

FuelCell Addendum – FRA Generator Amplitude Compensation

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Introduction

FuelCell compensates for control loop attenuation in the 850/890 loads by boosting the generator amplitude at higher frequencies. FuelCell version 3.6 and later uses the technique described below. Previous versions compensated with a different technique and didn't compensate for differing load sizes.

The 850/890 attenuates high frequency AC signals at 20db/decade.

To compensate, the 890ole program calculates the FRA generator amplitude using the equation

$$\text{Eq. 1} \quad \text{AppliedAmplitude} = \text{DesiredAmplitude} * \sqrt{1 + \left(\frac{f}{f_0}\right)^2}$$

where f_0 is the 3db point or “breakpoint frequency”, and f is the applied frequency

1) All standard 850/890 units have a f_0 value of 2400 Hz when operating at their rated full scale DC current. When operating at less than full scale DC current, f_0 varies in the form

$$\text{Eq. 2} \quad f_0 = f_{0(\text{fullscale})} * \frac{\text{DC_Current}}{\text{FullScale_DC_Current}}$$

Thus, if the DC current is at 10% of the unit's full scale, the f_0 value would be 240 Hz.

2) The f_0 value can be modified using the fuelcell.ini file. The BWHigh value in the [CalibrateI] section will set the $f_{0(\text{fullscale})}$ value.

```
[CalibrateI]
BWHigh=2400
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Note: The full compensation (Eq.1 and Eq.2) will be performed if the BWHigh value is ≥ 1000 . If the BWHigh value is less than 1000, only Eq.1 is performed. This was necessary to maintain backwards compatibility with older units that may have customized BWHigh values prior to the addition of Eq.2.