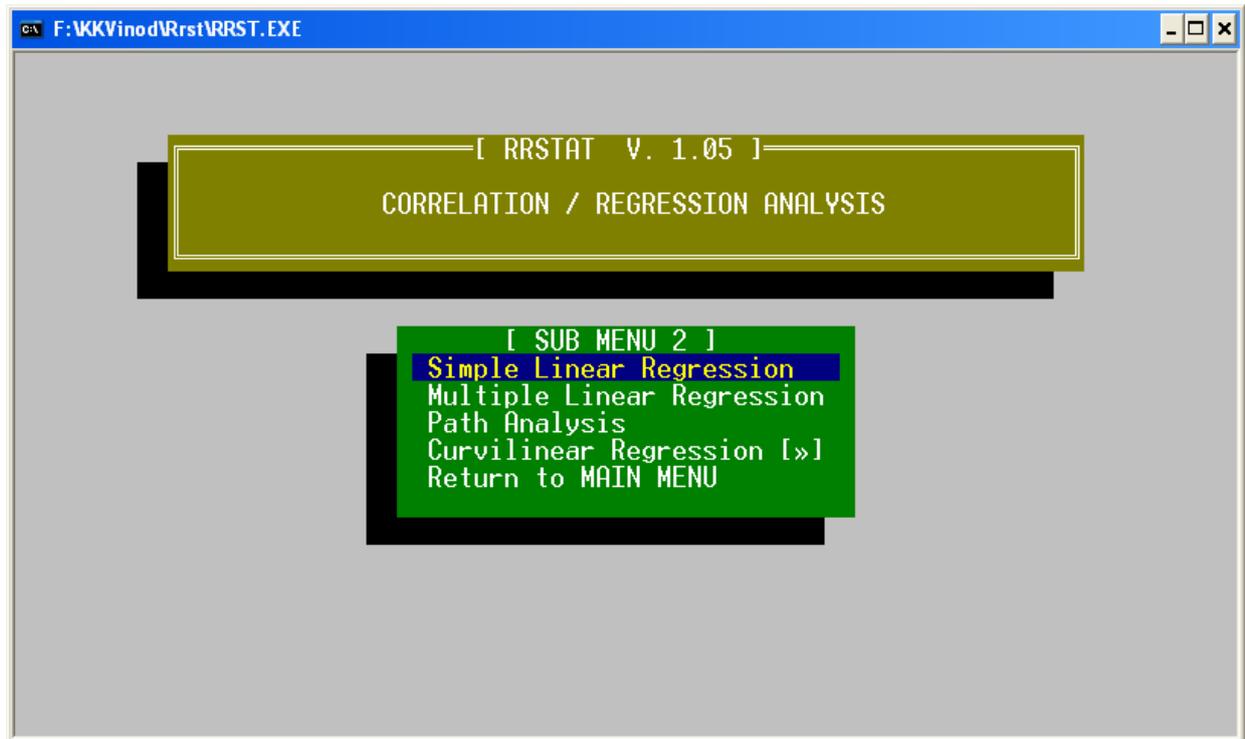
## Two Factor Designs



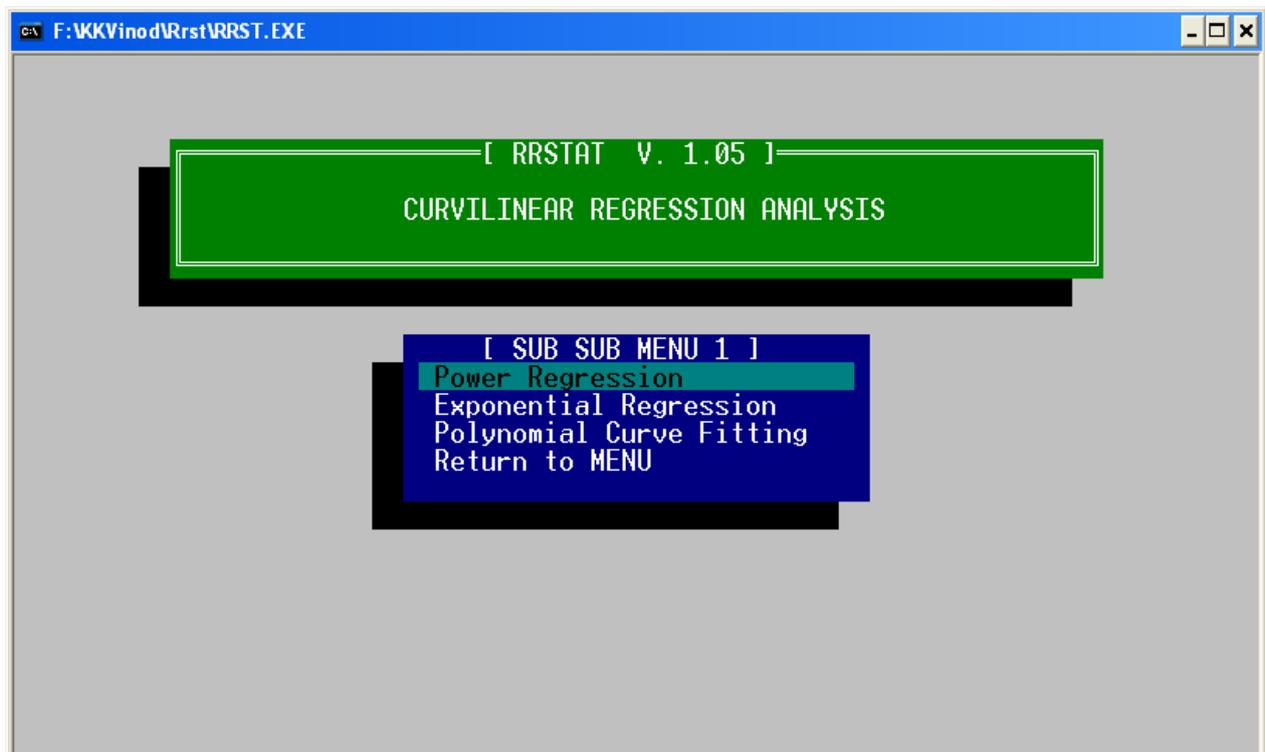
## Three Factor Designs



## Correlation / Regression Analysis



## Curvilinear Regression



To execute an item, highlight it in the corresponding menu and press ENTER.

No result is displayed on the screen while data is being processed. All the processes take place in back ground and the result files are created.

Try to create the data files using the RRSTAT Data Management System. This will help in reducing the File Access Errors.

# Printing a Result file

RRSTAT uses DOS utilities for viewing and printing the result file created. In the MAIN MENU an option to run DOS commands is provided for mainly this purpose. This option helps you to load DOS within RRSTAT while program remains resident in memory. All DOS commands for file management can be used here. When the job is completed type in EXIT at the DOS prompt to return to RRSTAT. In this topic the procedure to view and print a result file is explained.

Select the option Run DOS Commands from the MAIN MENU and press ENTER. Following message appears.

```
Type <EXIT> to return to RRSTAT Ver. 1.05
Microsoft(R) Windows DOS
(C)Copyright Microsoft Corp 1990-2001.
```

```
C:\RRST>
```

To view a file:

At the DOS prompt enter the command as follows

```
Type [drive]:\[Directoryname]\[Filename]
