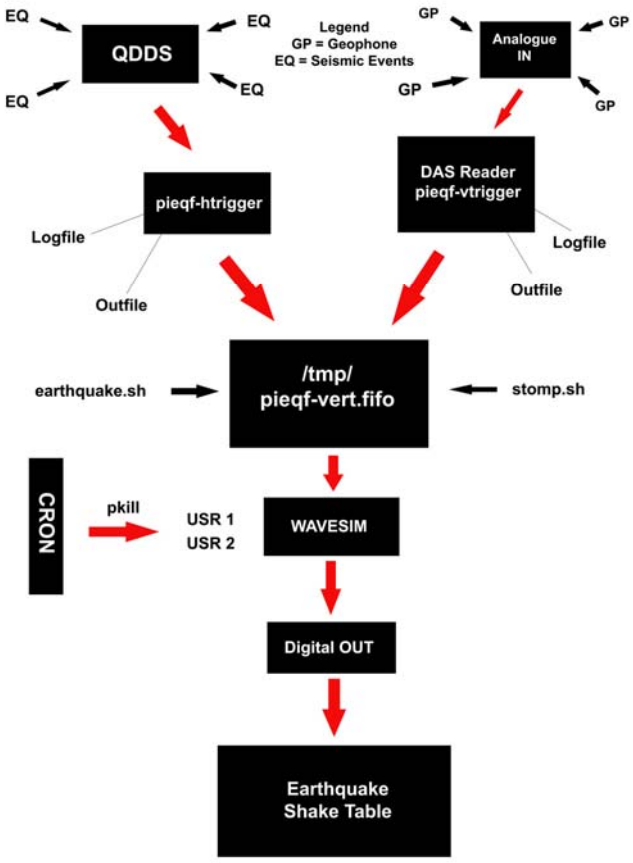
Seismology Research

Location – U.S.A./Australia

Project Introduction: D.V. Rogers, a conceptual artist undertaking a Masters of Fine Art by Research, is exploring seismology theories both on and off-site at the University of New South Wales, Sydney, Australia. He has developed the Parkfield Interventional DQ Fieldwork (PIEQF) system, which essentially is artwork mapping the terrain of shifting tectonics and digital information networks; an investigation of machine control (automation) arising from live representation of a remote physical environment.

System Requirements: PIEQF is a geologically interactive, machine controlled, seismic earthwork that was installed during the summer of 2008 in the remote township of Parkfield in Central California. The focal point of this conceptual art project is a hydraulic earthquake shake-table which is triggered by real-time earthquakes by a local array of vertical motion sensors installed around the shake-table.

The system control for the PIEQF requires a reliable and open source based operating system with industrial grade hardware that would operate in hot and dusty conditions. The original development of the PIEQF took place on an AMD-based domestic PC before moving to a Pentium-based Advantech industrial grade control chassis.



Parkfield Interventional EQ Fieldwork (PIEQF) Control Schematic

Project Implementation:

Advantech products used: IPC-611: 4U 14-slot rackmount chassis with front-accessible fan.

Software developed by Dr. Geo Homsy (US), Stock (NL), Mr. Snow (Aus), and Andy Michael (USGS)

System Description: The PIEQF installation has two modes of conceptual and distinct system control. PIEQF is triggered by all micro-seismic events that occur throughout the state of California from magnitude 0.1 and above. The conceptual basis behind this is to bring all seismic events that occur during the time of active intervention to a

hypothetical epicenter. Each time a seismic event is reported the horizontal motion of the earthquake shake-table is triggered. Surrounding the earthquake shake-table and buried within the excavation is an array of vertical motion sensors called L10 Geophones. The PIEQF sleeps at night between 9:30pm and 6:30am. The control system keeps polling and collecting seismic events that occur overnight, and then replays them at 6:30am on startup. After this morning replay sequence, PEIQF switches into live mode and is triggered near real-time reported earthquakes (30sec – 3min after actual event occurs) and triggering of local Geophone sensors. Attached to the earthquake shake-table is an array of 5/8 steel rods which resonate and deflect each time the shake-table is triggered.

Conclusion: The Parkfield Interventional EQ Fieldwork ran continuously for 91 days between 8/18/08 through 11/16/08. During this time, the shake table was triggered by 4000-4500 seismic events. Every earthquake detected by the USGS Californian seismic network is given a unique event identity and archived within the PIEQF system. The PIEQF streaming server box captured and delivered 43,000 frames remotely to the server at http://allshookup.org for remote viewing.

The essential ingredient of this project is towards promoting earthquake awareness and preparedness on the West Coast USA. An urban variation of PIEQF is already planned for Los Angeles in 2010.

The two Advantech 4U Chassis that made up the PIEQF system proved to be extremely reliable during the installation. The software developed for the project will be made public early 2009 and the online archive of growing documentation can be found at **http://pieqf.allshookup.org**

All photographs published in this article by Scott Haefner (USGS)