

## PART TWO COMPUTING CIRCUITS

The earliest applications of operational amplifiers were in computational structures applied to indirect modelling, called *analog computers*. In this Part, we present circuits that have found, or are likely to find, their principal employment by members of the computing trade, regardless of their persuasion—*analog*, *digital*, or “*hybrid*.” These circuits will readily be seen to have applications beyond the limited scope of problem-solving and data-handling, and a number of the more articulately-rendered circuits in the “*instrument*” section will be recognized as directly derived from the simple, basic configurations described here.

For convenience, for order, and for other good reasons, this Part has been divided into three sub-plots: *Linear Circuits*; *Continuous-Function Nonlinear Circuits*; and *Discontinuous-Function Nonlinear Circuits*.

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### Linear Circuits

Though these circuits are inherently linear (i.e., output magnitudes bear a directly proportional relationship to input magnitudes), bear in mind that they are often used successfully in combination with *nonlinear* devices and circuitry; either in the same Amplifier circuit, or in league with other Operational Amplifiers. Naturally, no claim to comprehensiveness is made here, either in diversity or in detail, but enough circuits are provided to encourage the Thoughtful Reader to expand on the basic ideas here discovered, and, so armed and stimulated, to crash through to solutions of his specific (and perhaps unique) problems.

Modules II.1-II.21 . . . pages 39–49

### Continuous-Function Nonlinear Circuits

If linear circuits are best characterized by their fundamentality and ubiquity, the circuits in this second subdivision are most notable for their *permutability*—the range and diversity of function that may be achieved by combining, superimposing, or reiterating them. Small wonder that we can here give only a representative and—we hope—intelligent sampling of the most powerfully potent of the genre! Once again, many of the seeds planted here will be found flowering in Part III, in the form of Instruments of bold ambition and gratifying competence.

Modules II.22-II.33 . . . pages 50–55

### Discontinuous-Function Nonlinear Circuits

Veteran followers of Philbrick publications (a calloused lot) will find nothing remarkable in the generous way in which we embrace such elements of the ungainly Digital Discipline as flipping, flopping, and gating. Indeed, we feel no such reluctance—most of these circuits were born *analog*—and find themselves in their constricted hysteretical, or schizophrenic condition because they have been driven to their limits . . . accidentally at first, perhaps, but now deliberately. Mad and misshapen though they be, they can be very useful indeed, and we value the end above the means, if the blood lines are right. (Digits are members of the Analog family.)

Modules II.34-II.51 . . . pages 56–62