

**Status report of KEK-PS T554**  
**(Performance Test of the Water Čerenkov Counters and trigger modules**  
**for the JLab E01-011 Experiment)**

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Jlab E01-011 collaboration ( $\Lambda$ -hypernuclear spectroscopy through the  $(e,e'K^+)$  reaction) has been developing detector packages for coming beamtime (from June 2005).

Improving the signals to noise ratio by optimization of the scattering electron spectrometer configuration, the hadron rate in the newly developed kaon spectrometer (High Resolution Kaon Spectrometer) increased. In order to have good  $K^+$  selection in the trigger level, good efficiencies of the water Čerenkov counter (proton, K separation) and aerogel Čerenkov counter ( $\pi$ , K separation), and intelligent trigger modules are essential.

We optimized the design of the water Čerenkov counters and developed a VME base highly flexible trigger module with FPGA (Tohoku Universal Logic: TUL-8040).

From the experiment, we learned:

1. Amino-G-salt concentration is optimized to be 100mg/l for our water Čerenkov counter.
2. TUL-8040 gives the same performance to the NIM logic under the real beam condition and it can be used for the JLab experiment.

All detectors are shipped to JLab and they are now under final tune.

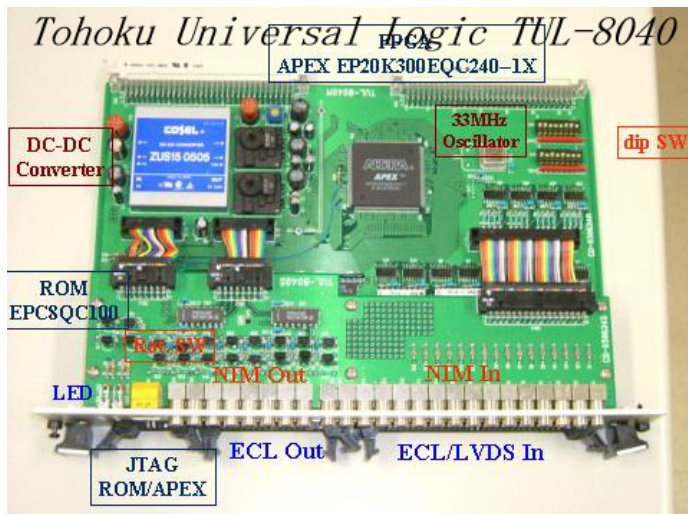


Fig. 1 The *Tohoku Universal Logic* module, TUL-8040. It has Altera FPGA powered by a normal VME crate. It accepts LVDS/ECL 64ch inputs and NIM 8ch, ECL 32ch outputs. Between those 80 inputs and 40 outputs, any logical operation can be programmed with a short process time. Its internal clock can be boosted up to 300MHz.

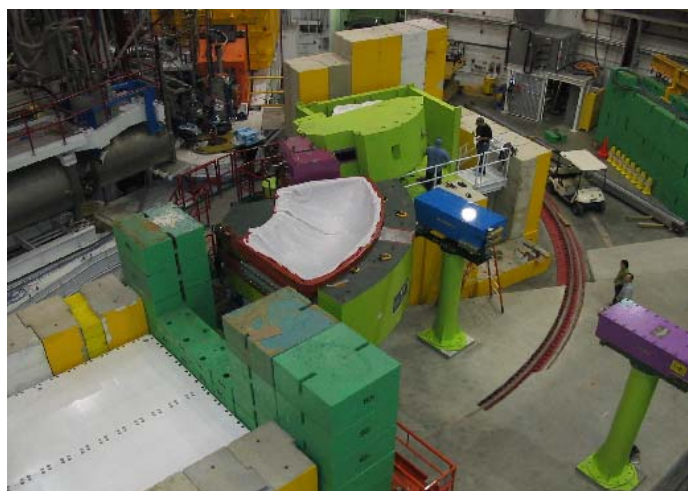


Fig. 2 The halfway assembled High resolution Kaon Spectrometer (HKS) dipole magnet in JLab Hall C. The scattering electron spectrometer (ENGE) tilted by 8 degrees can be seen just behind the HKS. Two quadrupole magnets (purple) of the HKS can be seen between HKS-D and ENGE. Blue and violet magnets are the beam steerer to guide unused beam to the dump.