## Colors as Hue, Saturation, and Lightness

Antenna House Formatter can use HSL colors by the hsl() and hsla() functions. Colors that are specified as hue, saturation, and lightness (HSL) values are more intuitive to use or to adjust than colors that are encoded by their red, green, and blue components. It is also easier to make sets of complementary or matching HSL colors by varying one of the hue, saturation, or lightness values to make the different colors. Use hsl(<H>, <S>, <L>) to specify a color, and use hsla(<H>, <S>, <L>, <A>) to specify a color with an additional alpha component representing its opacity. See also "hsl()" and "hsla()" in the Online Manual for details.

Hue is represented as the number of an angle of the color circle (i.e., the rainbow represented in a circle), where red is 0° (and 360°), green is 120°, and blue is 240°. Saturation, lightness, and opacity are represented either as 0% to 100% or 0.0 to 1.0. 100% saturation is full saturation, and 0% saturation is a shade of gray. 100% lightness is white, 50% lightness is "normal", and 0% lightness is black. 100% opacity is solid color, and 0% opacity is transparent.

The following example for the "cornflowerblue" named color (#6495ED, equivalent to hsl(219, 79%, 66%)) shows how colors can be adjusted by altering the hue, saturation and lightness values.

| cornflowerblue (#6495ED) | 20% more saturated | Saturation         | 20% less saturated |  |  |  |
|--------------------------|--------------------|--------------------|--------------------|--|--|--|
| 20% lighter              | hsl(219, 99%, 86%) | hsl(219, 79%, 86%) | hsl(219, 59%, 86%) |  |  |  |
| Lightness                | hsl(219, 99%, 66%) | hsl(219, 79%, 66%) | hsl(219, 59%, 66%) |  |  |  |
| 20% darker               | hsl(219, 99%, 46%) | hsl(219, 79%, 46%) | hsl(219, 59%, 46%) |  |  |  |
| 219 249 279              | 309 339 9          | 39 69 99           | 129 159 189        |  |  |  |

This example is for the "red" named color (#FF0000, equivalent to hsl(0, 100%, 50%)). Note that as "red" is 100% saturated, it cannot be made more saturated, so 120% saturation is clipped to 100%.

| red (#FF0000) | 20% more saturated | Saturation        | 20% less saturated |  |  |  |
|---------------|--------------------|-------------------|--------------------|--|--|--|
| 20% lighter   | hsl(0, 120%, 70%)  | hsl(0, 100%, 70%) | hsl(0, 80%, 70%)   |  |  |  |
| Lightness     | hsl(0, 120%, 50%)  | hsl(0, 80%, 50%)  |                    |  |  |  |
| 20% darker    | hsl(0, 120%, 30%)  | hsl(0, 100%, 30%) | hsl(0, 80%, 30%)   |  |  |  |
| 0 30 60       | 90 120 150         | 180 210 240       | 270 300 330        |  |  |  |

There are numerous "color picker" Internet sites that support picking a color or a range of related colors by HSL values. For example, <a href="http://www.workwithcolor.com/hsl-color-picker-01.htm">http://www.workwithcolor.com/hsl-color-picker-01.htm</a> and <a href="http://www.workwithcolor.com/mm-color-blender-01.htm">http://www.workwithcolor.com/mm-color-blender-01.htm</a>.

The following table<sup>(1)</sup> presents a range of saturation (S) and lightness (L) values for 12 hues (H). The hues are spaced at  $30^{\circ}$  intervals around the color circle, starting at  $0^{\circ}$ .

<sup>1.</sup> The table was made to fit on one page by specifying axf:overflow-condense="font-size" and Antenna House Formatter automatically adjusting the font size. See "axf:overflow-condense" in the Online Manual for details.

