Jewel case listings for mp3 cdroms

Abstract
Making jewel case listings for mp3 cdroms is a particular challenge, since up to about ten times as much information has to be on them as on jewel cases for regular audio disks. Here TEX's abilities to adjust entire paragraphs, as opposed to just single lines, shine at you.

Introduction

The use of MP3 audio compression brings a dramatic increase in music storage capacity of digital media. Where a music Compact Disc is limited to about 70 minutes of music, a data CD will store around ten times that much in high quality MP3s (128 kbit, 44.1 kHz stereo encoding).

With more and more devices hitting the market that can read MP3 CDs, it becomes attractive to take one's CD collection, rip and encode it to MP3 and burning it on several data CDs. The applications are numerous, even if I only mention playing MP3s during parties. You need fewer CD changes, resulting is less musical downtime.

The creation of MP3 CDs brings some challenges, and this article will face two of them. They are:

1. the extraction of track information from the MP3 files, to create a listing of the entire contents of the CD, and

2. the formatting of this listing so that it fits the backside of a standard CD case ("jewel case") and still looks nice.

The formatting is a typographical problem, so it's no surprise that TEX comes into play there. But TEX also shows its strength as a word processor when it parses the generated contents list.

The listing will include track number, name, and duration; this information can easily be extracted from the MP3 files themselves if the CD ripping software put it in. A small ruby program is displayed that generates the TEX input from a directory of MP3 files. The format of the TEX input file is simple enough to generate with your programming language of choice.

The typesetting is done with LaTEX, but plain TEX users will appreciate the fact that the solution uses mainly basic constructs. Some changes will have to be made to font selection and multicolumn formatting (done with `multicols`) if another format than LaTEX is to be used.

```
01 #!/usr/bin/env ruby
02
03 # mp3totex - list mp3's in given directory in TeX compatible format
04
05 require 'rubygems'
06 require 'mp3info'
07
08 album, tracks = nil, []
09
10 Dir["#{ARGV[0]}/*.mp3"].sort.each do |f|
11   m = Mp3Info.new(f)
12   album = m.tag['album'] unless album
13   ttit = m.tag['title']
14   tlen = m.length
15   tnum = m.tag1['tracknum']
16   tracks[tnum-1] = "%03d %s...(%d:%02d).\n" %
17                 [tnum, ttit, tlen/60, tlen%60 ]
18 end
11 puts "\\title #{album}.",tracks
```

Figure 1. The ruby program that generates the input file.

The Playlist

There is a plethora of software available to create MP3s of music CDs. I use Grip
(`http://nostatic.org/grip/`), which automates the entire process. Upon inserting a music CD, Grip checks with an on-line CDDB database for disc and track information. This information will be stored in the ID3 tags in the MP3s themselves. Grip also generates playlists in the form of m3u files, which are text files listing the path names of the generated MP3s.

Although most MP3 playing *software* can handle m3u playlists, *hardware* players are oblivious to this concept. They don't handle directory structures very well and tend to play tracks in 'natural' order (as layed out on the disc) or alphabetic order. Therefore, the best option is to prefix the MP3 file names with the three digit number indicating the order in which they are to appear. This number will also show up in the final track listing.

So, after ripping and burning I have:

1. a data CD containing ten music CDs worth of MP3s,

2. ten corresponding m3u files listing the names of the files.

For reasons explained later, I want the TeX input to come out looking like this:

```
\title I Robot.
012 I Robot...(6:03).
013 I Wouldn't Want to Be Like You...(3:23).
014 Some Other Time...(4:05).
015 Breakdown...(3:52).
016 Don't Let It Show...(4:21).
017 The Voice...(5:23).
018 Nucleus...(3:31).
019 Day After Day (The Show Must Go on)...(3:49).
020 Total Eclipse...(3:09).
021 Genesis Ch.1. V.32...(3:28).
```

All lines are delimited by a period. The tracks have a number, then a space, the title, three dots and the track time in parentheses. This formatting must be followed quite

```
052    A Forest The Cure . . . (4:55)
053    Fortune Presents Gifts
       not According to the
       Book Dead can Dance  (6:03)
054    Signs of Life Pink Floyd
       . . . . . . . . . . . . . . . . (4:24)
```
(1)

```
052    A Forest The Cure . . . . . . . . . . (4:55)
053    Fortune Presents Gifts not Ac-
       cording to the Book Dead can
       Dance . . . . . . . . . . . . . . . . . (6:03)
054    Signs of Life Pink Floyd  . . . . . (4:24)
```
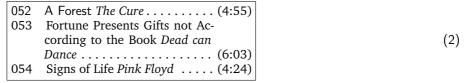(2)

Figure 2. Example listing at two different widths.

strictly. No white space should be placed between the dots and the parentheses, for instance.

