leaders   **1**

`leaders.`   You can use *leaders* to fill a space with copies of a pattern, e.g., to put repeated dots between a title and a page number in a table of contents. A leader is a single copy of the pattern. The specification of leaders contains three pieces of information:

1) what a single leader is
2) how much space needs to be filled
3) how the copies of the pattern should be arranged within the space

TeX has three commands for specifying leaders: `\leaders`, `\cleaders`, and `\xleaders` (p. '`\leaders`'). The argument of each command specifies the leader. The command must be followed by glue; the size of the glue specifies how much space is to be filled. The choice of command determines how the leaders are arranged within the space.

Here's an example showing how `\leaders` works:

```
\def\dotting{\leaders\hbox to 1em{\hfil.\hfil}\hfil}
\line{The Political Process\dotting 18}
\line{Bail Bonds\dotting 26}
```

Here we've put the leaders and their associated glue into a macro definition so that we can conveniently use them in two places. This input produces:

The Political Process   18
Bail Bonds   26

The hbox following `\leaders` specifies the leader, namely, an hbox 1 em wide containing a dot at its center. The space is filled with copies of this box, effectively filling it with dots whose centers are 1 em apart. The following `\hfil` (the one at the end of the macro definition) is glue that specifies the space to be filled. In this case it's whatever space is needed to fill out the line. By choosing `\leaders` rather than `\cleaders` or `\xleaders` we've insured that the dots on different lines line up with each other.

In general, the space to be filled acts as a window on the repeated copies of the leader. TeX inserts as many copies as possible, but some space is usually left over—either because of where the leaders fall within the window or because the width of the window isn't an exact multiple of the width of the leader. The difference among the three commands is in how they arrange the leaders within the window and how they distribute any leftover space:

- For `\leaders`, TeX first produces a row of copies of the leader. It then aligns the start of this row with the left end of the innermost box B that is to contain the result of the `\leaders` command. In the two-line example above, B is a box produced by `\line`. Those leaders that fit entirely in the window are placed into B, and the leftover space at the left and right ends is left empty. The picture

2   \   §*0*

is like this:

. . . .
⇓

The Political Process | window | 18

⇓

The Political Process   18
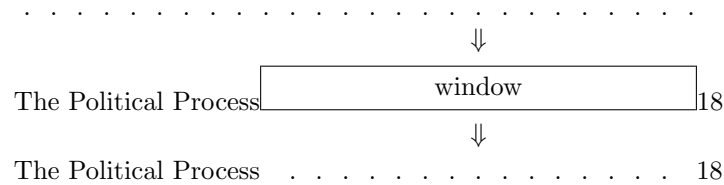
This procedure ensures that in the two-line example on the previous page, the dots in the two lines are vertically aligned (since the reference points of the hboxes produced by `\line` are vertically aligned).

- For `\cleaders`, TEX centers the leaders within the window by dividing the leftover space between the two ends of the window. The leftover space is always less than the width of a single leader.
- For `\xleaders`, TEX distributes the leftover space evenly within the window. In other words, if the leftover space is w and the leader is repeated n times, TEX puts space of width $w/(n + 1)$ between adjacent leaders and at the two ends of the leaders. The effect is usually to spread out the leaders a little bit. The leftover space for `\xleaders`, like that for `\cleaders`, is always less than the width of a single leader.

So far we've assumed that the leaders consist of hboxes arranged horizontally. Two variations are possible:

1) You can use a rule instead of an hbox for the leader. TEX makes the rule as wide as necessary to extend across the glue (and the three commands are equivalent).
2) You can produce vertical leaders that run down the page by including them in a vertical list rather than a horizontal list. In this case you need vertical glue following the leaders.

See pages 223–225 of *The TEXbook* for the precise rules that TEX uses in typesetting leaders.