Proposal for a VME Test Stand

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This note presents a proposal to develop a test stand for VME modules implemented in the slow controls system of the various detectors used in Hall B.

Slow control systems (SCS) of the detectors use VME modules. To ensure proper operation and safety of SCS, routine maintenance and calibration of these modules are necessary. To achieve these objectives, a VME test stand and supporting hardware and software are required. Additionally, the proposed test stand will be used to test components and circuit board assemblies used in detector systems, and to test temperature and humidity circuit boards used for environmental monitoring on detector systems.

The basic hardware needed are a VME crate, VME controller module, and a test computer. Additional hardware needed for the test station depends on the device under test. For example, to test an analog to digital converter (ADC), a programmable voltage source is needed, such as the Keithley 237 source meter, Fig. 1.

Table I lists hardware needed for each device to be tested and tests for each device. National Instruments LabVIEW software will be used to run the tests. The program will initialize the hardware, test the individual functions of the device, and acquire and store the data.

Data from the tests will be analyzed to determine if the device meets the specifications for the unit. If the device fails a test, a troubleshooting mode will be available to further check the device.

For modules that have suspected communication errors to the VME backplane, the test stand will include a VME bus analyzer manufactured by Curtiss Wright. The bus analyzer connects to a PC via USB and runs specialized software called BusView. The software has the capability to trigger on a pre-set pattern and read backplane data on VME bus. The analyzer can also compare backplane timing sequences between a good VME module and a defective one.

In summary, the proposed VME test stand is needed to check the currently deployed VME modules, ensuring effective and safe operation of the detectors.

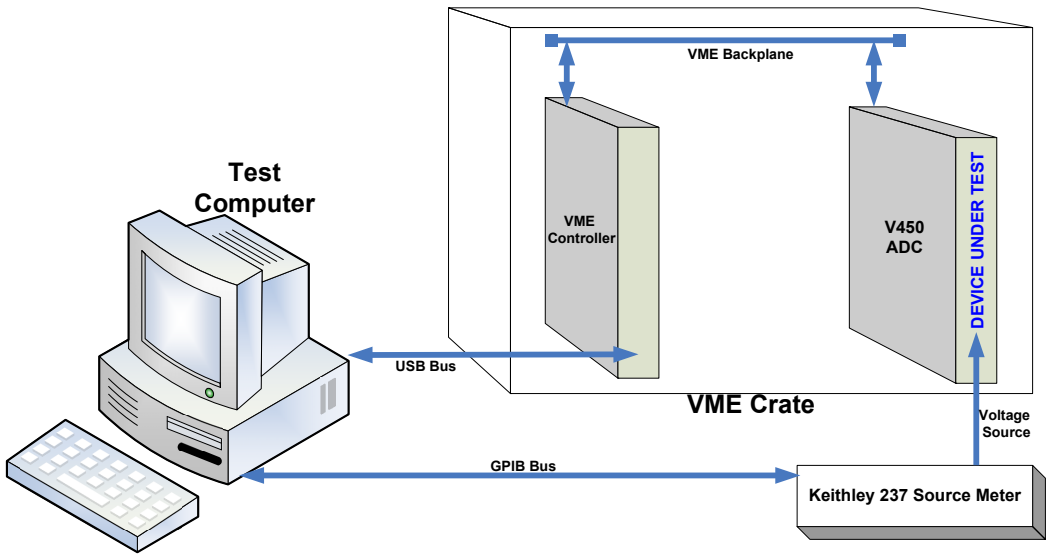

FIG. 1. Possible VME test stand hardware configuration for testing a V450 ADC.

Mfr.	Device under test	Hardware required	Summary of tests
JLab	environmental boards	VME crate VME controller module PC V450 ADC	functionality of dual temperature sensors and Honeywell dual humidity sensors
Highland	V450 ADC	VME crate VME controller module PC Keithley 237 source meter	register initialization accuracy dynamic range offset error gain error differential non-linearity integral non-linearity channel isolation RTD channel functionality sampling rate programmable filter front panel indicator on-board temperature sensor built-in self-test functionality
GE	4120 digital to analog converter	VME crate VME controller module PC Keithley 2001 meter	register initialization channel isolation voltage range voltage setting and resolution output current front panel indicator
GE	2232A relay unit	VME crate VME controller module PC Keithley 237 source meter Keithley 2001 meter	register initialization channel closed/open voltage drop load current built-in test functionality front panel indicator
GE	VMIVME-3122 analog to digital converter	VME crate VME controller module PC Keithley 237 source meter	register initialization voltage input vs. readback error channel isolation voltage range sampling rate front panel indicator

TABLE I. Initial devices to be tested, necessary hardware for each device, and tests for each device.