Chapter 4 - System Management

System Management

4.1. Hard Disk Directory, Structure and Management

The LEO UIF runs under the Microsoft® Windows$_{TM}$ operating system. This graphical operating system is loaded on top of a base disk operating system known as DOS. The DOS operating system is responsible for storing and handling files on the system.

If you are new to computers or DOS, you may have trouble understanding certain terms used in this manual. This section provides you with a brief overview of the following DOS concepts and functions.

This information is by no means a complete explanation of the DOS operating system. If you need more details, please refer to the MS-DOS® users manual that was delivered with the system.

4.1.1. What is DOS?

As mentioned above, DOS is shorthand for Disk Operating System. MS-DOS® is Microsoft's® version of DOS, while DR-DOS and PC-DOS are renditions from Digital Research and IBM. DOS is the traffic co-ordinator, manager, and operator for the transactions that occur between the parts of the computer system and the user. DOS operates in the background, taking care of low level computer tasks, for example, the flow of characters between the keyboard and the computer, between the computer and printer, and between disk(s) and internal memory (RAM).

Other transactions are initiated by entering commands on the DOS command line; in other words, immediately after the DOS prompt. The DOS prompt probably looks like one of the following:-

```
A>
B>
C>
```

The capital letter refers to the active disk drive (the one DOS is using right now). For instance, if the prompt is `A>`, it means that drive *A* is active and that commands given to DOS will refer to that drive. When another disk is required, the only command needed is the letter of the disk, followed by a colon and *Return* (usually the key marked ↵). For instance, to switch to drive *A*, just type

`A:` *Enter*

There are a few frequently used DOS commands which it is necessary to be familiar with:-

DEL or ERASE	To erase a file
DIR	To see a list of files on the logged disk
COPY	To copy files from one disk or disk area to another
REN or RENAME	To rename a file

DOS is not case sensitive, so commands can be entered in upper or lower case as preferred by the user.

The remainder of this chapter assumes familiarity with the above commands, refer to the DOS manual for further information about them.

4.1.2. Directories, Subdirectories, and Directory Structure

A *directory* is a convenient way to organise floppy or hard disk files. Directories allow the disk to be subdivided into sections, in a similar manner to conventional paper filing systems with draws and files. For example, a "Reports" subdirectory could contain a document template for a standard report, together with images to be included in reports and even spreadsheets containing additional information to be included.

On the system, it may be convenient to create a directory to hold all SEM image files, another for reports, another for notes, and so on. That way, it isn't necessary to wade through hundreds of files looking for the right one. Only the files from the current directory are listed with the DIR command or in a file selection box.

Although directories can be created on either floppy or hard disks, they are used most often on hard disks. Because hard disks can hold a greater volume of data, there is a greater need for the organisation and compartmentalisation.

At the DOS level, rather than in for example the LEO User Interface, DOS can be told to create directories, move files around between directories, and display which files are in a particular directory. See Section 4.2 *Creating and Using User Directories* for a practical example.

4.1.3. Subdirectories

For a greater degree of organisational structure it is possible to create subdirectories, or even subdirectories of subdirectories. There is no limit to the number which can be created, but too much structure may make it difficult for the user to keep track of where files are stored.

To set the currently logged directory, use the CHDIR or CD command followed by the name of the directory.

The DOS *prompt* indicates the current directory. If a subdirectory of IMAGES called TIFF, which is in turn a subdirectory of drive *C* is the current directory, the DOS prompt will look like:-

```
C:\IMAGES\TIFF>
```

Notice the backslash (\) before the directory names. When moving from one directory to another unrelated directory, type the name of the directory preceded by a backslash. The *parent* of any subdirectory is the directory immediately above it. In the example above, the parent of TIFF is IMAGES—TIFF is the subdirectory, IMAGES is the directory.

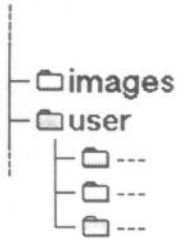
A backslash inserted directly after the drive characters refers to the *top-level* or *root* directory. The root directory does not have a parent directory.