```

Press ENTER key.

For example, to view a file called RBD.OUT from the directory

```
\RESULT of drive C:
```

```
Type C:\RESULT\RBD.OUT
```

Press ENTER key.

The file RBD.OUT will be displayed on the screen.

To print a file:

At the DOS prompt enter the command as follows

```
Print [drive]:\[Directoryname]\[Filename]
```

Press ENTER key.

For the above example,

Type in Print C:\RESULT\RBD.OUT at the DOS prompt and press ENTER key.

The file RBD.OUT will be printed in the printer attached.

Some Terminate-and-Stay Resident (TSR) programs like MS-DOS PRINT are found to interfere with RRSTAT when loaded within RRSTAT. As a result system halts while returning to MAIN MENU. This problem can be avoided by loading the resident part of PRINT outside RRSTAT. Please refer to the topic Troubleshooting for more details.

Since RRSTAT result files are in the ASCII format you can use any of the ASCII editors with printing option to view, edit and print a result file. A few popular editors are MS-DOS Edit, Windows Notepad, Sidekick's Notepad, PC Tools Word Processor, WordStar etc.

# Troubleshooting

RRSTAT has a powerful error handling routine which provides you possible reasons and solutions as and when errors occur. The error recovery routines are provided for all common errors which prevent unexpected program halting.

