Vidyadhar Vishnu Kamble, A microcontroller-based integral cycle power controller, M. Tech. Thesis, Department of Electrical Engineering, Indian Institute of Technology Bombay, 2010.

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Abstract **-** In ac power control, phase angle switching permits fine control but it introduces higher order harmonics and electromagnetic interference. Use of integral cycle switching reduces electromagnetic interference but it gives relatively discrete control steps and results in sub-synchronous and super-synchronous harmonics in the power supply line and it may cause dc current in inductive loads. In this project, a microcontroller-based integral cycle controller is developed for providing fine control steps and for suppressing the sub-synchronous and super-synchronous harmonics by using a switching strategy based on a pseudo-random sequence. An IIR filter simulating the load inertia is used for controlling the cycles to keep the duty cycle within a specified tolerance about the desired value. The pseudo-random selection of on-cycles distributes the switching noise over a broad-band, without any dominant sub-synchronous and super-synchronous harmonics. The pseudo-random sequence generator and the IIR filter are implemented in software on the microcontroller. A triac is used as the power switch and a zero-crossing detector is used to generate the firing pulses in synchronism to the ac supply zero crossings. The firing angle can be adjusted to reduce the dc current component in inductive loads.