

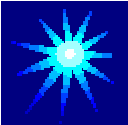
Corrector Power Supplies with a DAC Resolution up to 24 Bits Based on 16 Bit DAC Devices

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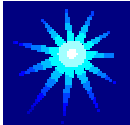


Outline



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- Design Goals
- Design Principle
- Measurements
- Conclusions

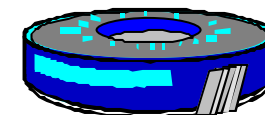


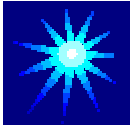


Introduction



- BESSY II started operation with Power Supplies equipped with 16 Bit DAC Devices
- Experiences with SVD based orbit correction scheme showed: 16 Bit resolution is insufficient for continuous orbit correction
- One typical solution: Reduction of dynamic corrector range
- Disadvantage: Large kicks NOT achievable



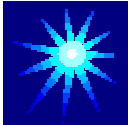


Design Goals

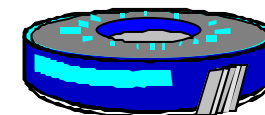
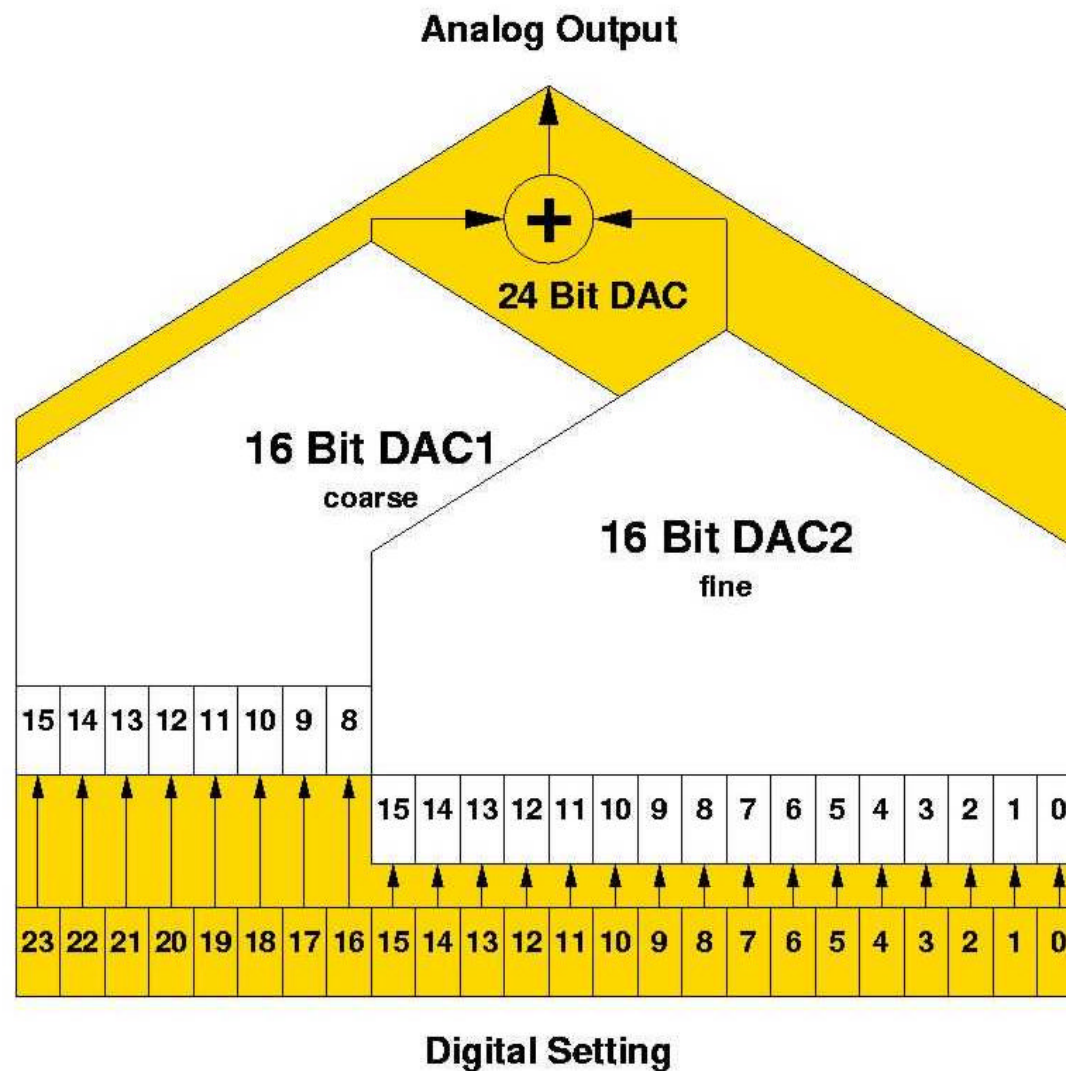


