Engineering and Mathematics
Practical Applications

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WHAT DOES GE AVIATION DO?

Designs, Builds, and Tests Aircraft Engines

WHAT DOES FACILITIES ENGINEERING DO?

Ensure the plant has the required utilities to function (i.e. lights, power, HVAC, tel/data etc.)

WHAT DO I DO?

Ensure the power, lighting, fire alarm and security systems are safe and reliable

GE Aviation, River Works Plant, Lynn, MA

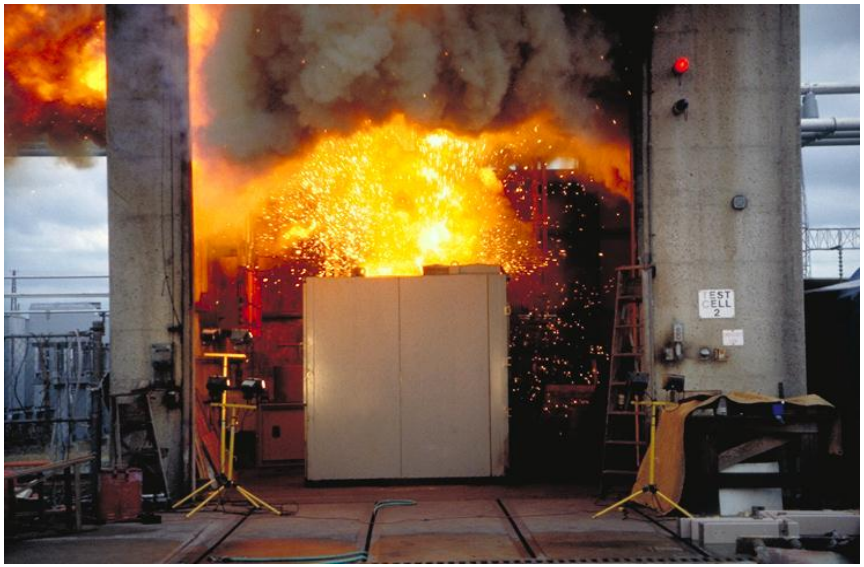
What **is a typical day like?**

Design power systems that are **safe**

Design power systems that are **reliable**

Design lighting systems that are **comfortable**

Design power systems that are **safe**



Finding the Bolted Fault Current

Re-derive equation to convert AFC to BFC

$$I_{bf} = \left(\frac{I_{at}}{A_4^{'}} \right)^{\frac{1}{A_3}}$$

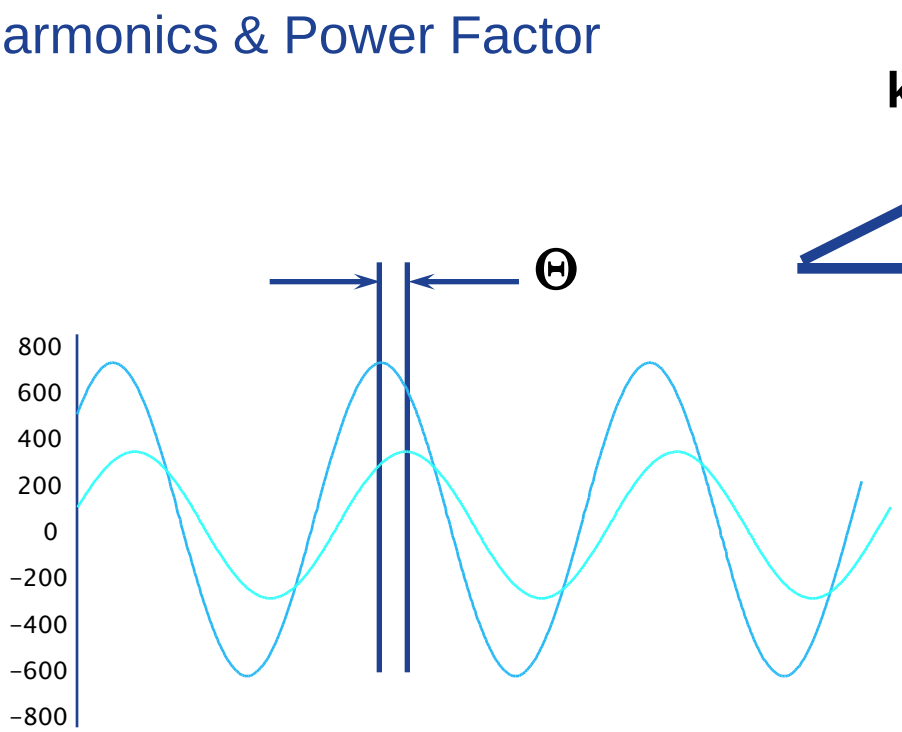