The Ruby program in Figure 1 produces this input from the directory of MP3 files. Here is a short description of what it does. Line 6 imports the mp3info module that is capable of reading the tags of an MP3 file. On line 10 a loop starts over all the MP3 files in the directory that was given as a command-line argument. The tags are extracted and stored formatted in the `tracks` array, in the proper order. The album is recorded only once, which means that all files are considered to be from the same album. After the loop, the album title and the tracks are printed.

If you run the program on each album directory and append the outputs to a single file, you should now have all your tracks nicely listed in the proper format. Now is the time to do some last-minute manual touch-ups that an automatic procedure can not address.

The Layout

The main challenge lies in fitting over a hundred track numbers, titles and times in the cramped space of a CD case, which measures 13.7cm × 11.7cm, and still make browsing the list a pleasant experience. This cannot be done without using a very economic typeface; I chose Helvetica narrow for the simple reason that it is condensed, generally available and readable in small print. By experimenting I found that a 6 pt size will usually fill up the available space quite nicely.

Just using a small font doesn't help with the browsing. To that end, the roving eye must be given guidance and directions to keep it 'on track,' while the landscape should display enough markers for orientation. In the layout presented below, guidance is delivered by putting the listing in narrow, flush colums; album titles printed in boldface form landmarks in the overcrowded area.

To illustrate how individual tracks are typeset, the examples in Figure 2 show an excerpt of an imaginary listing at two different column widths.

The layout was inspired by the typesetting of the Key Index in *Mathematical Reviews*, which was used as an example of complex typesetting in the article *Breaking Paragraphs into Lines* [1] wherein Donald E. Knuth and Michael Plass explain the versatility of the glue-box-penalty model.

The anatomy of a single entry could be described as follows: The first line starts with the track number against the left margin; it is followed by some white space; then come the track title and artist; finally appears the track time flush against the right margin. Each entry is one paragraph. The space between the artist and the track time is filled up with a dotted line (technically called *leaders*). If there is not enough room for everything on one line, the title and artist are broken across several lines, where all lines but the first keep the same distance from the left margin so

that they line out nicely with the start of the title in the first line, and all lines but the last have a ragged right margin. If there is no room left for the track time, it is placed on a line by itself with leaders in front aligning on the left with the title, as seen in (1).

Understanding how TeX is able to produce such intricate layouts requires some insight into the glue-box-penalty model. The most definitive source of information on this matter is the TeXbook, Chapter 14, but I will try to explain some of its particularities.

One of the aspects of TeX that really confused me as a novice user was the fact that it typesets paragraphs as a whole. I had grown accustomed to the linear typesetting behaviour of modern word processors: you type until the line is full and the word processor will insert a line break. At first, it will try to fill up the line by 'squeezing' it a little: the spaces are slightly narrowed, so more material fits on a line. But as you keep typing it must choose a breakpoint as close as possible to the end of the line. A clever word processor may reconsider the last breakpoint if it finds that it can hyphenate the word you are typing and the part before the hyphen will fit in the previous line; but even a clever word processor will not look further back than the last breakpoint. It doesn't care if a stretched line appears below a squeezed line, even if both lines could be improved by moving a small word from the end of the latter to the beginning of the former.

In contrast, TeX tries to balance an entire paragraph. The breakpoints are found by considering *all* candidates. The question it asks itself at every point is: "How bad would this paragraph be so far if I break it here? Or, how much do I need to stretch or shrink the line preceding it, and which previous breakpoint minimizes the total badness?" The notion that each potential breakpoint is linked to its previous breakpoint of minimal total badness introduces a "path of minimal badness" from the end of the paragraph right back to the beginning, traversing the 'optimal' breakpoints.

However clever, this approach has some repercussions. For instance, a novice user may be tempted to produce a single centered line in the middle of his paragraph for ad hoc displaying by typing something like

```
... by typing\\
{\centering some centered text\linebreak}
but to my dismay ...
```

but to his dismay, the display line
is   hopelessly   stretched.
That is because none of the parameters that affect the layout of paragraphs are used by TeX until it hits `\par`. At that moment, the paragraph builder springs into action, getting ready to build a perfectly balanced paragraph. The text has been reduced to a string of boxes, penalties and glues; the `\centering` declaration has already gone out of scope, the parameters it affected were reset when the } was read.

How, then, is it possible to have a paragraph that has the first line flush left, the middle lines indented, and the last line flush right? The answer is: a combination of standard TeXniques and some tricks.