| H: 0 (0° – Reds)            |          |              |         |       | H: 30 (30° – Oranges)                                       |                            |          |              |         | H: 60 (60° – Yellows) |   |                       |         |              |         |      |  |
|-----------------------------|----------|--------------|---------|-------|---|----------------------------|----------|--------------|---------|-----------------------|---|-----------------------|---------|--------------|---------|------|--|
|                             |          | <b>← S</b> → |         |       |   |                            |          | <b>←</b> S → |         |                       |   |                       |         | ← S →        |         |      |  |
| 100%                        | 75%      | 50%          | 25%     | 0%    | L↓  | 100%                       | 75%      | 50%          | 25%     | 0%                    | L↓  | 100%                  | 75%     | 50%          | 25%     | 0%   |  |
|                             |          |              |         |       | 100%  |                            |          |              |         |                       | 100%  |                       |         |              |         |      |  |
|                             |          |              |         |       | 88%   |                            |          |              |         |                       | 88%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 75%   |                            |          |              |         |                       | 75%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 63%   |                            |          |              |         |                       | 63%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 50%   |                            |          |              |         |                       | 50%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 38%   |                            |          |              |         |                       | 38%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 25%   |                            |          |              |         |                       | 25%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 13%   |                            |          |              |         |                       | 13%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 0%  |                            |          |              |         |                       | 0%  |                       |         |              |         |      |  |
| H: 90 (90° – Yellow-Greens) |          |              |         |       | H: 120 (120° – Greens)                                      |                            |          |              |         |                       | H: 150 (150° – Green-Cyans)                                 |                       |         |              |         |      |  |
| ← <b>S</b> →                |          |              |         |       |   |                            |          | <b>← S</b> → |         |                       |   |                       |         | ← S →        |         |      |  |
| 100%                        | 75%      | 50%          | 25%     | 0%    | $\mathbf{L}\downarrow$                                      | 100%                       | 75%      | 50%          | 25%     | 0%                    | $\mathbf{L}\downarrow$                                      | 100%                  | 75%     | 50%          | 25%     | 0%   |  |
|                             |          |              |         |       | 100%  |                            |          |              |         |                       | 100%  |                       |         |              |         |      |  |
|                             |          |              |         |       | 88%   |                            |          |              |         |                       | 88%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 75%   |                            |          |              |         |                       | 75%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 63%   |                            |          |              |         |                       | 63%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 50%   |                            |          |              |         |                       | 50%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 38%   |                            |          |              |         |                       | 38%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 25%   |                            |          |              |         |                       | 25%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 13%   |                            |          |              |         |                       | 13%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 0%  |                            |          |              |         |                       | 0%  |                       |         |              |         |      |  |
|                             | H: 180   | (180° –      | Cyans)  |       |   | H: 210 (210° – Cyan-Blues) |          |              |         |                       |   | H: 240 (240° – Blues) |         |              |         |      |  |
|                             |          | ← S →        |         |       |   |                            |          | <b>←</b> S → |         |                       |   |                       |         | <b>←</b> S → |         |      |  |
| 100%                        | 75%      | 50%          | 25%     | 0%    | L↓  | 100%                       | 75%      | 50%          | 25%     | 0%                    | L↓  | 100%                  | 75%     | 50%          | 25%     | 0%   |  |
|                             |          |              |         |       | 100%  |                            |          |              |         |                       | 100%  |                       |         |              |         |      |  |
|                             |          |              |         |       | 0.007   |                            |          |              |         |                       |   |                       |         |              |         |      |  |
|                             |          |              |         |       | 88%   |                            |          |              |         |                       | 88%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 75%   |                            |          |              |         |                       | 88%<br>75%  |                       |         |              |         |      |  |
|                             |          |              |         |       |   |                            |          |              |         |                       |   |                       |         |              |         |      |  |
|                             |          |              |         |       | 75%   |                            |          |              |         |                       | 75%   |                       |         |              |         |      |  |
|                             |          |              |         |       | 75%<br>63%  |                            |          |              |         |                       | 75%<br>63%  |                       |         |              |         |      |  |
|                             |          |              |         |       | 75%<br>63%<br>50%<br>38%<br>25%                             |                            |          |              |         |                       | 75%<br>63%<br>50%<br>38%<br>25%                             |                       |         |              |         |      |  |
|                             |          |              |         |       | 75%<br>63%<br>50%<br>38%<br>25%<br>13%                      |                            |          |              |         |                       | 75% 63% 50% 38% 25% 13%                                     |                       |         |              |         |      |  |
|                             |          |              |         |       | 75%<br>63%<br>50%<br>38%<br>25%                             |                            |          |              |         |                       | 75%<br>63%<br>50%<br>38%<br>25%                             |                       |         |              |         |      |  |
| H: 2                        | 270 (270 | ° – Blue     | -Magen  | ntas) | 75%<br>63%<br>50%<br>38%<br>25%<br>13%                      | H                          | : 300 (3 | 00° - M      | lagenta | s)                    | 75% 63% 50% 38% 25% 13%                                     | H: 3                  | 30 (330 | ° – Mag      | genta-R | eds) |  |
|                             |          | ← S →        |         |       | 75%<br>63%<br>50%<br>38%<br>25%<br>13%<br>0%                |                            |          | ← S →        |         |                       | 75%<br>63%<br>50%<br>38%<br>25%<br>13%<br>0%                |                       |         | ← S →        |         |      |  |
| H: 2                        | •        |              | e-Magen | ntas) | 75% 63% 50% 38% 25% 13% 0%                                  | H                          |          |              | lagenta | s)                    | 75% 63% 50% 38% 25% 13% 0%                                  | H: 3                  |         |              | genta-R | eds) |  |
|                             |          | ← S →        |         |       | 75% 63% 50% 38% 25% 13% 0%                                  |                            |          | ← S →        |         |                       | 75% 63% 50% 38% 25% 13% 0%                                  |                       |         | ← S →        |         |      |  |
|                             |          | ← S →        |         |       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88%                     |                            |          | ← S →        |         |                       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88%                     |                       |         | ← S →        |         |      |  |
|                             |          | ← S →        |         |       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75%                 |                            |          | ← S →        |         |                       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75%                 |                       |         | ← S →        |         |      |  |
|                             |          | ← S →        |         |       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75% 63%             |                            |          | ← S →        |         |                       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75% 63%             |                       |         | ← S →        |         |      |  |
|                             |          | ← S →        |         |       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75% 63% 50%         |                            |          | ← S →        |         |                       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75% 63% 50%         |                       |         | ← S →        |         |      |  |
|                             |          | ← S →        |         |       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75% 63% 50% 38%     |                            |          | ← S →        |         |                       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75% 63% 50% 38%     |                       |         | ← S →        |         |      |  |
|                             |          | ← S →        |         |       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75% 63% 50% 38% 25% |                            |          | ← S →        |         |                       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75% 63% 50% 38% 25% |                       |         | ← S →        |         |      |  |
|                             |          | ← S →        |         |       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75% 63% 50% 38%     |                            |          | ← S →        |         |                       | 75% 63% 50% 38% 25% 13% 0%  L↓ 100% 88% 75% 63% 50% 38%     |                       |         | ← S →        |         |      |  |