



FIGURE 9

The electromechanical analogy to the smoothed-recovery unit clarifies the underlying principles of the device.

version, however. Instead of making the attenuator resistors of discrete components, they are conceived of as points of constant resistance on a potentiometer.

Now, if the 15 bits of mantissa, S and Q , are placed in the left-most positions of the digital input register (corresponding to an exponent value of 0), full-scale output appears at the left end of the potentiometer. If the Q -bits are shifted 5 positions to the right, corresponding to an exponent value of -5 , full-scale output now appears 5 constant-resistance points to the right of the original point. Thus, at whatever exponent value the Q -bits are positioned, the potentiometer wiper may be located at a corresponding full-scale point.

Furthermore, it is possible to attenuate a full-scale output by moving the wiper to the left of whatever full-scale point is currently in use. Moving the wiper in this manner results in a rate of decrease of signal of 6 db/resistance point. Actually, the movement of the wiper produces a continuous decrease in signal, since the wiper contact is not limited to the constant-resistance points.

The output of the resistance ladder, picked up by the wiper, is applied to the buffer amplifier. The output of this buffer is the converted analog signal. In order to keep the average output constant, the buffer-amplifier output is also fed back, through a servo path, to vary the position of the wiper on the potentiometer. The first step on the feedback path is the average signal detector. This unit produces an output proportional to the average peak value of the reproduced seismic signal. This output is subtracted from a setpoint signal, and the difference is used to drive the wiper motor. The wiper motor drives the wiper to a position which provides a smoothed output at a constant average level. This level is proportional to the set point of the servo system.

Returning to the digital approach shown in Figure 8, the wiper analogy is replaced by a combination of the position of the Q -bits in the mantissa register and the gain of the variable-gain amplifier. Mantissa position is shifted, left or right by shift control, on the basis of data received from the exponent register and the coarse-resolution counter. Gain is varied in proportion to the count in the fine-resolution counter.