

# The **octave** Package for Typesetting Musical Pitches with Octave Designations

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There are two standard ways of indicating the octave of a musical pitch:

1. The Helmholtz system, which uses subscript numerals after the pitch letter name, where “middle C” is  $C_4$
2. The traditional system, which uses upper- and lowercase letters followed by prime (tick) marks, where “middle C” is  $c'$  and an octave higher is  $c''$ .

This package allows you to typeset pitch names conveniently using either method (or even switching between) without worrying about typography, with a simple, semantically meaningful interface. Authors can write their documents without worrying about which system of nomenclature their editor or press will prefer. Simply changing the option with which the package is called will change the display of all the pitches in the document that have been written with this package’s commands.

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## 1 Package Options

`number` (Default) Use Helmholtz numbers  
`prime` Use the traditional system with prime/tick marks

To use octave numbers, just add `\usepackage{octave}` to your preamble.  
To use the traditional system, write `\usepackage[prime]{octave}` instead.

## 2 Switching Systems within One Document

At any time, you can change from one system to the other.

`\octaveprimes` Switch to the traditional system (prime/tick marks)  
`\octavenumbers` Switch to the Helmholtz system (numbers)

## 3 Style

The default setup (stored in the command `\pitchfont`) is for pitch letters and numbers in the Helmholtz system to be in the normal font, while pitch letters and prime marks are in italic. You can change this, for example:

`\renewcommand{\pitchfont}{\mdseries}`.

## 4 Entering Pitch Names

To enter a pitch name, use the `\pitch` command. It takes three arguments:

1. (Mandatory) Letter name of the pitch: Can be upper- or lowercase; the package will adjust the case as necessary
2. (Optional, in square brackets) Accidental command, e.g., `$_sharp$` or `\sh` from the `semantic-markup` package
3. (Mandatory) Number of the pitch in the Helmholtz system

Yes, the package requires you to use the numbered system, even if you want the output to be in the traditional system. Thus middle C is `\pitch{C}{4}`, and an octave and a semitone above that is `\pitch{C}[\sh]{5}` (using the `semantic-markup` package for the accidental).

## 5 Table of Octave Designations in the Two Systems

The package also provides the `\octavetable` which displays a comparison of the two systems, shown in table 1.

Table 1: Pitch designations in traditional (**prime**) and Helmholtz (**number**) systems

$C''$	$C_0$
$C'$	$C_1$
$C$	$C_2$
$c$	$C_3$
$c'$	$C_4$
$c''$	$C_5$
$c'''$	$C_6$
$c''''$	$C_7$

## 6 Code

```

\NeedsTeXFormat{LaTeX2e}
\ProvidesPackage{octave}
[2017/08/21 Octave designations in Helmholtz or traditional style]

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%
% This work has the LPPL maintenance status ‘maintained’.
% The Current Maintainer of this work is Andrew A. Cashner.
% This work consists of the package file octave.sty
% and the documentation file octave.tex.

% CHANGE LOG
% 2017-08-21 First version on CTAN

\newif\if@OctaveNumber
\@OctaveNumbertrue % Use Helmholtz numbers by default

\DeclareOption{prime} {\@OctaveNumberfalse}
\DeclareOption{number} {\@OctaveNumbertrue}

\ProcessOptions\relax

