Backing-Up Data on CD-R or CD-RW Disks on the Gateway, Windows-2000 PC.

Definitions:

- **CD-R**: A writeable CD that cannot be erased or re-written. These are the most affordable, and the recommended disks for data archiving. The write-speed is much faster, and there is no reason that one would need (or want) to delete the archived data anyway. The CD-R disks can be “formatted” for writing by the DirectCD program (see below).

- **CD-RW**: A CD that can be written, erased, and re-written. Using the DirectCD program, it can be formatted like a very large floppy-disk, for transparent access like any other storage device. These disks are more expensive, and formatted disks (DirectCD) cannot be read by a conventional CD-ROM drive unless special software is loaded.

- **Ez-CD-Creator**: The standard software for writing CD-R disks. The users selects files to be written in a session, the files are written, and the session is closed. Additional files can be added in other sessions. Historically, the biggest problem with this method is something called “buffer underrun”. When burning a session, the data must be written in a single, interrupted thread so the source disk must be readable faster than the writing operation. Therefore, data should not be written directly from the mounted network-drive because any network delay will stop the write operation. If a buffer-underrun error occurs, the disk is permanently destroyed.

- **Session**: When burning a set of data using EZ CD Creator, the data is written as a single session. After the data is written, the session is closed. If the disk is left open (the default situation), additional sessions may be added in the future.

- **Direct-CD**: A program that pre-formats a CD-RW disk, or performs a “virtual formatting” of a CD-R disk, so that it may be treated as a direct-access filesystem. After the disk is prepared, you can open “My Computer”, and copy files to the CD-R or CD-RW disk as if the disk were any other storage device. CD-RW disks need to be completely formatted, which can take over an hour; however, after formatting files can be save, deleted, renamed, ...etc. just like a hard-drive. When Direct-CD is used to copy files to a CD-R disk, the disk is ejected, the user is prompted to “leave the disk alone”, or to “re-format” the data for reading on a normal CD-ROM drive (not a CD-R or CD-RW drive). Leaving the formatting “as is” allows additional files to be saved by simply inserting the disk, and dragging new files to the disk.

I. **Method I: Using EZ-CD-Creator**:

A. Copy all of your files from the *rgroups* directory to the “Temporary CDR Folder”, via the shortcut on the desktop. You may create a new folder (directory) in this folder by clicking the Right Mouse Button, select “New”, and then “Folder”. Name the folder, open it, and drag your files/directories into that folder.

   1. Potential problems when copying files:
      a) Duplicate Filenames: Since UNIX filenames are case-sensitive, and PC filenames are not, it is possible for two files to be different in UNIX, and not different on the PC (i.e. “Myfile.DA”T, and “myfile.dat” are two different files on the UNIX system, and one filename on the PC. Avoid this by never duplicating filenames (or relying on character “case” to distinguish between files).
      b) Illegal Characters: It is possible that a character was used in a filename (i.e. “:”, “=”,”?”) that is not allowed in a PC filename. To fix this, you will have to go back to the UNIX workstation and change the filename. You can avoid this by following the naming rules in the “Bare Bones Guide” for operating the NMR spectrometer.

B. Insert your CD-R disk in the drive, and the “Select A Project” window should appear.

C. Place the pointer over the “Make a Data CD” button, and then select “dataCD Project”. This will run the EZ CD Creator program.

   1. Note: Alternatively, you can close the Project-Selector window (click “X” in the corner), and you can run EZ-CD-Creator manually by double-clicking the icon on the desktop.
D. Once in the EZ CD Creator program, the lower-portion of the window (initially empty) is where you will drag-and-drop your files. You can select your files using the “Windows Explorer” interface in the upper half of the program window; however, it is often easier to open the “Temporary CDR Folder”, then open the folder containing your data, and then “Drag-and-Drop” this folder into the lower-left box in the EZ-CD-Creator Program (See Below):

E. Click on [Record] (red circle). The CD-R drive is capable of writing up to 12X speed, but I recommend that you use 8X because it seems to be more reliable (depending on the media). The reliability at higher speeds is very media dependent.
   1. If your data disk already contains closed sessions, they will be recovered before the new session is written.
   2. DO NOT do anything else with the computer while the CD is being written. Preferably, close all other programs before recording, and don’t do anything until recording is completed!
   3. If you have to leave the lab while the CD is writing, leave a note on the keyboard, asking others not to use the computer.
F. A prompt will appear when writing is completed.
G. Eject and label your disk.
H. I suggest that you try your disk in another CD-ROM drive (to make sure that it reads correctly) before deleting your files/directories from the “Temporary CDR Folder”.

Note: Some Macintosh CD-ROM drives seem to have trouble with the file-naming used by the PCs, so if you try to recover your data on a Macintosh don’t panic if the file/directory names are changed. They should be fine on any PC, UNIX, or LINUX CD-Rom drive.
II. **Method II: Using DirectCD to Backup Files:**

A. From the Roxio Project Selector, point to “make a data CD”, and select “directCD”.
   1. Alternatively, you can run “directCD” from the icon on the desktop.

B. Click on “Format” on the following window:

C. Enter a disk label if you wish, and then click on “Format”. If you are using a CD-R disk (recommended), the formatting process will only take a few seconds (if you are formatting a CD-RW for full Read/Write access, this will take almost 2 hours), after which you will see the prompt shown at right:

D. Click [OK], and you can copy files to your CD the usual way, using “My Computer”, open the drive (D:\ in this example), open your /nmrdata/rgroups folder, and Drag-and-Drop your files into the CD.

Note: Since writing the CD takes longer than magnetic media, the process of copying will be noticeably longer than copying from disk to disk.

E. To eject your disk, don’t push the eject button on the drive.

   Rather, double-click the CDR-icon (with red dot) ... in the lower-right corner of the screen. This will bring up the Direct-CD program: Click on the [eject] button to eject your disk. This ensures that all writing operations are completed, and the disk is ejected cleanly.

F. After clicking on [eject], a dialog box will appear, asking you to choose how to prepare the disk prior to ejecting (see right). Choose “Leave As Is”, if you intend to add more files to the disk in the same manner. You can choose either of the other choices; however, it will be more difficult to add files later. Once you click [OK] your disk will be ejected.

G. If you chose “Leave As Is”, the disk is readable/writeable on any CD-RW drive on a PC with directCD running. You can continue to add files until the disk is full.