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# What is SWR

A simple explanation, hopefully

Find this at pradiofun.com

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# SWR Calculation

- Voltage Standing Wave Ratio

$$VSWR = \frac{\text{Voltage forward} + \text{Voltage reflected}}{\text{Voltage forward} - \text{Voltage reflected}}$$

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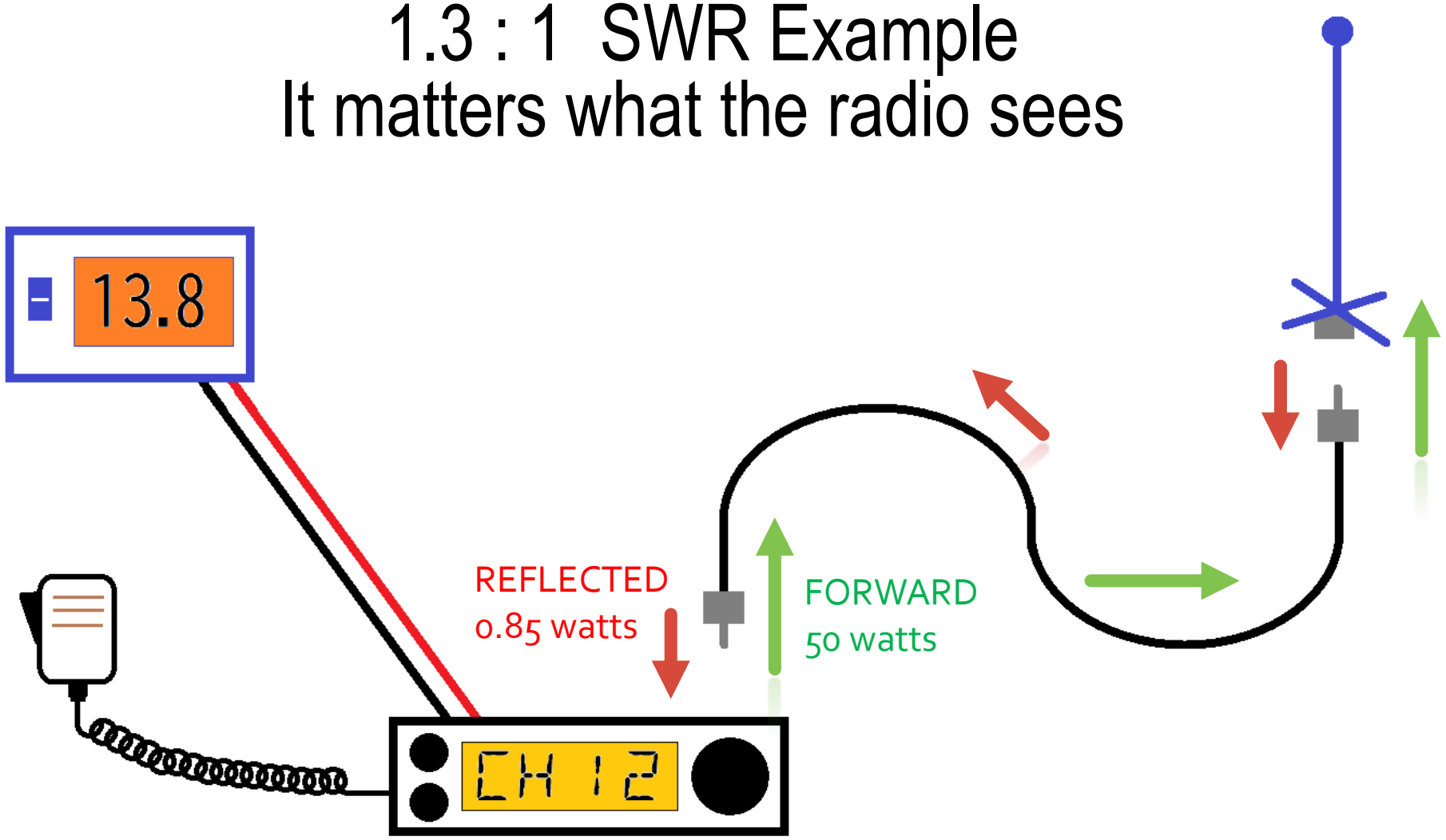
# Forward vs. Reflected power