```

```

\RequirePackage{xparse}

% Allow user to switch styles mid-document
\NewDocumentCommand{\octaveprimes} {}{\@OctaveNumberfalse}
\NewDocumentCommand{\octavenumbers} {}{\@OctaveNumbertrue}

%*****
% Main user command to enter pitch
% example: middle C is \pitch{c}{4}, semitone up is \pitch{C}[\sh]{4}
% #1 Pitch letter (can be lower or uppercase)
% #2 Optional accidental (e.g., $\flat$, or \fl{} from semantic-markup package)
% #3 Octave number (Helmholtz numbers, middle C = 4)
\NewDocumentCommand{\pitch}{ m o m }{%
  \if@OctaveNumber
    {\pitchfont{\MakeUppercase{#1}%
      \IfValueTF{#2}{#2}{}\textsubscript{#3}}}%
  \else
    {\pitchfont{%
      \@GetOctaveTick{#1}[#2]{#3}%
    }}%
  \fi
}

% Font for pitch and octave designation, default italics for prime style
% User can change with \renewcommand
\NewDocumentCommand{\pitchfont}{}{%
  \if@OctaveNumber\mdseries%
  \else\itshape%
  \fi
}

%*****
% If using ticks, determine the right letter and octave symbols to print
%
% Octave  Designation
%      0  C''
%      1  C'
%      2  C
%      3  c
%      4  c'
%      5  c''
%
% The input octave number can be less than zero or more than 5; this will just
% produce a lot of tick marks (e.g., \pitch{c}{8} => c''''')

```

```

% Mnemonic for selecting upper or lowercase letters,
% used as argument to \@PrintLetter
\NewDocumentCommand{\@OctaveUpper}{}{1}
\NewDocumentCommand{\@OctaveLower}{}{0}

% Get the letter of the proper case and the right number of ticks.
% #1 Pitch letter
% #2 Optional accidental
% #3 Pitch number in Helmholtz notation
\newcount\@OctaveNum
\NewDocumentCommand{\@GetOctaveTick}{ m o m }{%
  \@OctaveNum = #3
  \ifnum\@OctaveNum < 3
    % Octave < 3: Letter lowercase + (-OctaveNum + 2)ticks
    \@PrintLetter{\@OctaveUpper}{#1}%
    \multiply\@OctaveNum by -1
    \advance\@OctaveNum by 2
  \else
    % Octave >= 3: Letter uppercase + (OctaveNum - 3)ticks
    \ifnum\@OctaveNum > 2
      \@PrintLetter{\@OctaveLower}{#1}%
      \advance\@OctaveNum by -3
    \fi
  \fi
  % Print accidental if there is one
  \IfValueTF{#2}{\@SpacedAccidental{#2}}{}%
  % Print ticks; No need to do so if octave 2 or 3
  \ifnum\@OctaveNum > 0
    \kern1pt\@PrintTicks{\@OctaveNum}%
  \fi
}

% Accidental with spacing around it
% #1 accidental symbol code
\NewDocumentCommand{\@SpacedAccidental}{ m }{%
  \kern0.4pt#1\kern-0.4pt%
}

% Print letter in proper case
% #1 \@OctaveUpper (=1) or \@OctaveLower (=0)
% #2 Character to print
\NewDocumentCommand{\@PrintLetter}{ m m }{%
  \ifnum #1 = \@OctaveLower
    \MakeLowercase{#2}%
  \else
    \MakeUppercase{#2}%
  \fi
}

```

```

}

% Print sequence of tick marks
\newcount\@TickNum
\NewDocumentCommand{\@PrintTicks}{ m }{%
  \@TickNum = #1%
  \loop
    \@Tick{}%
    \advance\@TickNum by -1
    \ifnum\@TickNum > 0
      \repeat
}
\NewDocumentCommand{\@Tick}{}{\ensuremath{'}}

%*****
% Octave comparison table for demonstration
\newcounter{TableOctave}
\NewDocumentCommand{\octavetable}{}{%
  \def\@TablePitchNames{%
    \loop
      \edef\@TablePitchNames{%
        \@TablePitchNames
        {\octaveprimes \pitch{C}{\the@TableOctave}} &
        {\octavenumbers \pitch{C}{\the@TableOctave}}\tabularnewline
      }%
      \stepcounter{TableOctave}%
      \ifnum\value{TableOctave} < 8
        \repeat
      %
      \begin{tabular}{ll}
        \@TablePitchNames
      \end{tabular}%
    }
}

\endinput

```