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Television Engineering Formulas

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List of 17 Television Engineering Formulas

Television Engineering

Fundamental Parameters

1) Horizontal Frequency

$$\text{fx } f_{\text{hzt}} = N_L \cdot \text{FPS}$$

[Open Calculator !\[\]\(de95854c7ee024cfadc48187bbb781b2_img.jpg\)](#)

$$\text{ex } 48\text{Hz} = 2 \cdot 24$$

2) One Horizontal Line

$$\text{fx } L_{\text{ht}} = \frac{L_{\text{oh}}}{s}$$

[Open Calculator !\[\]\(6a9b39b98eb945faa14c645ec99e4eaa_img.jpg\)](#)

$$\text{ex } 8 = \frac{5}{0.625\text{b/s}}$$

3) One Horizontal Line Scan

$$\text{fx } L_{\text{hc}} = \frac{\text{HR}}{2 \cdot \text{BW}}$$

[Open Calculator !\[\]\(f1c5da15572e3e09d343161be98f508d_img.jpg\)](#)

$$\text{ex } 6.800815 = \frac{534}{2 \cdot 39.26}$$



4) One Horizontal Line Tracing

$$\text{fx } L_{ht} = \frac{L_{oh}}{s}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

$$\text{ex } 8 = \frac{5}{0.625b/s}$$

5) One Horizontal Time

$$\text{fx } T_h = \frac{VRT}{L_h}$$

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

$$\text{ex } 70ms = \frac{1400ms}{20}$$

6) Video Bandwidth

$$\text{fx } BW = \frac{HR}{2 \cdot L_{hc}}$$

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

$$\text{ex } 39.26471 = \frac{534}{2 \cdot 6.8}$$

7) Video Bandwidth Signal

$$\text{fx } s = \frac{L_{oh}}{L_{ht}}$$

[Open Calculator !\[\]\(b64b40baaee5acddc1eab8538ba84754_img.jpg\)](#)

$$\text{ex } 0.625b/s = \frac{5}{8}$$



Resolution Parameters

8) Aspect Ratio

$$\text{fx } AR = \frac{w}{h}$$

[Open Calculator !\[\]\(23d9fc146e83b5c3013cfa32c784f8d5_img.jpg\)](#)

$$\text{ex } 1.780151 = \frac{160\text{cm}}{89.88\text{cm}}$$

9) Height of Rectangle Picture Frame

$$\text{fx } h = \frac{w}{AR}$$

[Open Calculator !\[\]\(aa53ad6fea213b8b2226d3077e30533a_img.jpg\)](#)

$$\text{ex } 89.88764\text{cm} = \frac{160\text{cm}}{1.78}$$

10) Horizontal Resolution

$$\text{fx } HR = BW \cdot (2 \cdot L_{hc})$$

[Open Calculator !\[\]\(626ce8ac21792b9405bfddfea8e0c96a_img.jpg\)](#)

$$\text{ex } 533.936 = 39.26 \cdot (2 \cdot 6.8)$$

11) Kell Factor or Resolution Factor

$$\text{fx } KF = \frac{L_h}{N_L}$$

[Open Calculator !\[\]\(c1168d6a8b365d11e842ece304635fa7_img.jpg\)](#)

$$\text{ex } 10 = \frac{20}{2}$$



12) Number of Frames Per Sec

$$\text{fx } \text{FPS} = \frac{f_{\text{hzi}}}{N_L}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

$$\text{ex } 24 = \frac{48\text{Hz}}{2}$$

13) Number of Horizontal Lines Lost during Vertical Retrace

$$\text{fx } L_h = \frac{\text{VRT}}{T_h}$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

$$\text{ex } 20 = \frac{1400\text{ms}}{70\text{ms}}$$

14) Number of Lines in Frame

$$\text{fx } N_L = \frac{f_{\text{hzi}}}{\text{FPS}}$$

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

$$\text{ex } 2 = \frac{48\text{Hz}}{24}$$

15) Vertical Resolution (VR)

$$\text{fx } \text{VR} = N_L \cdot \text{KF}$$

[Open Calculator !\[\]\(7bc43b319a082987e20f7bf78f4bab80_img.jpg\)](#)

$$\text{ex } 20.1 = 2 \cdot 10.05$$



16) Vertical Retrace Time

$$\text{fx } \text{VRT} = L_h \cdot T_h$$

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

$$\text{ex } 1400\text{ms} = 20 \cdot 70\text{ms}$$

17) Width of Rectangle Picture

$$\text{fx } w = h \cdot \text{AR}$$

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

$$\text{ex } 159.9864\text{cm} = 89.88\text{cm} \cdot 1.78$$







Variables Used

- **AR** Aspect Ratio
- **BW** Video Bandwidth
- **f_{hzi}** Horizontal Frequency (*Hertz*)
- **FPS** Number of Frames per Second
- **h** Height of Rectangle Picture Frame (*Centimeter*)
- **HR** Horizontal Resolution
- **KF** Kell Factor
- **L_h** Horizontal Lines Lost
- **L_{hc}** One Horizontal Line Scan
- **L_{ht}** One Horizontal Line Tracing
- **L_{oh}** One Horizontal Line
- **N_L** Number of Lines in Frame
- **s** Video Bandwidth Signal (*Bit Per Second*)
- **T_h** One Horizontal Time (*Millisecond*)
- **VR** Vertical Resolution
- **VRT** Vertical Retrace Time (*Millisecond*)
- **w** Width of Rectangle Picture (*Centimeter*)









Constants, Functions, Measurements used

- **Measurement: Length** in Centimeter (cm)
Length Unit Conversion 
- **Measurement: Time** in Millisecond (ms)
Time Unit Conversion 
- **Measurement: Frequency** in Hertz (Hz)
Frequency Unit Conversion 
- **Measurement: Bandwidth** in Bit Per Second (b/s)
Bandwidth Unit Conversion 



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