Foreword

The signal-processing products of Analog Devices (and its worthy competitors) have always had broad applications, but in a special way: they tend to be used in critical roles making possible—and at the same time limiting—the excellence in performance of the device, instrument, apparatus, or system using them.

Think about the *op amp*—how it can play a salient role in amplifying an ultrasound wave from deep within a human body, or measure and help reduce the error of a feedback system; the *data converter*—and its critical position in translating rapidly and accurately between the world of tangible physics and the world of abstract digits; the *digital signal processor*—manipulating the transformed digital data to extract information, provide answers, and make crucial instant-by-instant decisions in control systems; *transducers*, such as the life-saving MEMS accelerometers and gyroscopes; and even *control chips*, such as the one that empowers the humble thermometric junction placed deep in the heart of a high-performance—but very vulnerable—microcomputer chip.

From its founding two human generations ago, in 1965, Analog Devices has been committed to a leadership role in designing and manufacturing products that meet the needs of the existing market, anticipate the near-term needs of present and future users, and envision the needs of users yet unknown—and perhaps *unborn*—who will create the markets of the future. These existing, anticipated and envisioned "needs" must perforce include far more than just the design, manufacture and timely delivery of a physical device that performs a function reliably to a set of specifications at a competitive price.

We've always called a product that satisfies these needs "the augmented product," but what does this mean?

The *physical* product is a highly technological product that, above all, requires *knowledge* of its possibilities, limitations and subtleties. But when the earliest generations—and to some extent later generations—of such a product appear in the marketplace, there exist few (if any) school courses that have produced graduates proficient in its use. There are few knowledgeable designers who can foresee its possibilities. So we have the huge task of creating awareness; teaching about principles, performance measures, and existing applications; and providing ideas to stimulate the imagination of those creative users who will provide our next round of challenges.

This problem is met by deploying people and publications. The *people* are Applications Engineers, who can deal with user questions arriving via phone, fax, and e-mail—as well as working with users in the field to solve particular problems. These experts also spread the word by giving seminars to small and large groups for purposes from inspiring the creative user to imbuing the system, design, and components engineer with the nuts-and-bolts of practice. The *publications*—both in hard copy and on-line—range from authoritative handbooks, such as the present volume, comprehensive data sheets, application notes, hardware and software manuals, to periodic publications, such as "Solutions Bulletins" and our unique *Analog Dialogue*—the sole survivor among its early peers—currently approaching its 39th year of continuous publication in print and its 7th year of regular publication on the Internet.

This book is the ultimate expression of product "augmentation" as it relates to data converters. It can be considered a direct descendant of the Analog Devices 1972 *Analog-Digital Conversion Handbook*, edited by the undersigned. This timely publication was seminal in the early days of the mini- and microcomputer

era—advocating the understanding and use of data converters and their links to an IC computer market that was then on the verge of explosive growth. Its third—and most recent—edition was published nearly 20 years ago, in 1986.

Data converters have been marketed as board-mountable components since the mid- to late 1960s, and practical IC D/A and A/D converters have been available since the mid-'70s. Yet, a third of a century later, there is still a need for a book that embraces the many aspects of conversion technology—one that is thorough in its technical content, that looks forward to tomorrow's uses and back to the principles and applications that still make data converters a vital necessity today. This is indeed such a book, and I am delighted that Walt Kester continues the practice of "augmenting" our data converters in such an interesting and accessible form.

Dan Sheingold, August 24, 2004
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