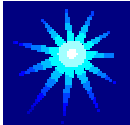
- Full dynamic range of correctors
- Resolution ≥ 20 bit
- Monotonicity ≥ 17 bit
- Stability 1.5 ppm / °C
- Eurocard form factor



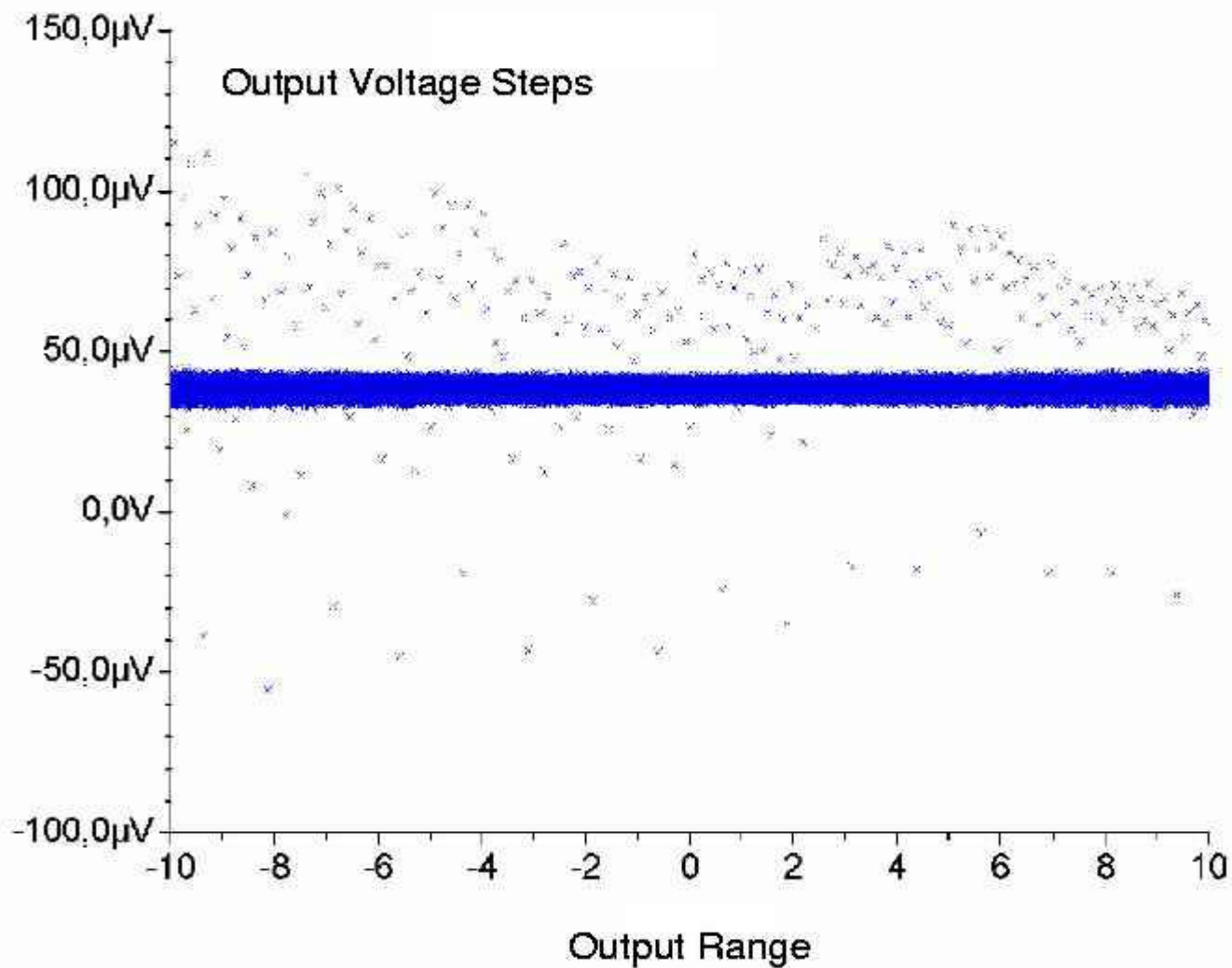


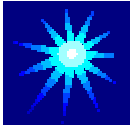
Design Principle





Measurements

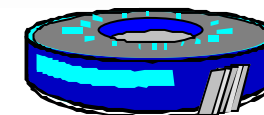
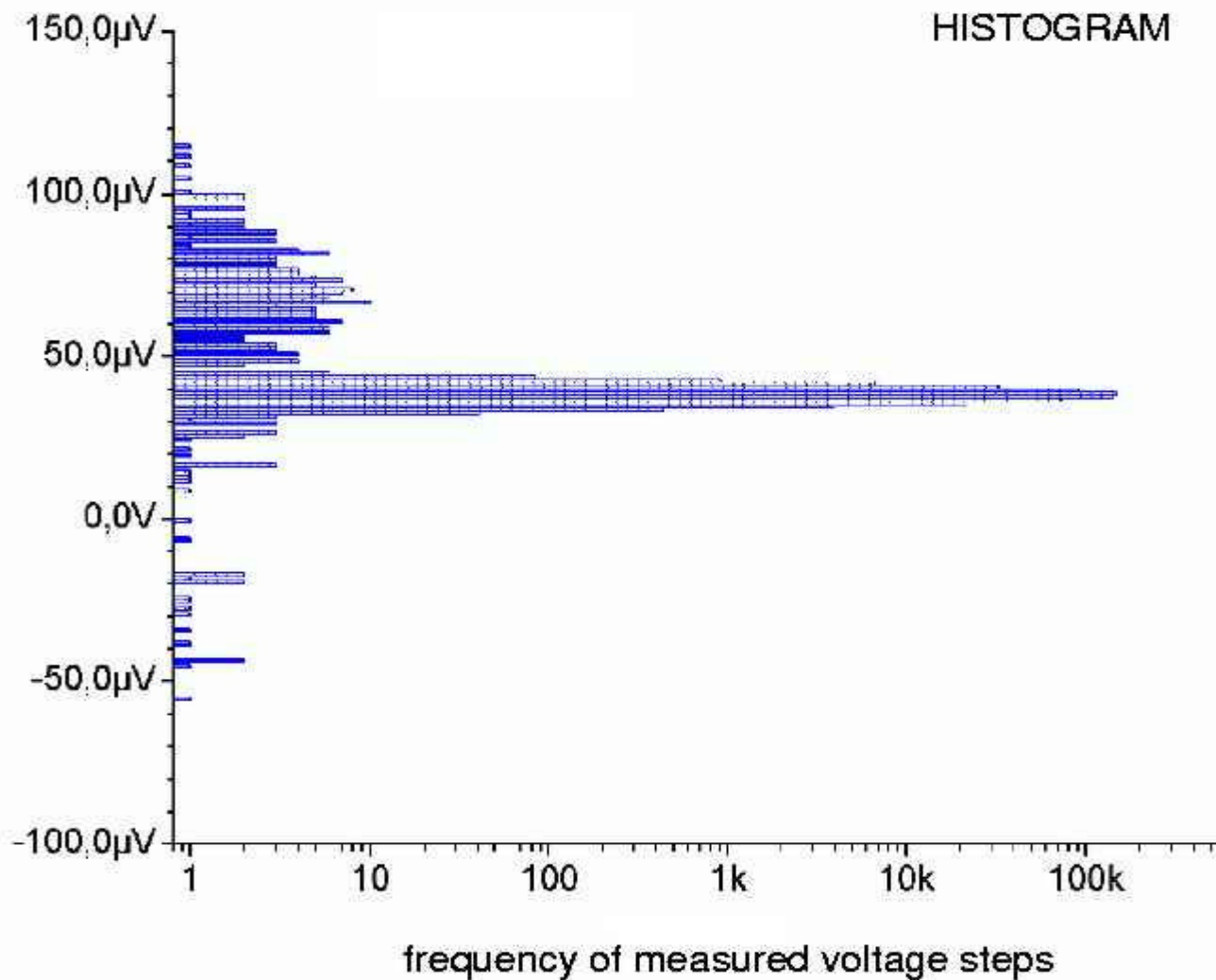