- To switch to the root directory, simply enter `CHDIR \` followed by *Return*. To enter the IMAGES directory, type `CHDIR \IMAGES`, to enter the TIFF subdirectory, type `CHDIR \IMAGES\TIFF` and so on.
- DOS always works relative to the currently logged directory. In IMAGES, to go to TIFF, simply enter `CHDIR TIFF`. To go straight to the root directory type `CHDIR \` or `CHDIR C:\`
- Finally, to move from a subdirectory to its parent directory, for example to move from TIFF to IMAGES, specify '..' as the directory in the `CHDIR` command

4.1.4. The LEO Directory Structure

Below is a graphical representation of how the files are arranged for the LEO User Interface—LEO UIF. Each directory is shown as a 'folder'. This format is compatible with Windows$_{TM}$ File Manager:

In addition there are two generic directories:-



Except where specifically defined, files or directories should NOT be modified in any way. Leica Cambridge will not be responsible for consequences if the above files or directories are modified.

4.1.5. Directory Contents

Directory:	Directory Contents:
\GSPUTILS	This directory is used to hold files for use by Leica personnel only
\LEO	This is the main LEO software directory which holds the major part of the LEO application software. The subdirectory \LEO\HELP contains the LEO Help files. LEO also holds the following special files Standard *.ANN files Vacuum System files CONFIG.LEO. Annotation fonts. POINT.BMP
LICENCE	This directory contains the licence files which have been installed into the microscope. It will also contain any licence report files which may have been generated.
\LOG	This directory is used to hold the LEO log file and archived log file This directory should be checked to ensure the log files are not becoming too large.
\S430	This directory contains files specific to the S430 including User Interface files
\TIGA	This directory is used to hold the graphics processor files.
\USER	This is a root directory for a collection of user directories. On delivery one subdirectory is set up USER\DEFAULT Other subdirectories may be used as required.
User Directory	A subdirectory of the \USER directory is selected on system startup which is used to hold customisation or user specific files. The directory may be subsequently changed from the Top Menu. Such files may include : APP.LEO, LAYOUT.LEO, MACROS.LEO, OUTLPTS.LEO, OUTLUTL.LEO, STATWIND.SSL, TOOLBAR.LEO, *.ANN, *.ITB, *.MAC, *.MLF, *.OLT, *.PRE, *.SSL, *.TIF, *.ULU, *.XYZ.
Image Directory	This is a user selected directory in which TIFF files are stored. By default this is the user directory, it may be set to any directory on any device from any of the TIFF functions.

4.2. Creating and Using User Directories

4.2.1. From DOS

In the examples that follow, it is assumed that the hard disk is the current drive so that the prompt on the screen is *similar* to `C:\>`. To create directories on floppy disks, substitute *A* or *B* for *C* in this example.

To make directories for USER files, do the following:-

1. Select the MS-DOS® Prompt icon from the Windows™ Main Group—as shown below.

2. Type `CHDIR \USER` and press *Return*. The CHDIR command tells DOS to move into the USER directory. See above for an explanation on directories and subdirectories.

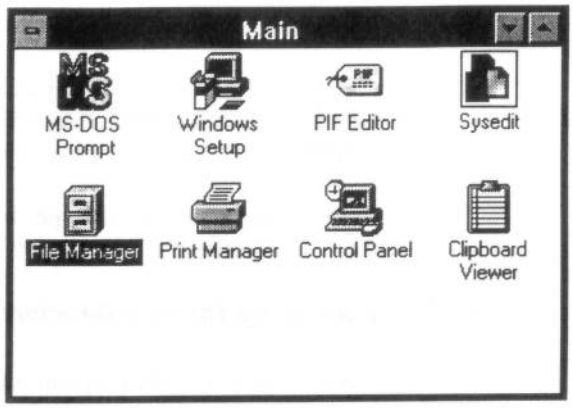
3. At the `C:\USER>` prompt, type `MKDIR NEWUSER` and press *Return*. The MKDIR command tells DOS to make a directory called NEWUSER in subdirectory USER. To create additional directories, simply substitute NEWUSER for the new directory name. For example, try `MKDIR HENRY` or `MKDIR DAVE`.

