**K-long-and-muon Detector**

**Integration Plan**

# Integration at Indiana University

## Scope

This section describes the integration effort at Indiana University (IU). The KLM electronics will be integrated to the extent possible before a more complete effort at KEK. The IU effort will focus on a small number of connections between each integration item (a single octant). Only the electronics will be integrated; the actual scintillator and RPC detectors will not be used.

## Integration Configuration

The integration items and connections are shown in the block diagram.



## Integration Items and Method

| **Interface** | **Description** | **Method** | **Required Parties** |
| --- | --- | --- | --- |
| TTD/B2TT | Clock and timing for all boards | Implement and b2tt in each connected FPGA. | IU, UH |
| Trigger | Data Concentrator to UT3 interface | Stream data to UT3 and use ChipScope to verify. Requires special 4 to 1 cable. | IU |
| DAQ/B2link | Data Concentrator to COPPER interface, run control, and data collection. | Stream run control data from binary file using low level COPPER utilities. Record DAQ data with low level COPPER utilities. Verify on HSLB with ChipScope. | IU, UH |
| Scintillator | Motherboard to Data Concentrator interface | Stream run-control data through Data Concentrator to Motherboard. Stream scintillator DAQ data through Data Concentrator. Verify with ChipScope. DAQ known data pattern can be generated by TARGET built-in-test or SCROD FPGA. | IU, UH |
| RPC | RPC Front End to Data Concentrator interface | Stream run-control data through Data Concentrator to RPC Front End. Stream RPC DAQ data through Data Concentrator. Verify with ChipScope. DAQ known data pattern can be generated by RPC Front End built-in-test or FPGA. | IU |

## Equipment List

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Item No.** | **Qty.** | **Part No.** | **Description** | **Supplier** |
| 1 | 1 |  | VME Crate, 6U, Timing and Trigger | IU |
| 2 | 1 | UT3 | Universal Trigger Board | IU |
| 3 | 1 | FTSW | Front-End Timing Switch | IU |
| 4 | 1 |  | VME Crate, 6U, 21 Slot, RPC | IU |
| 5 | 13 | 4020035 | RPC Front End Board | IU |
| 6 | 1 | 4020044 | Data Concentrator Board | IU |
| 7 | 1 |  | VME Crate, 9U, COPPER | IU |
| 8 | 2 |  | Scintillator Motherboard | UH |
| 9 | 1 |  | COPPER-II | IU |
| 10 | 1 | HSLB | High-Speed Link Board | IU |
| 11 | 8 |  | SFP Fiber Module | IU |
| 12 | 4 |  | Duplex Fiber Optic Cable | IU |
| 13 | 4 |  | Network Cable, CAT6 | IU |
| 14 | 2 |  | Network Cable, CAT5e | IU |
| 15 | 1 | CBX-STH008APQ-MXXN-UC2N-16.5 | MPO Break-out Cable, Trigger | IU |
| 16 | 1 |  | Desktop Computer, Linux Operating System | IU |

# Integration at KEK

# Appendix

## Trigger Test Cable