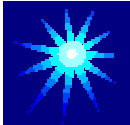


Measurements



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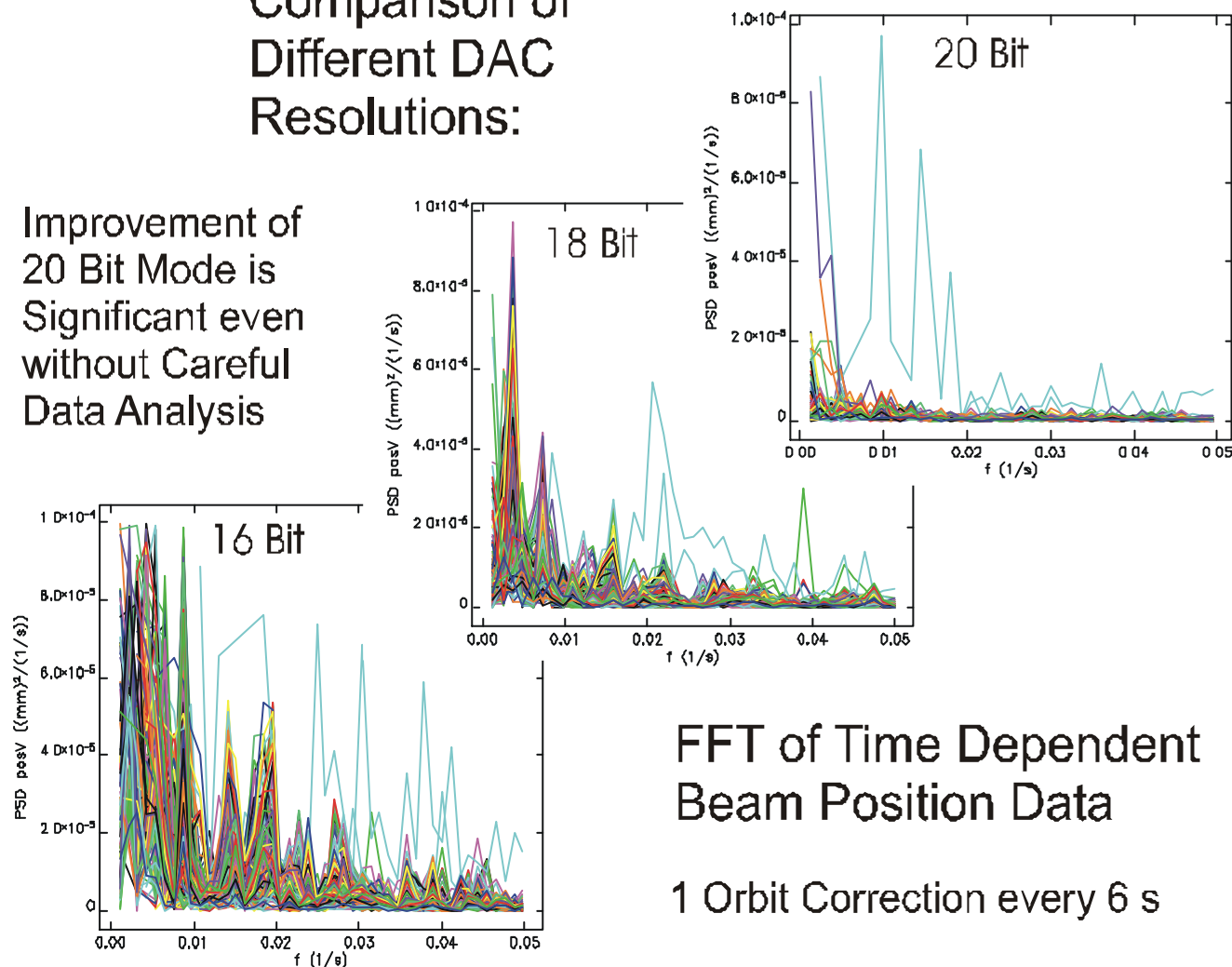


Measurements



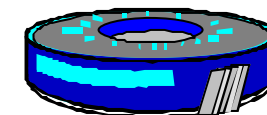
Comparison of
Different DAC
Resolutions:

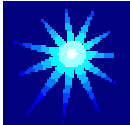
Improvement of
20 Bit Mode is
Significant even
without Careful
Data Analysis



FFT of Time Dependent
Beam Position Data

1 Orbit Correction every 6 s



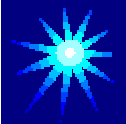


Conclusions



- The new 24 bit I/O board design provides resolution needed for continuous orbit correction
- The known static orbit stability is guaranteed
- Full dynamic range of correctors available
- The closed orbit is now being corrected with a stability of typically $< 1..2 \mu\text{m}$





Future Plans