4. If you make a mistake, simply remove the directory with the command `RD NEWUSER` *Return*, where NEWUSER represents the directory you wish to delete.

That's all there is to it. A directory should be treated in the same way as a disk drive: To access any specific DOS file such as a saved TIFF image for example, the correct directory must be specified, or DOS won't be able to find the file.

4.2.2. From Windows™

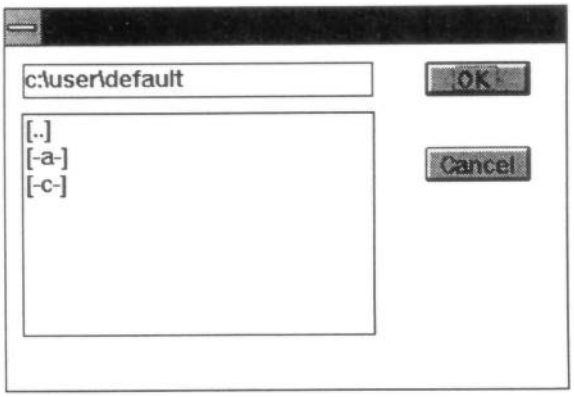
The concept and final results are the same as in DOS when creating directories from within Windows™. Simply click on the File Manager icon instead of the MS-DOS® Prompt icon—shown below. Refer to the Windows™ on-line help, or the Windows User Guide for File Manager operation.



4.3. The User Directory Concept

A user directory is simply a convenient way of separating the frequently changing LEO User Interface configuration parameters, from the system software data files. It can also be used to keep each user's files separate. If each user has their own configuration parameter directory, the system can be configured to suit each user in terms of tool-bars, menus, modes of operation etc, without having to re-configure the User Interface each time it is loaded.

As mentioned above, a subdirectory of the \USER directory is selected on system startup which is used to hold these customised or user specific files. The directory may be subsequently changed from the Top Menu. This is the directory that should be entered into the dialog box displayed during LEO UIF initialisation:-



Such files found in this directory may include :

APP.LEO, LAYOUT.LEO, MACROS.LEO, OUTLPTS.LEO, OUTLUTL.LEO, STATWIND.SSL, TOOLBAR.LEO, *.ANN, *.ITB, *.MAC, *.MLF, *.OLT, *.PRE, *.SSL, *.TIF, *.ULU,*.XYZ

Refer to the section on file types for an explanation of the various uses for each of the file types listed above.

4.3.1. Backing Up The User Directory

It is advisable to make frequent backups of this directory onto floppy-disk for safe keeping. In this way, any unwanted changes to the User Interface configuration or operating conditions can be partially restored by copying the files back as required. See the Microsoft® Windows™. User Guide for details on copying files using the Windows™ File Manager.

4.4. File Types, e.g. .TIF, .OLT, .MAC etc.

4.4.1. LEO Files

File type:	Description :
Standard Annotation	These are files with the extension ANN. They contain annotation panels for measurement (e.g. angular, radial, profile etc.) and datazone. The master copies are held in \LEO, if required modified versions may be saved in the user directory where they will be used in preference to the master copies. For further information use context help on the annotation and measurement popup menu.
Vacuum System	These files are specific to the vacuum system and electron optics of the SEM. They hold calibration information essential to the operation of the microscope. DEFAULT.VAC is used for initialising the vacuum system Non Volatile RAM (NVRAM) and DATA.VAC holds a backup copy of the NVRAM current data.
CONFIG.LEO	This file holds configuration information specific to the microscope.
Annotation font	These files with extension FNT are Font files for use in the SEM overlay plane for annotation and measurement functions.
POINT.BMP	This file contains the bitmap used for point to point measurement. If required this may be replaced by an alternative bitmap.
Licence	These are files with the extension LIC which are used to install licences which enable microscope functions to be used. A licence file is specific to a microscope and may only be installed by the LEO licence install application. A copy is held in the \LICENCE directory for reinstallation should this be required.
Licence report	These are text files with extension REP which contain the report generated by the LEO Licence Install application when a licence file is installed. They may be inspected using NOTEPAD.
LOG.LEO	This is a text file which records all significant events on the microscope. **Note** that while the interface is running this file is being accessed and partial contents may still be in memory. This file is for use by Leica Service personnel. For further information use context sensitive help on the Configuration menu.
LOG.OLD	This is an archived log file. This file is for use by Leica Service personnel. For further information use context sensitive help on the Configuration menu.