## 1.3 : 1 SWR Example
## It matters what the radio sees



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# SWR Calculation

- Standing Wave Ratio using POWER (wattage)

$$VSWR = \frac{1 + \sqrt{\frac{\text{Power reflected}}{\text{Power forward}}}}{1 - \sqrt{\frac{\text{Power reflected}}{\text{Power forward}}}}$$

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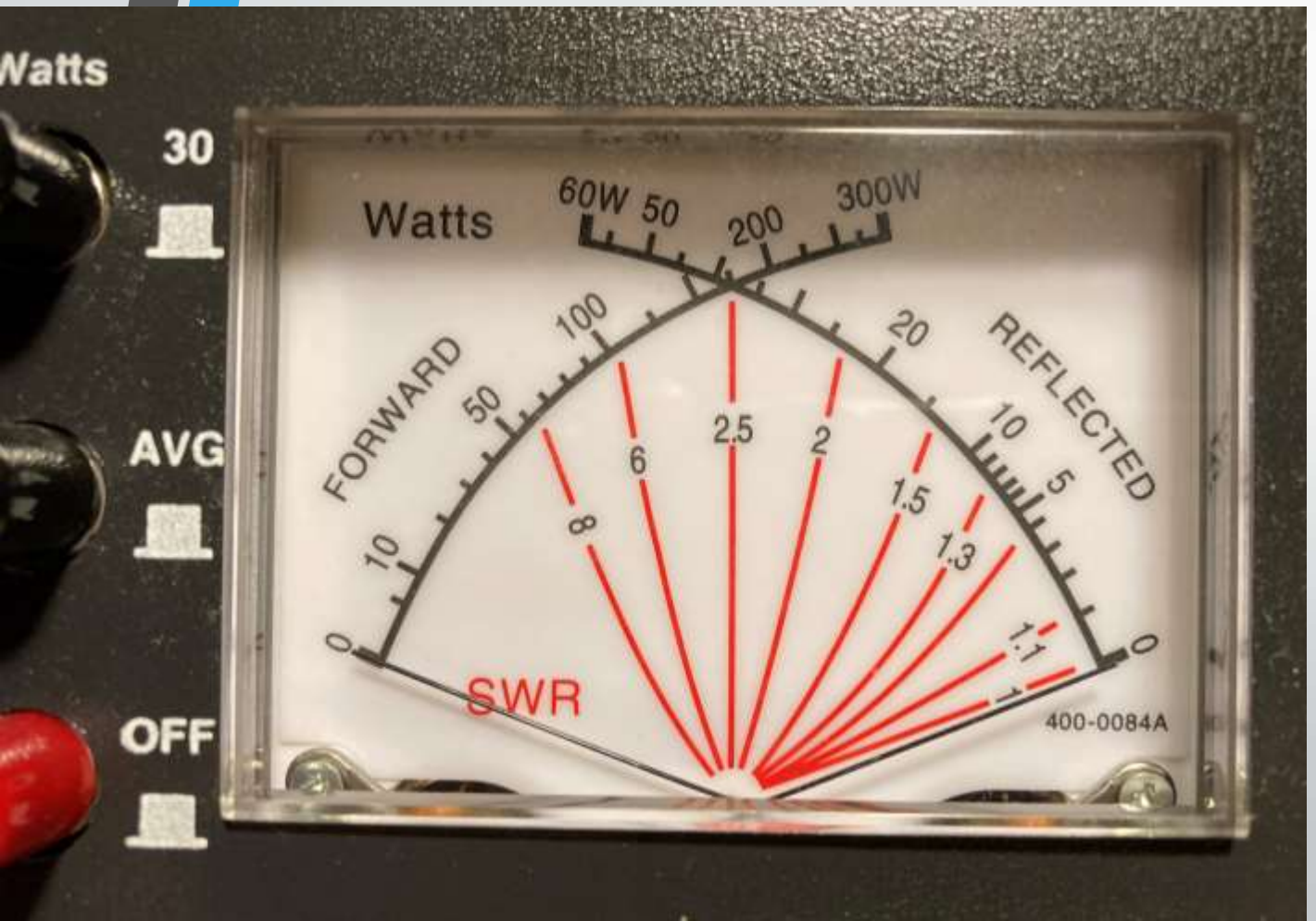
# SWR and antenna tuning

