

TKR Preparation for Data Taking
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This is the minimum set of tests necessary to give us confidence on the TKR system to allow one to develop integrated TKR/CAL tests. **We expect that if we can provide a similar list for CAL tests we can have a focused effort for integrated TKR/CAL tests and establish baseline for data taking.** Most of the scripts either exist or are being developed by Marcus and Luca. We have not yet revised this note with JJ.

1. System Characterization

- a. Measure noise level in rms electrons versus DAC hit threshold for each layer
- b. Obtain list of noisy strips based on 2 different occupancy values and establish baseline to be monitored during EM activities (time history). Feedback to offline to verify effect on pattern recognition
- c. Determine whether data and trigger masks need to be different depending on the tests performed above (Consult with JJ to understand if there are any correlations that deserve study for encoding algorithms)
- d. Measure trigger rate occupancy versus DAC hit threshold for each layer
- e. Measure Occupancy by scanning Calibration DAC versus TACK delay to determine minimum of TACK
- f. Quantify gain uniformity per layer and per chip in one single histogram/table
- g. Create a script that allows thresholds settings on individual GTFEs use noise land efficiency measurement as figure of merit to decide whether to set them individually or not.
- h. Record cosmics as function of TACK delay and check number of missing hits (explain why 1 to 7% was acceptable in previous minitower and now < 1% seems to be the acceptable number. What is the figure of merit?)
- i. Measure efficiency versus bias voltage in steps of 10 V from underpletion to overdepletion for each layer
- j. Record cosmics as function of DAC hit threshold to compare hit, cluster multiplicities, TOT distributions and trigger rates.
- k. Based on all tests above, develop baseline configuration for data taking and characterize raw distributions, noise and trigger rates for minitower in vertical, horizontal and upside down position (check offline if CAL on top of TKR has any effect on pattern recognition).
- l. Identify Level IV requirements and see which ones have been met (this is for me and you Mike)

2. Debug known problems

- a. Understand charge injection versus TOT response with 3 sets of L/R GTFE split, namely [0,23], [23 ,0] and nominal (most layers is [12,12])
- b. Calculate increase in leakage current and estimate the noise level expected in the system to explain why we did not use the leakage current measurement to diagnose the “inefficiencies” seen in the liveness test

- c. New tests proposed by J. Olsen/M. Huffer to debug timeout error problem
- 3. Script Automation
 - a. Automate script that performs GTRC register configuration test for all layers
 - b. Automate script that performs GTFE register configuration test for all layers
 - c. Automate script that performs GTFE register configuration test (using broadcast) for all layers
 - d. Automate TACK scripts
- 4. Infrastructure
 - a. Clean up minitower test directory in cvs
- 5. Timing
 - a. Develop script to time cables using charge injection. Enable only channel 10 on one layer and measure occupancy by scanning Calibration DAC versus TACK delay to determine minimum of TACK. Repeat measurement 3 times by reading data from LEFT cable [0,23], from right cable [23,0] and nominal split [12,12]. Then perform same test for channel 1540. Repeat test for all layers and determine minimum TACK
 - b. Study extreme cases. Based on the previous test determine optimum TACK for all layers and also try to misalign layers to minimize trigger probability (to prove we understand what the knobs are doing)