

$$x = 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21 + 23 + 25 + 27 + 29 + 31 \quad (6)$$

$$y = 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20 + 22 + 24 + 26 + 28 + 30 \quad (7)$$

The result of which is shown at the top of this page. This technique allows the definition of the equations to be positioned arbitrarily as needed so that the (floating) equations will appear where desired. The “[t]” option forces L<sup>A</sup>T<sub>E</sub>X to do its best to place the equations at the top of the next page. Had it been “[b]” instead, then the stfloats (or even better, dblfloatfix) package would need to be loaded and the \vspace command, followed by the \hrulefill command, would have to occur *before* the equations in the figure.

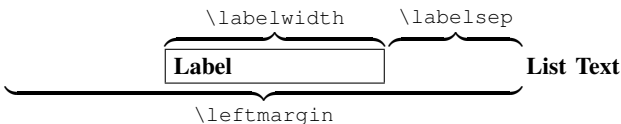
The double column equations can then be referenced in the main text like:

```
% The previous equation was number five.
% Account for the double column equations here.
\addtocounter{equation}{2}
As can be seen in (\ref{eqn_dbl_x}) and
(\ref{eqn_dbl_y}) at the top of the page ...
```

Thankfully, double column equations are rare.

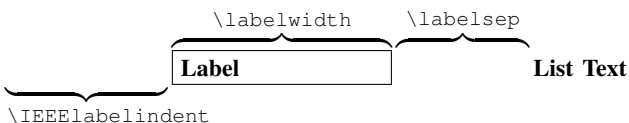
## XI. LISTS

The traditional L<sup>A</sup>T<sub>E</sub>X itemize, enumerate and description (IED) list environments are ill-suited for producing the style of lists used in IEEE publications. The main problem is that they do not provide the user a means for controlling the parameters of the resultant list. Furthermore, making global changes to the parameters of the underlying \list will result (often unexpectedly to a user) in the improper behavior of other commands that depend on it, such as \quote. Finally, L<sup>A</sup>T<sub>E</sub>X’s \list considers the left margin of the list text to be the reference point that determines how the list is positioned relative to the left margin of the main text:



This contrasts with IEEE lists which use the label box as the reference point for the list structure. i.e., for a given circumstance, the list labels will be indented by a certain amount, the list text block will be indented from the label boxes by a given amount and these spacings will determine the position of the list text.

For these reasons, IEEEtran provides enhanced IED list environments that make it much easier to produce IEEE style lists. The underlying \list remains the same as in traditional L<sup>A</sup>T<sub>E</sub>X so as not to break code that depends upon it. IEEEtran uses a new length variable, \IEEElabelindent, so that users can specify IED list structures directly in IEEE fashion:



The IEEEtran IED lists ignore all “external” changes to the list length parameters. Instead, IED lists are controlled exclusively via two interfaces:

- 1) “global” control via the \IEEEiedlistdecl command; and
- 2) “local” control via an *optional* argument that can be provided to \itemize, \enumerate, and \description.

For example, declaring

```
\renewcommand{\IEEEiedlistdecl}{\settowidth{\labelwidth}{Hello}}
```

in an IEEEtran document will set the default width of the label boxes in *all* later IED lists to be equal to the width of “Hello”. Note: Because setting a \labelwidth is so commonly performed, IEEEtran provides a command: \IEEEsetlabelwidth{X} which is a shorter form of: \settowidth{\labelwidth}{X}.

The local control is used if the parameters are to apply only to an individual IED list:

```
\begin{itemize}[\IEEEsetlabelwidth{\gamma$}]
```

Within an IED list, the local control is executed just after the global control and therefore, the commands in the local control can both augment and countermand those in the global control. Please note that the code in the local and global controls are executed in the same manner as normal L<sup>A</sup>T<sub>E</sub>X code. Therefore, the user should ensure that unwanted blank spaces do not appear in the controls. If a control definition is too long to fit on one line, shield the end of lines with “%” to prevent them from being interpreted as blanks (Section IV-B1 has some information on this topic). Also, note that the L<sup>A</sup>T<sub>E</sub>X parser requires that braces be placed around commands with optional arguments that are placed directly within the optional arguments of other commands:

```
\begin{itemize}[{\mycmd[1]{example}}]
```

This IEEEtran IED implementation makes it easy to control IED lists, even when they are deeply nested.

The default spacings the IED lists use are stored in various length (not macro) commands. Changes to these “master” defaults are rarely needed and should be done only at the beginning of the document, *not in the IED list controls*. These constants will now be briefly explained.

**\IEEElabelindent:** This length is the default amount the itemized list label boxes are indented from the left margin. The IEEE seems to use at least two different values. For example, in the IEEE/OSA JOURNAL OF LIGHTWAVE TECHNOLOGY and the IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS, they tend to use an indentation equal to \parindent, while for IEEE TRANSACTIONS ON COMMUNICATIONS they tend to indent itemized lists a little more (1.3\parindent). The shorter length is stored as \IE

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