LIGO

Fifth Engineering Run

LSC meeting, August 14, 2001

Setup

- Friday, July 3, 10:00AM PDT and Monday, July 6, 10:00AM.

- 2K Hanford interferometer was run in full power-recycled configuration with arm cavities,

- Livingston mode cleaner,vertex Michelson and physical environment data was taken.

- A four hour one arm run was added at the end to support the e2e modeling effort.

Configuration

❑ LHO 2K interferometer being "locked" for more than 50% of the time.

❑ Lock stretches were typically 30-60 minutes long limited mainly by tidal drift.

❑ Lock acquisition wasn't as reliable (yet) as one could have wished for but once locked the interferometer was running smoothly.

❑ Data was taken both with the full frame builder and the reduced data set writer. No problems were encountered and all data made it to disk and tape.

❑ Monitor programs were running on the DMT machines pretty much using up all available CPU cycles.

First "Results"

❑ The Livingston site experienced a large thunderstorm on Sunday night and some interesting data was recorded on magnetometers, seismometers and microphones.

❑ During the run the tidal predictor was controlling the temperature of the reference cavity compensating for roughly 50% of the common mode tidal motion. (Since it was full moon tidal drifts were large.)

❑ The "lock of loss" study identified at least two categories of lock losses:

➢ 13Hz instability encountered mainly during the first half of the run when the resonant gain stages for Michelson and PRC were engaged,

➢ Out-of-range condition when the error signal in reflection used to feed back to the common mode was running into a rail.

➢ At least one lock loss might be attributed to a magnitude 6.5 earthquake in the southern east pacific rise.

First "Results"

- ❑ Violin modes?
  - ➢ Ring-up of a resonance at 687.4702Hz.
  - ➢ Width was equal or smaller than 0.7mHz indicating a Q of a million or more.
  - ➢ The most likely explanation is that the control system was ringing up the first harmonic of a violin resonance.

- ❑ Relative timing accuracy during the run
  - ➢ Data acquisition system was stable within +/-2μs
  - ➢ Difference between the two sites (as measured by the GPS clocks) was 70μs or less.