



FIGURE 8

Simplified diagram shows major components of the smoothed-recovery digital-to-analog converter.

the value of the mantissa, permitting the D/A converter to accommodate deviations in the below-average direction.

Once positioned in the register, the mantissa bits are converted to the analog equivalent by a conventional resistance ladder. The summed analog signal is applied to the variable gain amplifier and then to each of the channel output amplifiers in sequence. The selection of the output amplifier is made by the decommutation control so that the channel, currently contained in the digital input registers, corresponds to the channel number of the output amplifier selected.

The feedback path from the variable-gain-amplifier output performs two functions, both by digital means:

one is the variation of the amplifier gain; and the other, in conjunction with the exponent register, is the shifting of the mantissa. Before describing how these functions are accomplished digitally, the explanation of an electromechanical analogy will serve to clarify the underlying principles.

This electromechanical counterpart, diagrammed in Figure 9, consists of a 29-bit digital input register (necessary to contain the mantissa and exponent in fixed-point representation), a 29-bit resistance ladder for D/A conversion, a buffer amplifier, an average signal detector, and a servo system. The resistance ladder consists of binary "weighing" resistors of value $2R$ and attenuator resistors (between bits) of value R . This resistance network differs from the conventional