- 1.5 : 1 and 1 : 1.5 mean the same thing
- SWR is 1 : 1 if no reflected power




Cross needle SWR / Power Meter

SWR red lines

Power (Watts) black lines

Place between the radio and antenna with a coax jumper

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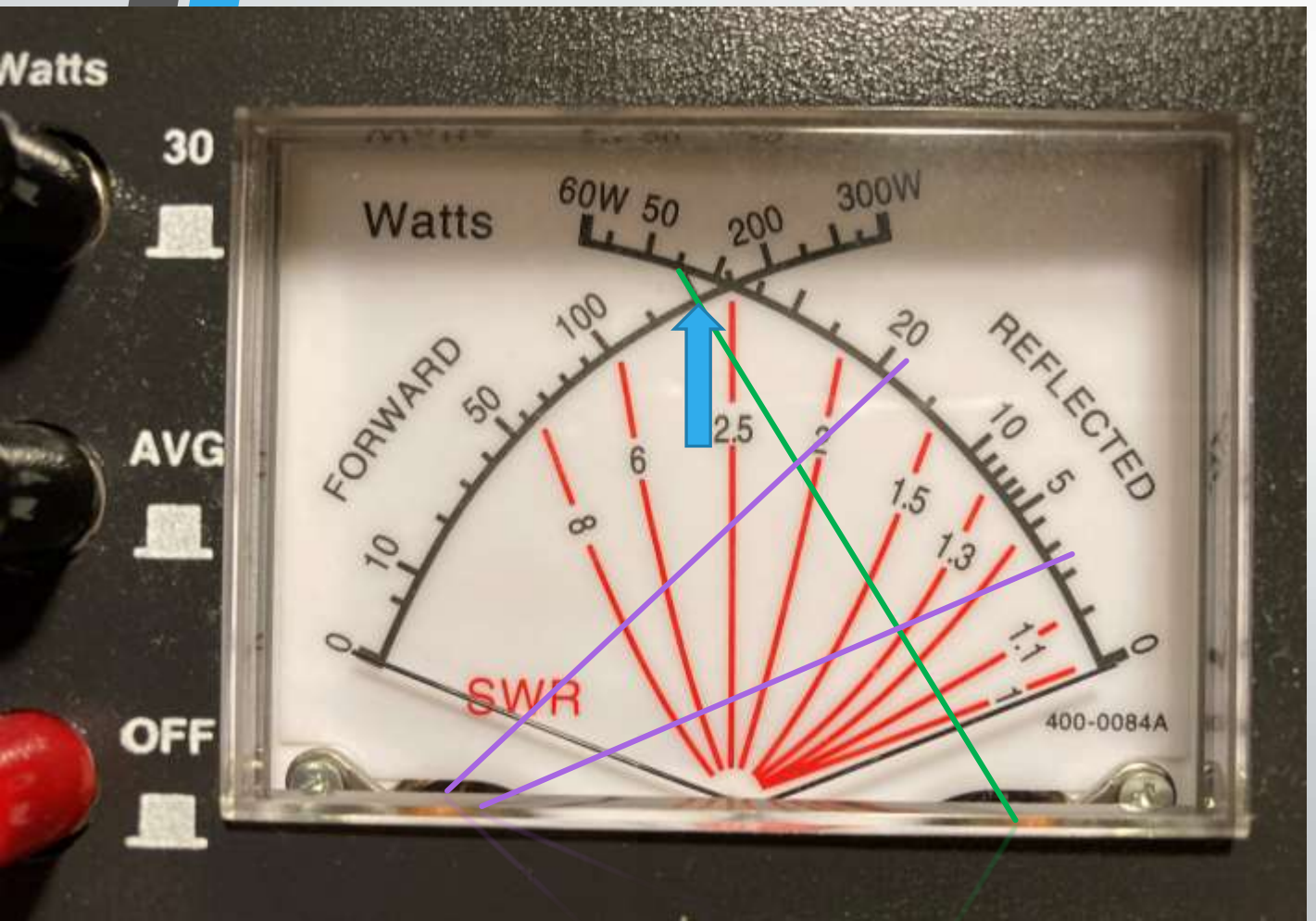
# SWR and antenna tuning




**Example**

1. We have a 15 Watt radio
2. Set Watts 300 / 30 button to 30
   - All forward and reflected numbers are divided by 10
   - 300 becomes 30.0
3. First test
   - Refl. = 1.8 watts  SWR = 2.1
4. Tune the antenna
5. Second test
   - Refl. = .25 watts  SWR = 1.3