$$A_3 = 0.662 + 0.5588V - 0.00304G$$

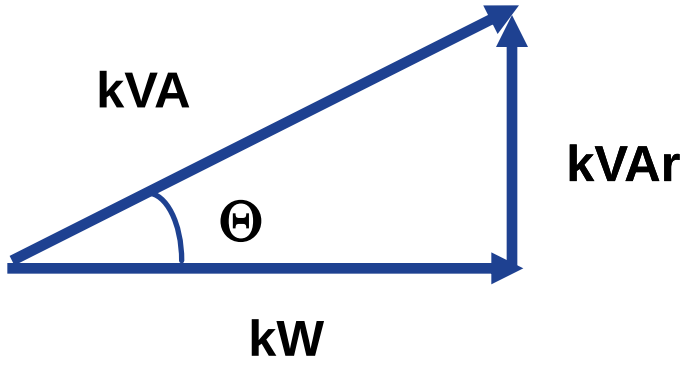
$$A_4 = K + 0.0966V + 0.000526G$$

$$A_4^{'} = 10^{A_4}$$

Design power systems that are **reliable**

Harmonics & Power Factor





$$PF = Power\,Factor$$

$$PF = kW / kVA = \cos\phi$$

Quick Resonance Frequency Calculation

- General formula for resonant frequency

$$f_r = \frac{1}{2\pi\sqrt{LC}}$$

- Quick power engineering version

$$h = \sqrt{\frac{SSkVA}{kVAR}}$$

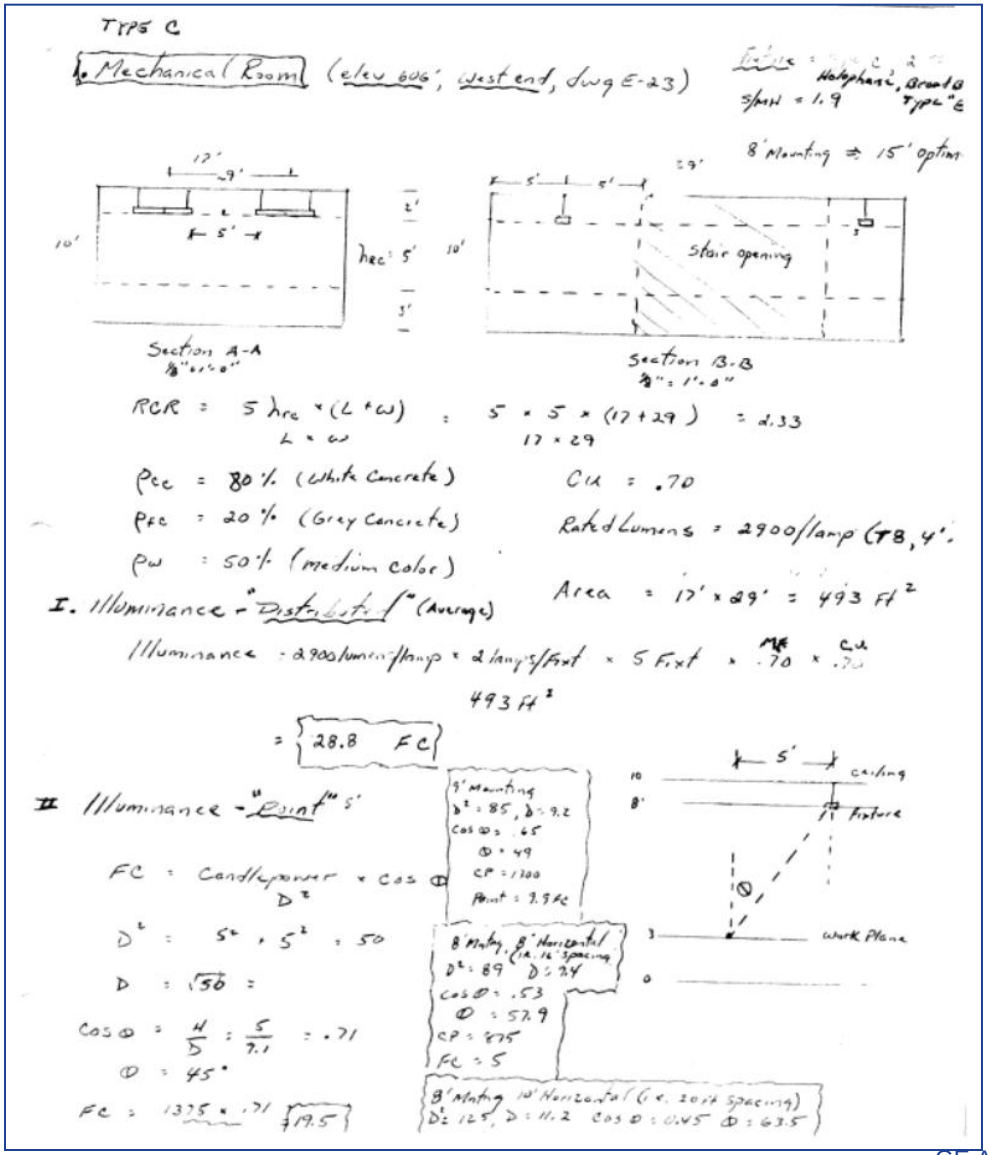
Total Harmonic Distortion - THD

A measure of the amount of distortion associated with a voltage or current waveform

$$V_{THD} = \sqrt{\frac{\sum V_h^2}{V_1^2}} \Rightarrow \frac{V_{RMS\text{-}H}}{V_{Fundamental}}$$

$$I_{THD} = \sqrt{\frac{\sum I_h^2}{I_1^2}} \Rightarrow \frac{I_{RMS\text{-}H}}{I_{Fundamental}}$$

Design lighting systems that are **comfortable**



Practical

Design lighting systems that are **comfortable**