The indentation of all but the first line is done with hanging indentation. Keeping the lines away from the right margin is done by setting `\rightskip`. This is a glue parameter that is added on the right of every line. The only real trick is to get the last line flush right. To do this, the `\rightskip` glue must be cancelled out. This can be done by putting *negative glue* next to it. The `\parfillskip` glue, that TeX inserts at the end of a paragraph, comes in handy here. This parameter usually has some stretch so the last line of the paragraph doesn't need to be full. If you have a hard time imagining what negative glue looks like, just consider the simple arithmetic it involves. People seem to have no problem whatsoever in everyday life

understanding negative money.

Here is the list of parameters that are in effect when typesetting the entries.

```
\parindent 0pt
\leftskip 0em
\rightskip 2em plus 1.5em
\newlength{\threedigs}
\settowidth{\threedigs}{000\quad}
\hangafter 1
\hangindent \threedigs
\parfillskip -\rightskip
```

Then there is the matter of the leaders. There are two possible situations:

1. the track time goes on the same line as the last words of the track title and the leaders go between them;

2. there is not enough room left on the line, and the track time will have to go on a line of its own. The leaders will appear starting from the left edge (respecting the hanging indent).

The second case is really distinct because a linebreak will happen just before the leaders. Leaders, glue, and interword spaces are discarded at linebreaks. Normally this is a good thing, because you don't want spaces to appear at the beginning of a line. But in this case it is more aesthetic to have a line of leaders preceding the lonely track time. So in order to prevent the discarding, the following list of items is used:

☐ a penalty, indicating that it is possible (though undesirable) to break here;

☐ an empty `\hbox`, preventing the following leaders to be discarded if the above penalty should be chosen as a breakpoint;

☐ an infinite penalty, preventing a break *at* the following leaders (which would discard them);

☐ the leaders.

The result is that if a break happens at the first penalty, the empty box appears as the first item of the following line, in which case the leaders are safe.

The Index in *Mathematical Reviews* was even more elaborate, since it had a number of lines flush left, followed by leaders, followed by a number of lines flush right. See if you can figure out how to do *that*.

Translating the input

So now let's turn to the (human-readable) input file, and see how TeX is able to ingest it and produce the above layout.

The pivotal macro is called `\entry`, which has the following definition.

```
\def\entry#1 #2...(#3).{#1\track#2\tracktime(#3)\par}
```

What is immediately clear is that its ⟨parameter text⟩ is made to match the input format. The `\track` is 0.5 em of space. The `\tracktime` is the list of items that eventually result in the leaders, as was discussed in the previous section.

In order to make this control sequence magically appear before every line of the input, we set `\everypar` to `{\entry}`. This token list is inserted when TeX has begun a new paragraph. Since each `\entry` ends in a `\par`, every line of the input becomes an `\entry`. The only exceptions are the CD titles; since they should be exempted from becoming entries, the `\title` temporarily disables the `\everypar` and sets all the other parameters that were used for the list entries to

The Alan Parsons Project

Tales of Mystery and Imagination
001 A Dream Within a Dream . . . . (4:13)
002 The Raven . . . . (3:57)
003 The Tell-tale Heart . . . . (4:38)
004 The Cask of Amontillado . . . . (4:33)
005 (The System of) Doctor Tarr and Professor
    Fether . . . . (4:20)
The Fall of the House of Usher
006 …Prelude . . . . (7:02)
007 …Arrival . . . . (2:39)
008 …Intermezzo . . . . (1:00)
009 …Pavane . . . . (4:36)
010 …Fall . . . . (0:51)
011 To One in Paradise . . . . (4:46)

I Robot
012 I Robot . . . . (6:03)
013 I Wouldn't Want to Be Like You . . . . (3:23)
014 Some Other Time . . . . (4:05)
015 Breakdown . . . . (3:52)
016 Don't Let It Show . . . . (4:21)
017 The Voice . . . . (5:23)
018 Nucleus . . . . (3:31)
019 Day After Day (The Show Must Go on) . . (3:49)
020 Total Eclipse . . . . (3:09)
021 Genesis Ch.1. V.32 . . . . (3:28)

Pyramid
022 Voyager . . . . (2:24)
023 What Goes Up… . . . . (3:31)
024 The Eagle Will Rise Again . . . . (4:22)
025 One More River . . . . (4:17)
026 Can't Take It With You . . . . (5:04)
027 In The Lap Of The Gods . . . . (5:30)
028 Pyromania . . . . (2:43)
029 Hyper-Gamma-Spaces . . . . (4:19)
030 Shadow Of A Lonely Man . . . . (5:34)