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# SWR vs. % of Power Loss

| SWR reading | % of Loss | % of full ERP |
|---|---|---|
| 1.0 : 1 | 0 % | 100 % |
| 1.1 : 1 | 0.2 % | 99.8 % |
| 1.2 : 1 | 0.8 % | 99.2 % |
| 1.3 : 1 | 1.7 % | 98.3 % |
| 1.4 : 1 | 2.8 % | 97.2 % |
| 1.5 : 1 | 4.0 % | 96.0 % |

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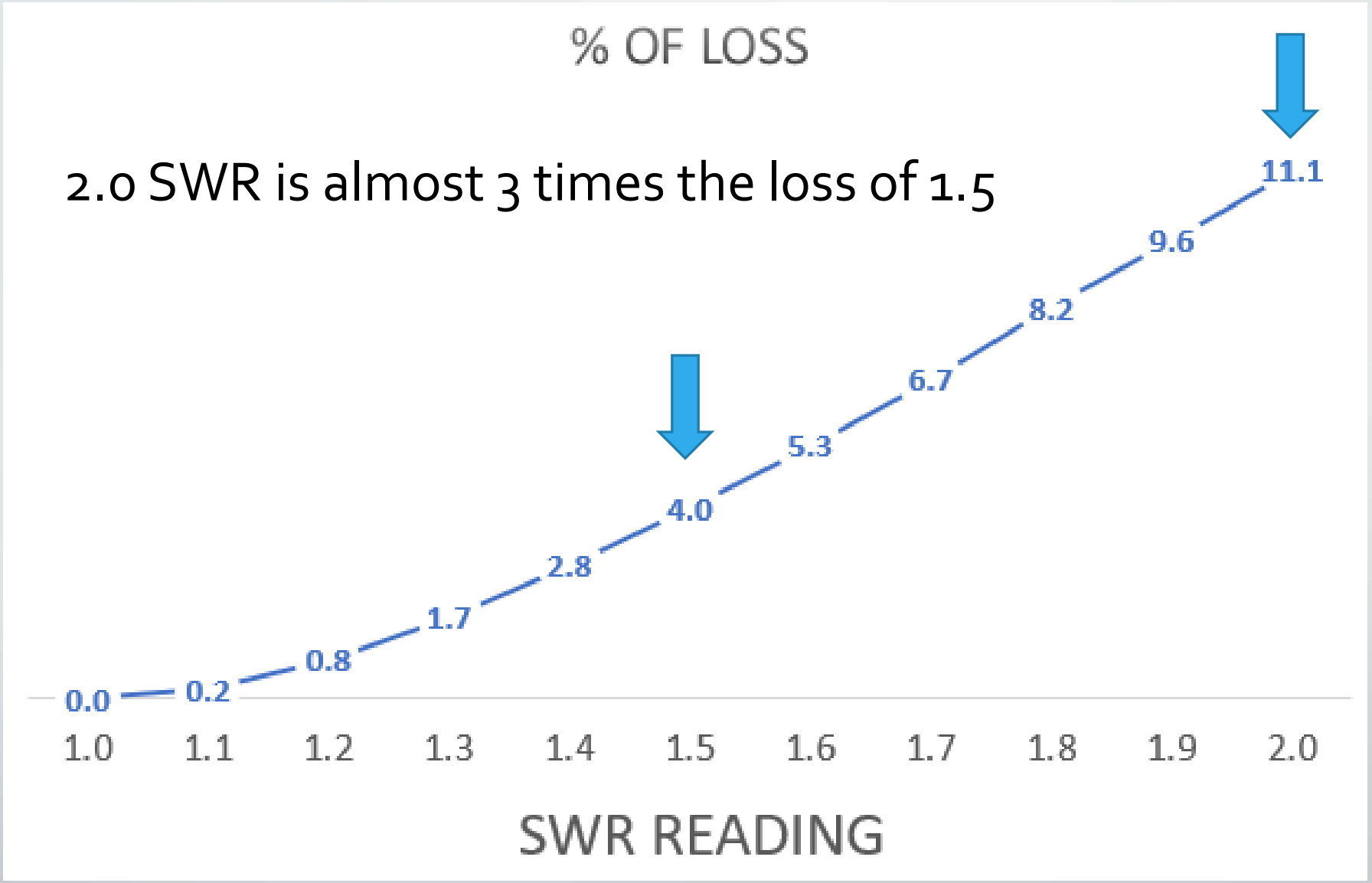
2.0 SWR is almost 3 times the loss of 1.5



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SWR above 1.5 could damage the radio or the radio will automatically reduce power output to keep it from being damaged.