4.4.2. Machine Specific Interface Files

The following files are found in either the \S430 directories:-

File	Description
EXPERT.LAY, NOVICE.LAY, FTEST.LAY	These files contain the EXPERT, NOVICE and SERVICE user interface panels
EXPERT.ITB, NOVICE.ITB, FTEST.ITB	These files contain the EXPERT, NOVICE and SERVICE toolbars
MACROS.LEO	This file contains the installed macro library. The standard macro library file is located in the \S430 directory. On system shutdown a copy of the current installed macro library is saved as MACROS.LEO in the user directory On system startup the macro library is loaded from file MACROS.LEO in the user directory if one exists, otherwise the standard macro library is loaded.
APP.LEO	This file is located in the user directory and records the user customisation on shutdown (e.g. window positions).
LAYOUT.LEO	This file is located in the user directory and records the current set of user panels on shutdown.
OUTLPTS.LEO	This file is located in the user directory and records the display LUT Window points list on shutdown.
OUTLUTL.LEO	This file is located in the user directory and contains the display LUT contents on shutdown.
STATWIND.SSL	This file is located in the user directory and contains the status selection list for the status window on shutdown.
TOOLBAR.LEO	This file is located in the user directory and contains the current TOOLBAR on shutdown.
.ANN files	These are annotation panels or complete overlay information saved by the annotation/measurement function
.ITB files	These are files containing Toolbar sequences (Icon Toolbar) created with the Toolbar Editor.
.MAC files	These are macro files created by the macro editor.
.MLF files	These are Macro Library files saved by the macro Editor.
.OLT files	These are files containing actual display LUT contents saved by the display LUT Window
.DLU files	These are files containing display LUT points lists saved by the display LUT Window
.ULU files	These are files containing a User defined points list generated by the input LUT Window
.PRE files	These are files containing predefined values for specific parameters. The file name is derived from the parameter mnemonic.
.XYZ files	These are files of stage position information generated by the stage window.
.TIF files	These are files in TIFF format
.SSL files	These are status selection lists saved in the Status window

4.5. Good Housekeeping, i.e. keeping sufficient free disk space

As the LEO User Interface operates as a Windows$_{TM}$ Application, it relies on sufficient system resources from the Windows$_{TM}$ operating system itself. In this case, system resources refer to both free physical memory, and free hard-disk space.

If either of the above resources are in short supply, system performance can be impaired. As the physical memory fitted in the machine is managed by the system software itself, little can be done to improve system performance in this way, other than ensuring that only the applications that are required are loaded into memory at any one time.

Because Windows$_{TM}$ provides a 'virtual machine' environment to its applications, generally an application can demand as much memory from the system as it needs. When physical memory is full, Windows$_{TM}$ will temporarily swap 'chunks' or 'pages' of it onto the hard-disk using a process known as paging. If the hard disk is nearly full, this reduces the size of the temporary files Windows$_{TM}$ creates, and thus increases the frequency at which these files are accessed.

As free hard-disk space is a premium, there are a number of good housekeeping strategies the system administrator can employ to ensure maximum software efficiency. All the functions shown below can be performed using the Windows$_{TM}$ File Manager:-

- Ensure that any unused user directories are backed up and removed from the system
- Remove any unwanted image files from the system regularly by backing the files up then deleting them from the hard-disk
- Check that any temporary files from the `\Windows\TEMP` subdirectory are deleted