I. **CD-ROM recording, HFS+9660 Hybrid**
  A. **Source preparation**
    1. **File system compatibility**
      a) Check file and directory names for ISO interchange compliance
      b) Check directory (=folder) nesting depth
    2. **Required allocation block size for Hybrid HFS/9660 CDs**
      a) The allocation block size is the minimum amount of disk space taken up by a file.
        (1) This size is tied to the total capacity of the disk volume: larger capacity requires larger blocks.
      b) ISO 9660 discs require a 2 KByte (= 2,048 Bytes) block size. For a hybrid disc, the allocation block size of the source volume must be a multiple of 2 KBytes (e.g., 2,048 Bytes, 4,096 Bytes, etc.)
      c) To find out a volume' s block size, run Norton Disk Doctor and look in the report issued at the end of the disk check.
      d) Changing the block size requires partitioning the drive. Note that this will erase the entire contents of the drive, and should therefore be completed before copying files to the source drive.
        (1) Most disk formatting software will not allow you to specify directly the block size—you will have to experiment with the volume size. The following volume sizes work with the APS PowerTools 4.0 program:
          (a) 130,170 KBytes (block size is 2,048 Bytes)
          (b) 262,140 KBytes (block size is 4,096 Bytes)
          (c) 393,210 KBytes (block size is 6,144 Bytes)
          (d) 524,280 KBytes (block size is 8,192 Bytes)
          (e) 655,350 KBytes (block size is 10,240 Bytes)
          (f) 786,420 KBytes (block size is 12,288 Bytes)
    3. **Optimization of the source volume**
      a) The files in the source volume must be contiguous and not fragmented. Use Norton Speed Disk (or equivalent program) to defragment files and free space.
      b) The files should also be laid out in the most likely playback sequence, to minimize the need to seek across the CD-ROM.
        (1) When the premastering software does not provide controls on file placement, you can achieve similar results by copying the files to the source volume one by one, in the desired sequence.
          (a) To avoid fragmentation, the source volume should be completely erased before files are copied to it.
        (2) Director optimizes the placement of castmembers within a movie file with the File-->Save and Compact command. Linked files, however, do not benefit from this command.
    4. **Optimization of the computer used for recording**
      a) Take care to minimize interferences with the operation of the premastering software during recording, so as to avoid buffer underruns which would ruin the CD.
        (1) Turn off networking software.
        (2) Turn off unnecessary extensions (in Extensions Manager).
        (3) Disconnect all unnecessary devices from the computer (ideally, limit the SCSI devices to the startup disk, the source disk, and the CDR recorder).
        (4) Avoid other sources of interrupts (such as mouse motion) during recording.

b) When choosing a CDR recording platform, consider:
  (1) The speed of the CPU
  (2) The amount of memory (it may be necessary to place the Virtual File System—used in the creation of ISO 9660 discs—on a RAM disk)
  (3) The transfer rate of the source disk, and its thermal recalibration scheme.
    (a) If the drive is not "AV rated", allow it to warm up for a few hours before recording, to reduce the frequency of T-cals.

B. **Premastering using QuickTOPiX software and Optima CDR recorder**
  1. **Preferences (Tools menu)**
    a) "Disable async SCSI" and "Disable SCSI manager 4.3" may have to be checked for compatibility with older recorders.
    b) "Disable direct SCSI access" must be checked if the source volume is on a disk array.
  2. **Template selection**
    a) In the main window, choose "Hybrid" from the Template pop-up menu.
      (1) If necessary, click Options to place the cache on a faster disk (though *not* on the source drive), and/or to choose a different unit for disc space.
  3. **Source selection and settings**
    a) Click Setup in the Source box of the main window to display the Hybrid Setup dialog
      (1) HFS Component settings:
        (a) Click HFS Source and select the source volume.
          i) If the allocation block size is not Hybrid-compatible, the program will reject your choice.
        (b) Check the "Truncate" box to record only the portion of the source which actually contains files.
      (2) ISO 9660 Component settings:
        (a) Check the "Auto verify source" and "Detect dir level > 8" boxes
        (b) Choose an Interchange Level from the ISO 9660 Name Translation pop-up menu
          i) To prevent the addition of a trailing ";1" at the end of filenames, check the "Omit Version #" box
          ii) To manually assist in the conversion of filenames, check the "Prompt" box
        (c) Click ISO Source, then click New to create the Virtual File System.
          i) Enter a name for the VFS—this will become the name of the ISO 9660 volume (though it can be changed before recording)
          ii) Save the VFS on the fastest available drive—*not* on the source drive, though.
          iii) When done saving, the Hybrid ISO 9660 File Selection dialog appears:
            (1) In the Host File System list, choose the items (files and folders) that ISO 9660 users should be able to see, then click Add
              (a) You can add directories visible only to ISO 9660 users by clicking New Folder
            (2) Close the Hybrid ISO 9660 File Selection dialog

(3) Choose Mode 1 from the Track Mode pop-up menu.

(4) Click OK to close the Hybrid Setup dialog.

b) Use VFS-->Prepare to generate the ISO 9660 file system.

4. Target selection and settings

a) Insert a CDR blank in the recorder.

b) Click Target in the main window to display the Devices dialog

(1) Select the Optima CDR from the list of devices, and close the dialog

(a) If the entry for the CDR displays "not ready", click Update until the available space on the disc is displayed.

c) Click Setup in the Target box of the main window to display the Optima Setup dialog

(1) Select Single or Double Speed for Data Track recording, then close the dialog.

d) In the main window, enter "1" for the number of copies.

5. CD "Make" sequence

a) Use Tools-->Test to verify that the data transfer rate is fast enough for recording

(1) Testing will take just as long as the actual recording. If at the end the program reports "Ready" you can proceed to burn the CD.

(2) If the test fails, consider recording at single speed, or review the optimization steps.

b) Use Tools-->Record to actually transfer data to the CDR blank

(1) Any interruptions to this process will cause the disc to become unusable.

c) Use Tools-->Compare to verify that data on the CDR and on the source match

(1) The compare operation apparently works only if executed immediately after recording.

d) Use Tools-->Close Session to create the intersession gap and to write a Table of Contents that makes the disc readable in ordinary CD-ROM drives.

(1) If space on the disc is tight, you may need to use Tools-->Finalize CD instead. This command prevents any further additions of data to the CD-ROM.

e) Complete the process with Tools-->Eject.