Eve
031 Lucifer . . . . (5:09)
032 You Lie down With Dogs . . . . (3:48)
033 I'd Rather Be a Man . . . . (3:54)
034 You Won't Be There . . . . (3:37)
035 Winding Me Up . . . . (4:02)
036 Damned If I Do . . . . (4:53)
037 Don't Hold Back . . . . (3:37)
038 Secret Garden . . . . (4:44)
039 If I Could Change You Mind . . . . (5:48)

Turn of a Friendly Card
040 May Be a Price to Pay . . . . (4:57)
041 Games People Play . . . . (4:21)
042 Time . . . . (5:02)

043 I Don't Wanna Go Home . . . . (4:56)
044 The Gold Bug . . . . (4:33)
045 The Turn of a Friendly Card . . . . (16:21)

Eye in the Sky
046 Sirius . . . . (1:53)
047 Eye in the Sky . . . . (4:36)
048 Children of the Moon . . . . (4:51)
049 Gemini . . . . (2:11)
050 Silence and I . . . . (7:23)
051 You're Gonna Get Your Fingers Burned . (4:23)
052 Psychobabble . . . . (4:51)
053 Mammagamma . . . . (3:35)
054 Step by Step . . . . (3:54)
055 Old and Wise . . . . (4:54)

Ammonia Avenue
056 Prime Time . . . . (5:03)
057 Let Me Go Home . . . . (3:21)
058 One Good Reason . . . . (3:37)
059 Since The Last Goodbye . . . . (4:35)
060 Don't Answer Me . . . . (4:12)
061 Dancing on a Highwire . . . . (4:23)
062 You Don't Believe . . . . (4:26)
063 Pipeline . . . . (3:57)
064 Ammonia Avenue . . . . (6:32)

Vulture Culture
065 Let's Talk About Me . . . . (4:29)
066 Separate Lives . . . . (4:59)
067 Days Are Numbers (The Traveller) . . . . . (4:31)
068 Sooner Or Later . . . . (4:25)
069 Vulture Culture . . . . (5:22)
070 Hawkeye . . . . (3:49)
071 Somebody Out There . . . . (4:55)
072 The Same Old Sun . . . . (5:25)

Stereotomy
073 Stereotomy . . . . (7:18)
074 Beaujolais . . . . (4:27)
075 Urbania . . . . (4:59)
076 Limelight . . . . (4:39)
077 In the Real World . . . . (4:20)
078 Where's the Walrus? . . . . (7:30)
079 Light of the World . . . . (6:19)
080 Chinese Wispers . . . . (1:00)
081 Stereotomy Two . . . . (1:20)

Gaudi
082 La Sagrada Familia . . . . (8:49)
083 Too Late . . . . (4:30)
084 Closer To Heaven . . . . (5:53)
085 Standing On Higher Ground . . . . (5:03)

086 Money Talks . . . . (4:26)
087 Inside Looking Out . . . . (6:22)
088 Paseo De Gracia . . . . (3:37)

Freudiana
089 The Nirvana Principle . . . . (3:44)
090 Freudiana . . . . (6:20)
091 I Am A Mirror . . . . (4:06)
092 Little Hans . . . . (3:15)
093 Dora . . . . (3:51)
094 Funny You Should Say That . . . . (4:36)
095 You're On Your Own . . . . (3:54)
096 Far Away From home . . . . (3:11)
097 Let Yourself Go . . . . (5:27)
098 Beyond The Pleasure Principle . . . . (3:13)
099 The Ring . . . . (4:22)
100 Sects Therapy . . . . (3:40)
101 No One Can Love You Better Than Me . . (5:40)
102 Don't Let The Moment Pass . . . . (3:40)
103 Upper Me . . . . (5:16)
104 Freudiana (2) . . . . (3:43)
105 Destiny . . . . (0:51)
106 There But For The Grace Of God . . . . . . (5:56)

Try Anything Once
107 The Three Of Me . . . . (5:52)
108 Turn It Up . . . . (6:13)
109 Wine From The Water . . . . (5:43)
110 Breakaway . . . . (4:07)
111 Mr. Time . . . . (8:17)
112 Jigue . . . . (3:24)
113 I'm Talking To You . . . . (4:38)
114 Siren Song . . . . (5:01)
115 Dreamscape . . . . (3:01)
116 Back Against The Wall . . . . (4:38)
117 Re-Jigue . . . . (2:28)
118 Oh Life (There Must Be More) . . . . (6:32)

the Time Machine
119 The Time Machine (Part 1) . . . . (4:54)
120 Temporalia . . . . (1:00)
121 Out Of The Blue . . . . (4:54)
122 Call Up . . . . (5:14)
123 Ignorance Is Bliss . . . . (6:45)
124 Rubber Universe . . . . (3:52)
125 The Call Of The Wild . . . . (5:22)
126 No Future In The Past . . . . (4:46)
127 Press Rewind . . . . (4:20)
128 The Very Last Time . . . . (3:42)
129 Far Ago And Long Away . . . . (5:15)
130 The Time Machine (Part 2) . . . . (1:49)
131 Dr. Evil Edit . . . . (3:23)

