

May 23, 1988

TO: the gravity physics group

05a

FROM: Sheryl Smith

List of 3/1/89

This memo is concerned with what data should be archived, and at what rate, from each pair of receivers (a pair of receivers is a full length and a half length receiver).

If you have ANY comments or additions please tell me.

The data archived will be used for two purposes, searches for radiation and further receiver development. Data which needs to be sampled at the full bandwidth (10kHz sampling rate) includes:

1. full length receiver signal
2. half length receiver signal
3. the weighted average of the two
4. microphone (the sum of microphones located at each station)
5. the anti-seismic interferometer (the sum of the four)

The reason for recording the weighted average of the two is that in future data analysis it is this signal which would be used, and it would improve the efficiency of the data analysis to only have to read 1 signal, rather than two. This is a luxury, and if data storage proves to be too expensive this signal should be sacrificed, since it carries no new information.

I believe that Paul Linsay, and possibly Jeff Livas, feel that the data should be oversampled, so that when you try to compensate for the doppler shift you don't need to interpolate to find the proper value for the signal at the shifted time. This would also be a nice feature, as it would ease the computation requirement on periodic searches. It, too, is a luxury, since it doesn't carry any new information. If we have the room to store the data it would probably be nice to record the weighted average of the signals at approximately three times the Nyquist rate (I need to ask Jeff if 3 is correct!!). There is no reason to store the signals from the individual receivers at this rate, since they would be used primarily for receiver development, and double checking potential burst signals, rather than for periodic signals, if the sum of the two receivers was also recorded.

The anti-seismic interferometer signals and the microphone signals could conceivably be added together to save on storage space. If it turned out that there were some nasty features in the sum of the signals, such as a resonance, then to isolate the source of the problem we might wish to record each signal individually. I feel that this would probably be a temporary measure; there should be no need to always record these signals separately.

Signals which should be stored at a lower rate include:

1. Low frequency feedback to each arm's servo loop (4 @ 100Hz)
2. Orientation control signals (20-40 @ 10Hz)
This includes tilt, rotation, x and y for each mass, you would probably be willing to add some of these together.
3. Laser light levels, input level and level at each photodiode (10 at 100Hz)
4. Seismometers (10 @ 10Hz)

There will also be some signals which people will probably want to record for a short time while doing detector development, but which will not need to be archived. For example, people will want to see how variations in the temperature affect the detector's performance. Once this is understood there probably will be no need to continue collecting that signal. People will probably think of more as time goes on, but this should be a fairly accurate estimate of what will be necessary.

In addition, it would probably be sufficient to store one byte of data, rather than two, for all of the above signals. So long as the data is reasonably white there should be no loss of signal-to-noise. During the data run in March of 1987 the data was not sufficiently white because of a resonance at 200Hz.

This is on CITGRAV

file name

/user/sheri/data rates.