The common error messages are given below:

## **RRSTAT non-fatal errors**

Insufficient conventional memory to run RRSTAT. Quit some applications to free memory and try again.

RRSTAT driver could not be loaded due to the want of sufficient memory. Quit any active applications resident in memory and try again.

RRSTAT driver could not locate function modules in the current drive.....

RRSTAT on initialisation search for all its function modules in a directory called RRST or root directory of that drive. The driver program will not be able to access these modules from another drive though they are present there. To solve this problem, change to the drive where fuction modules are located and restart the program.

Bad or missing configuration file RRST.CNF. Run 'I/O configuration' from the MAIN MENU to create a new copy of the file and try again.

On starting of the main overlay file it searches for the RRST.CNF file to load input - output configuration. If this file is not available it should be created for continuing with the software execution. Create it using the option I/O configuration from the MAIN MENU and resume. The MAIN MENU can be accessed by pressing any key which causes an error recovery.

You have not created the configuration file RRST.CNF. Create it now.....

Attempt was made to execute the MAIN MENU choices before creating the RRST.CNF file. Create it to resume.

Insufficient conventional memory to load DOS. Quit some applications and try again.

The RRSTAT is unable to load DOS within it due to insufficient conventional memory. Make more memory available by removing some active applications and try again.

## *File Access Error*

File Access error is a common error flashed for all errors occurring while file handling. It can be either file not found, path not found, invalid file name or unexpected file type errors.

File access error occurring in the Data Management System is commonly invalid file name errors. Rarely, it can also be due to an attempt to write over a read only file. To avoid this the file name is to be entered with care. Use always a valid DOS file name. Please refer to your DOS manual for details.

While on the other hand, File Access error occurring during a programme execution may probably a file not found error.

At first make sure that you have specified the correct file name.

Then make sure that your I/O configuration has the correct data input path, and the specified file exist in the data directory.

If everything is fine then check that the input data file is not corrupted. If it is corrupted create a new data file.

If the file is not corrupted check whether the data file has the required format that is recognised by the RRSTAT. If you are not sure about this, always create the data files using the Data Management System and do not use any ASCII editor for this purpose.

## **RRSTAT fatal Errors**

Unlike the non-fatal errors the fatal errors may not give a clear error message. In some cases, the system halts without any warning. In some cases the execution is abruptly terminated.

There are certain factors which are found to cause fatal errors. They are mentioned below.

## **TSR programs**

Terminate and Stay Resident (TSR) programs are softwares which once loaded stay resident in RAM (Random Access Memory) and continue to monitor hardware activities. There are several kinds of TSR programs available for different purposes.

Many of the TSR programs when loaded inside RRSTAT is found to cause interference, when the DOS is unloaded after running the TSR software. This is due to memory conflicts caused by TSR programs which may remove the resident component of the RRSTAT driver when they are loaded. To avoid this always load the TSR programs before RRSTAT is loaded. This can be done by adding the TSR programs in the AUTOEXEC.BAT file in the specified order ( see your DOS manual for details) and executing RRSTAT in the last. Once loaded in memory all TSR programs work well with RRSTAT.

The common TSR programs used are PRINT (MS-DOS), GRAPHICS (MS-DOS), VSAFE (MS-DOS), Other anti-virus software, APPEND (MS-DOS), FASTOPEN (MS-DOS), JOIN (MS-DOS), Mouse Drivers, KEYB.COM (MS-DOS), MIRROR (MS-DOS), SUBST (MS-DOS), virus-like programs etc.

It is always recommended that load the TSR programs before starting RRSTAT.

## **Memory Corruption**

Memory corruption occur very rarely when different programs are executed continuously one after the another for a long time. As a result system halts. If it happens restart the computer.

## **Low Memory**

Low memory also is a rare problem. If it happens the program execution is terminated. Clear the memory and restart the program.

## References

- Constantinides, A. 1987. Applied Numerical Methods with Personal Computers. McGraw Hill Book Co., Singapore. 626p.
- Gomez, K.A. and Gomez, A.A. 1984. Statistical Procedures for Agricultural Research. John Wiley and Sons, New York. 680p.
- Little, T.M. and Hills, F.J. 1978. Agricultural Experimentation - Design and Analysis. John Wiley and Sons, New York. 350p.