The Alan Parsons Project

Figure 3. Example CD backside of my Alan Parsons Project collection.

more conventional values.

```
\def\title#1.{%
  \vskip\baselineskip % blank space
  \penalty-100%
  {%
    \everypar{}%
    \leavevmode
    \rightskip 0pt%
    \leftskip 0pt%
    \hangafter 0%
    \hangindent 0pt%
    \parfillskip \fill
    \fontseries{bc}\selectfont
    #1\par\nobreak
  }
}
```

The macro starts with a blank line. The `\penalty-100` indicates that this is a good point for breaking a column. The remainder of the declarations are grouped, so they only affect the current paragraph. The definition finishes on a `\nobreak` to prevent a 'widow' title at the bottom of the column.

The typeset results are displayed in Figure 3. The full LaTeX source and input data to produce this can be downloaded from `http://wwww.ntg.nl/maps/33/cdcases`.

The Alan Parsons Project

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001 A Dream Within a Dream . . (4:13)
002 The Raven . . . .(3:57)
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005 (The System of) Doctor Tarr
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I Robot
012 I Robot . . . . (6:03)
013 I Wouldn't Want to Be Like
     You . . . . (3:23)
014 Some Other Time . . . .(4:05)
015 Breakdown . . . .(3:52)
016 Don't Let It Show . . . .(4:21)
017 The Voice . . . .(5:23)
018 Nucleus . . . .(3:31)
019 Day After Day (The Show
     Must Go on) . . . . (3:49)
020 Total Eclipse . . . .(3:09)
021 Genesis Ch.1. V.32 . . . . . .(3:28)

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025 One More River . . . .(4:17)
026 Can't Take It With You . . . .(5:04)
027 In The Lap Of The Gods . . .(5:30)
028 Pyromania . . . .(2:43)
029 Hyper-Gamma-Spaces . . . .(4:19)
030 Shadow Of A Lonely Man . .(5:34)

Eve
031 Lucifer . . . .(5:09)
032 You Lie down With Dogs . . (3:48)

033 I'd Rather Be a Man . . . . .(3:54)
034 You Won't Be There . . . . .(3:37)
035 Winding Me Up . . . .(4:02)
036 Damned If I Do . . . .(4:53)
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Turn of a Friendly Card
040 May Be a Price to Pay . . . .(4:57)
041 Games People Play . . . . . .(4:21)
042 Time . . . .(5:02)
043 I Don't Wanna Go Home . . (4:56)
044 The Gold Bug . . . . (4:33)
045 The Turn of a Friendly Card
     . . . . (16:21)

Eye in the Sky
046 Sirius . . . .(1:53)
047 Eye in the Sky . . . .(4:36)
048 Children of the Moon . . . . .(4:51)
049 Gemini . . . .(2:11)
050 Silence and I . . . . (7:23)
051 You're Gonna Get Your
     Fingers Burned . . . .(4:23)
052 Psychobabble . . . .(4:51)
053 Mammagamma . . . .(3:35)
054 Step by Step . . . .(3:54)
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062 You Don't Believe . . . .(4:26)
063 Pipeline . . . .(3:57)
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Vulture Culture
065 Let's Talk About Me . . . . . .(4:29)
066 Separate Lives . . . .(4:59)
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068 Sooner Or Later . . . .(4:25)
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070 Hawkeye . . . .(3:49)
071 Somebody Out There . . . .(4:55)
072 The Same Old Sun . . . . . . (5:25)

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092 Little Hans . . . . (3:15)
093 Dora . . . .(3:51)
094 Funny You Should Say That
     . . . . (4:36)
095 You're On Your Own . . . . .(3:54)
096 Far Away from home . . . .(3:11)
097 Let Yourself Go . . . . (5:27)

098 Beyond The Pleasure
     Principle . . . .(3:13)
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101 No One Can Love You Better
     Than Me . . . .(5:40)
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     . . . . (3:40)
103 Upper Me . . . .(5:16)
104 Freudiana (2) . . . .(3:43)
105 Destiny . . . .(0:51)
106 There But For The Grace Of
     God . . . . (5:56)

