

time scale. If the first-break amplitude were expected to be approximately -24 db (below the 1-volt reference level), as shown in the figure, it would be appropriate to set the early gain to -18 db. Setting the early gain 6 db short of the expected amplitude can be tolerated because gain is also controlled in the down direction in this system.

Trip sensitivity (which is common to all channels) is expressed in decibels below the early-gain level. For example, if the trip sensitivity is set at -24 db, the input level at which trip occurs is (-18) plus (-24) db or -42 db below the 1-volt level.

The combination of early gain and trip sensitivity should always be great enough to assure that gain control will be tripped by the early signal.

After the seismic signal exceeds the trip level, gain control becomes active and attempts to maintain the digitizer level between one-half scale and one-quarter scale, corresponding to an upper control level of -6 db and a lower control level of -12 db on Figure 2. Examples of -6 db gain reductions may be seen at approximately 1.3 and 1.5 seconds in the figure. These are examples of the 6000 db/sec attack rate. Examples of gain increases, requiring a "sliding window" release rate, may be viewed at 0.25 and 0.35 second.

When gain reaches the final level, 84 db, gain control no longer functions. The declining signal continues to fall after passing the quarter-scale control point, as illustrated after 2 seconds.

ABILITY TO SAMPLE BURST-OUTS

As pointed out in the paragraphs on automatic gain selection, with half-scale and quarter-scale setpoints and an attack rate of 6 db/ms, very few burst-outs will occur so rapidly as to exceed the full scale of the digitizer. In other words, since gain can be reduced by one-half in one millisecond, a burst-out can nearly always be held within the range of the digitizer. Nevertheless, it is a matter of interest to ascertain how

rapidly a burst-out must occur in order to exceed the digitizer scale.

The burst-out ratio is defined as the maximum amplitude of the burst-out signal to the maximum amplitude of the preceding cycle. Referring to Figure 3, the burst-out ratio is $\frac{b}{a}$.

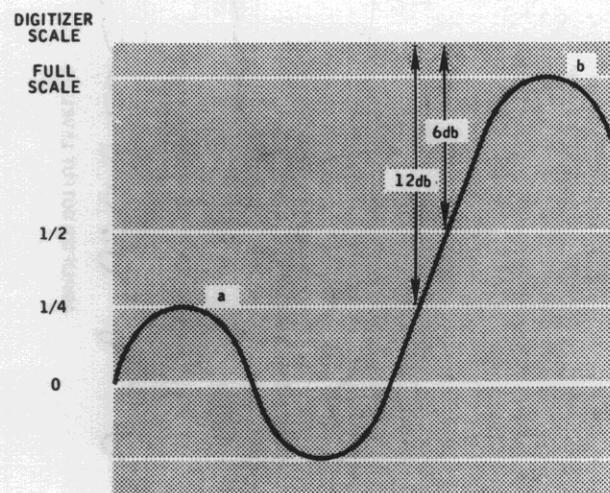


FIGURE 3

Burst-out ratio is defined as the maximum amplitude of the burst-out signal, b, to the maximum amplitude of the preceding cycle, a.

The ability of the system to sample burst-outs depends upon four variables. One is the frequency of the seismic signal. The second is the amplitude of the increasing signal. Third is the chance location of the last sample before burst-out--whether it is just over or some place below half scale. The fourth is the sampling rate.

As the frequency of the burst-out signal increases, it is evident that the ability of the system to keep the burst-out within scale will decline. That is, at a given sampling rate, the system has less time at high frequency to respond to an increasing signal by reducing the gain. Consequently, it is more likely that signals