

Slow Control for the KamLAND Z-Axis Calibration System

Y. Chan, L. Greiner and the LBNL/KamLAND Group

Kamland is a relatively large (18-meter in diameter) and complex optical detector that requires extensive calibration in order to understand its energy and spatial (timing and vertex reconstruction) responses. An early source deployment device required for the turn-on phase of the detector has been constructed and is called the Z-Axis Phase 0 system. This device, with a coated stainless steel cable stored in a spool and driven by a stepping motor, is capable of positioning the calibration source anywhere along the central vertical axis of the detector. The instantaneous position of the source is readout by an optical encoder. In order to minimize the down time of the detector, it is desirable to operate the device remotely in a dark environment. A slow control software package, based on the industrial standard LabView platform, has been developed for this purpose. The major component of the motion drive mechanism is a commercially available stepping motor controller (SC8800E by Orientalmotors Inc.). This programmable controller is set to a continuously broadcasting mode once

activated. The slow control program, intercepts the broadcasted information from a RS232 communication port. It decodes the received message and display it graphically on the computer screen with the LabView GUI. The instantaneous source position, stepping motor speed, accumulated step count, internal status of the controller, as well as certain manually controlled interrupt bits are updated every 200ms. The lower left figure shows a picture of the Zaxis control screen and the one on the right is a schematic drawing of the program flow. The slow control program is run at a dedicated calibration computer, but can also be manipulated by any computer that has a network link to the calibration node. If needed, the control can be transferred to a manually operated control box, which communicates with the controller by setting the relevant hardwired input sense bits. This system has been tested and characterized to a deployment distance of up to 10 meters at either dry or wet conditions.