Try Anything Once
107 The Three Of Me . . . .(5:52)
108 Turn It Up . . . .(6:13)
109 Wine From The Water . . . .(5:43)
110 Breakaway . . . .(4:07)
111 Mr. Time . . . .(8:17)
112 Jigue . . . .(3:24)
113 I'm Talking To You . . . . . .(4:38)
114 Siren Song . . . . (5:01)
115 Dreamscape . . . . (3:01)
116 Back Against The Wall . . . .(4:38)
117 Re-Jigue . . . .(2:28)
118 Oh Life (There Must Be
     More) . . . .(6:32)

the Time Machine
119 The Time Machine (Part 1) (4:54)
120 Temporalia . . . . (1:00)
121 Out Of The Blue . . . .(4:54)
122 Call Up . . . .(5:14)
123 Ignorance Is Bliss . . . .(6:45)
124 Rubber Universe . . . .(3:52)
125 The Call Of The Wild . . . . .(5:22)
126 No Future In The Past . . . .(4:46)
127 Press Rewind . . . .(4:20)
128 The Very Last Time . . . . . .(3:42)
129 Far Ago And Long Away . . (5:15)
130 The Time Machine (Part 2) (1:49)
131 Dr. Evil Edit . . . .(3:23)

The Alan Parsons Project

Figure 4. CD backside in four columns.

Exploring alternatives

Looking at the examples of Figure 2, one thing that really stands out is what a difference a slightly wider or narrower column can make. For example, (1) might be used for a four-column, and (2) for a three-column layout. Although four columns have 1/3 more lines, (1) requires 2/5 more lines than (2). The optimal number of columns can only be found by experimenting, although as a general rule wider entries need wider columns.

To show the difference between three and four columns, Figure 4 shows the same listing as Figure 3, only in a four-column setting. Here, the space advantage goes to the four column layout. The good looks were somewhat compromised, though, because 14 entries needed to be spread over multiple lines against only one in the three column version. The overall feel is more staggered. I will spare you the results if the number of columns is set to *five*. But there is something else that can be done.

There is a remarkable parallel between the format of the input and the resulting index. But although this was by design, the similarity has no deeper meaning. There is, for instance, no relation between the three dots that appear in the input and the leaders that are inserted in the final typesetting. Even the parentheses around the track time are part of the macro template, so that we could format this entirely differently if we wanted.

This led me to think of an entirely different approach to the problem of a tight, but browsable layout. Why should the solution have to have columns? Why could guidance and directions not be given in another form? The human eye may have some surprises for us; I will present an alternative that will have a *horizontal* accent rather than *vertical*. Whether this is better, or more beautiful than the original I leave up to the reader to decide.

The layout in Figure 5 shows the results; we'll get to the TEXnicalities below.

One thing that stands out is the overall uniformness; there are no unsightly gaps.

