

Integrated 3-Channel Flux-Locked-Loop Electronics for the Readout of High- T_c SQUID

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We designed and constructed integrated 3-channel flux-locked-loop (FLL) electronic system for the control and readout of High- T_c SQUIDs. This system consists of low noise preamplifier, integrator, interface circuit, and software. FLL operation is carried out with biased signals of 15 kHz modulated current and 125 kHz modulated flux, which are reconstructed as detected signals by preamplifier and demodulator. Computer controlled interface circuit regulated FLL circuit and adjusts SQUID parameters to the optimum operating condition. The software regulates interface circuit to make an auto-tuning for the control of SQUIDs, and displays readout data from FLL circuit. 3-channel SQUID electronic system has the size of 56 mm x 53 mm x 150 mm containing 3 signal and one power printed-circuit-boards easily exchangeable. Overall noise of the system was around 200 fT/ $\sqrt{\text{Hz}}$ when measured in shielded room, 300 fT/ $\sqrt{\text{Hz}}$ in unshielded environment, respectively.

keywords: SQUID, magnetometer, FLL, modulation, magnetocardiogram, MCG.