Tales of Mystery and Imagination— 001 A Dream Within a Dream (4:13) **002** The Raven (3:57) **003** The Tell-tale Heart (4:38) **004** The Cask of Amontillado (4:33) **005** (The System of) Doctor Tarr and Professor Fether (4:20) *The Fall of the House of Usher:* **006** …Prelude (7:02) **007** …Arrival (2:39) **008** …Intermezzo (1:00) **009** …Pavane (4:36) **010** …Fall (0:51) **011** To One in Paradise (4:46) **—I Robot— 012** I Robot (6:03) **013** I Wouldn't Want to Be Like You (3:23) **014** Some Other Time (4:05) **015** Breakdown (3:52) **016** Don't Let It Show (4:21) **017** The Voice (5:23) **018** Nucleus (3:31) **019** Day After Day (The Show Must Go on) (3:49) **020** Total Eclipse (3:09) **021** Genesis Ch.1. V.32 (3:28) **—Pyramid— 022** Voyager (2:24) **023** What Goes Up… (3:31) **024** The Eagle Will Rise Again (4:22) **025** One More River (4:17) **026** Can't Take It With You (5:04) **027** In The Lap Of The Gods (5:30) **028** Pyromania (2:43) **029** Hyper-Gamma-Spaces (4:19) **030** Shadow Of A Lonely Man (5:34) **—Eve— 031** Lucifer (5:09) **032** You Lie down With Dogs (3:48) **033** I'd Rather Be a Man (3:54) **034** You Won't Be There (3:37) **035** Winding Me Up (4:02) **036** Damned If I Do (4:53) **037** Don't Hold Back (3:37) **038** Secret Garden (4:44) **039** If I Could Change You Mind (5:48) **—Turn of a Friendly Card— 040** May Be a Price to Pay (4:57) **041** Games People Play (4:21) **042** Time (5:02) **043** I Don't Wanna Go Home (4:56) **044** The Gold Bug (4:33) **045** The Turn of a Friendly Card (16:21) **—Eye in the Sky 046** Sirius (1:53) **047** Eye in the Sky (4:36) **048** Children of the Moon (4:51) **049** Gemini (2:11) **050** Silence and I (7:23) **051** You're Gonna Get Your Fingers Burned (4:23) **052** Psychobabble (4:51) **053** Mammagamma (3:35) **054** Step by Step (3:54) **055** Old and Wise (4:54) **—Ammonia Avenue— 056** Prime Time (5:03) **057** Let Me Go Home (3:21) **058** One Good Reason (3:37) **059** Since The Last Goodbye (4:35) **060** Don't Answer Me (4:12) **061** Dancing on a Highwire (4:23) **062** You Don't Believe (4:26) **063** Pipeline (3:57) **064** Ammonia Avenue (6:32) **—Vulture Culture— 065** Let's Talk About Me (4:29) **066** Separate Lives (4:59) **067** Days Are Numbers (The Traveller) (4:31) **068** Sooner Or Later (4:25) **069** Vulture Culture (5:22) **070** Hawkeye (3:49) **071** Somebody Out There (4:55) **072** The Same Old Sun (5:25) **—Stereotomy— 073** Stereotomy (7:18) **074** Beaujolais (4:27) **075** Urbania (4:59) **076** Limelight (4:39) **077** In the Real World (4:20) **078** Where's the Walrus? (7:30) **079** Light of the World (6:19) **080** Chinese Wispers (1:00) **081** Stereotomy Two (1:20) **Gaudi— 082** La Sagrada Familia (8:49) **083** Too Late (4:30) **084** Closer To Heaven (5:53) **085** Standing On Higher Ground (5:03) **086** Money Talks (4:26) **087** Inside Looking Out (6:22) **088** Paseo De Gracia (3:37) **—Freudiana— 089** The Nirvana Principle (3:44) **090** Freudiana (6:20) **091** I Am A Mirror (4:06) **092** Little Hans (3:15) **093** Dora (3:51) **094** Funny You Should Say That (4:36) **095** You're On Your Own (3:54) **096** Far Away From home (3:11) **097** Let Yourself Go (5:27) **098** Beyond The Pleasure Principle (3:13) **099** The Ring (4:22) **100** Sects Therapy (3:40) **101** No One Can Love You Better Than Me (5:40) **102** Don't Let The Moment Pass (3:40) **103** Upper Me (5:16) **104** Freudiana (2) (3:43) **105** Destiny (0:51) **106** There But For The Grace Of God (5:56) **—Try Anything Once— 107** The Three Of Me (5:52) **108** Turn It Up (6:13) **109** Wine From The Water (5:43) **110** Breakaway (4:07) **111** Mr. Time (8:17) **112** Jigue (3:24) **113** I'm Talking To You (4:38) **114** Siren Song (5:01) **115** Dreamscape (3:01) **116** Back Against The Wall (4:38) **117** Re-Jigue (2:28) **118** Oh Life (There Must Be More) (6:32) **—the Time Machine— 119** The Time Machine (Part 1) (4:54) **120** Temporalia (1:00) **121** Out Of The Blue (4:54) **122** Call Up (5:14) **123** Ignorance Is Bliss (6:45) **124** Rubber Universe (3:52) **125** The Call Of The Wild (5:22) **126** No Future In The Past (4:46) **127** Press Rewind (4:20) **128** The Very Last Time (3:42) **129** Far Ago And Long Away (5:15) **130** The Time Machine (Part 2) (1:49) **131** Dr. Evil Edit (3:23)

The Alan Parsons Project

The Alan Parsons Project

Figure 5. The same listing as before, only now *inline*.

The listing occupies an entire rectangular area. Since there is no space going into any leaders, this layout is definitely the most economic. This allows for a much larger interline space, which gives more 'air' and some welcome guidance along the very long lines.

The track numbers are now put in bold, which makes them stand out, strewn across the page like spots on a Dalmatian. The larger landmarks are formed by the boldface album titles, which are adorned with em-dashes for extra horizontal accenting.

So there it is: guidance and directions for the browsing eye. I would dare to stipulate that looking up the track number for a given song will, on average, take no longer in this version than in the column layout. I admit that counting the number of tracks of an album or calculating the total time of an album probably takes a little longer.

What is remarkable about this layout is that *it was generated from exactly the same input file as the original!* It just took a little more trickery.

In contrast with the column layout, where each entry was a paragraph, the inline listing is put in a single paragraph. We've seen the use of \parfillskip earlier, and here it is set to 0pt to make the listing come out exactly rectangular. With a long listing like this, TeX will have no trouble finding suitable breakpoints to make it happen. Here the paragraph balancing is really showing off.

The listing is placed in a \parbox with a predetermined width and height, so the margins around the text appear nicely uniform. The interline space is flexible, so the text will stretch to fill the desired height.

`\baselineskip 10pt plus 10pt`

Attentive readers will notice how the em-dashes disappear at the beginning and end of lines. If you remember the discussion about the leaders and how to protect them from being discarded, you'll probably have guessed (and rightly so) that the

em-dashes are in fact leaders.

```
\def\leaddash{\cleaders\hbox to 1em{\hss---\hss}\hskip 1em}
```

A stupid kludge was needed to make the dash disappear for the first title; since this does not appear at a line break, no glue is discarded. I had to insert a line break right at the beginning, and back the entire text up vertically to compensate for the blank line.

```
\vskip -6pt\mbox{}\\
```

The really tricky part was to read the input. I could not use `\everypar` again, since there is only one large paragraph. So I made the newline character an active character, to insert the `\entry` macro for every line.

```
\let\par\entry
\obeylines
```

That left me with handling the lines beginning with `\title`. In the column layout, the `\title` was read before the `\everypar` tokens were inserted, so they could be temporarily turned off. here, the newline character is seen *before* `\title`, so the `\entry` macro has to do some looking ahead.

```
\def\entry{\space\futurelet\next\bentry}
\def\bentry{\ifcat\noexpand\next0\tentry\fi}
```

The `\futurelet` allows the looking ahead of one token. So `\next` is set to be either `\title` or the first digit of the track number. Control is then passed to `\bentry`. This macro compares the category code of `\next` with that of a digit. The `\noexpand` is necessary because `\ifcat` would otherwise expand `\next` if it were `\title`. Digits have category code 12, while a control sequence has category code 16. If a digit is detected, `\tentry` is inserted which handles the entry like before.

```
\def\tentry#1 #2...(#3).{\tracknr{#1}\track{#2}\tracktime(#3)}
```

Otherwise nothing is inserted and the `\title` handles the line.

```
\def\title#1.{\leaddash{\fontseries{bc}\selectfont#1\leaddash}}
```

As can be seen, the inline lay-out has very little formatting work to do.

```
\def\tracknr#1{{\fontseries{bc}\selectfont #1}}
\def\track#1{\nobreak\space #1}}
\def\tracktime(#1){\nobreak\space(#1)}
```

The `\nobreaks` prevent breaking a line between the track number and title, or between the title and the time.

The full LaTeX source and input data to produce this layout can be downloaded from http://wwww.ntg.nl/maps/33/cdcases.

In conclusion, creating a good looking CD case layout is best left to TeX. The examples shown could not have been made with any common word processor. Furthermore, there is full separation of content and layout, which is the boon of today's information gurus. Whether you like columns or in-line, the input file is the same.

Postscriptum

I learned a lot about TeX during the writing of this article. I designed the layout several years ago and didn't bother to make it too clean. Writing about it in this detail forced me to clean up the code and verify everything for correctness (which never turned out to be the case *entirely*). Eventually I redid a lot of stuff. I wanted to show the input parsing strength by having an input format with hardly a control sequence in it (which the original had). With some extra effort, the last control sequences (`\titles`, mostly) could disappear as well. It is just a matter of comparing the catcodes, and making sure the title lines start with a letter instead of a number.

I have tried very hard to make sure the examples work as described; for those who are genuinely interested I will make the scripts and test files available on the Internet.

The idea to try an alternative, inline layout came as an afterthought, while I was already halfway through the article. Coding, experimenting and documenting was done in the last minute; I don't actually have any experience with the usability of the result. If anyone tries it out, I'm curious about what they think.

I owe many thanks to Wybo Dekker, who came up with the Ruby script mp3totex as an elegant replacement for the rather kludgy Python program I originally used. It can easily be enhanced to support larger collections of files and different output formats.

The mp3totex program, the macros and finished layouts in this article were for a CD collection of one band. The examples from Figure 2 are more suited for CDs with *various artists*, where it makes sense to include the artist name with the track. This requires some modifications to script and macros.

I created the layouts some years ago, and time is catching up with old technology. People are carrying around MP3 players the size of a deck of cards and ten times the storage of a CD. Already, DVDs are replacing CDs as the default optical medium.

I have no hope of ever creating a readable layout that will fit thousands of titles on the back of an iPod, but a DVD jewel case booklet sounds just about doable.

References

[1]   D. E. Knuth and M. F. Plass. Breaking paragraphs into lines.   In *Digital Typography*, volume 78 of *CSLI Lecture Notes*, chapter 3, pages 67–155. CSLI Publications, Stanford, California, 1998.   Originally published in Software—Practice and Experience **11** (1981), 1119–1184.

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