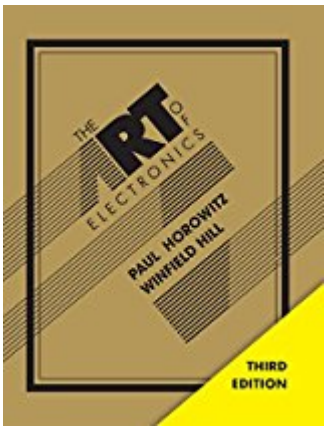
Book The Art of Electronics By Paul Horowitz, Winfield Hill



At long last, here is the thoroughly revised and updated third edition of the hugely successful The Art of Electronics. It is widely accepted as the best single authoritative book on electronic circuit design. In addition to new or enhanced coverage of many topics, the third edition includes 90 oscilloscope screenshots illustrating the behavior of working circuits, dozens of graphs giving highly useful measured data of the sort that is often buried or omitted in datasheets but which you need when designing circuits, and 80 tables (listing some 1650 active components), enabling intelligent choice of circuit components by listing essential characteristics (both specified and measured) of available parts. The new Art of Electronics retains the feeling of informality and easy access that helped make the earlier editions so successful and popular. It is an indispensable reference and the gold standard for anyone, student or researcher, professional or amateur, who works with electronic circuits.

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Review "Who among us has not kept a cherished copy of AoE on our workbench throughout our careers? Engineers, hackers and makers of all stripes, rejoice for the third edition ... has been worth the wait! Packed with tons of delicious knowledge to navigate electronics in both work and hobby. An encyclopedia of electronics knowledge, [The Art of Electronics] is a pleasure to read through for tips and tricks and is an unbeatable resource! Take a day out to read a chapter - you will learn things you didn't even know you didn't know. Or, refer to the pinouts, diagrams, and techniques as necessary to guide you through a difficult project. If you think electrical engineering is magical then

you must pick up this tome!" Limor 'Ladyada' Fried, Adafruit Industries "First of all, after I forklifted [Chapter 5] onto my reading table, I sat down and read it. It is simply spectacular. That may be overly exclamatory language but it is the only appropriate verbiage I can summon. Spectacular, deep and wide. I especially like the comments about interpreting specifications and the deconstruction of the Agilent voltmeters is just, well, wonderful." Jim Williams, Linear Technology Corp "Wow. Chapter 5 details every circuit artifact that I've encountered in the past thirty years in a through, pragmatic, and straightforward way. My only 'twinge' is that [it] disclosed and explained (in glorious graphical detail and with real part numbers) many topics that I thought were my personal trade secrets ... I love the plots. I know that it must take an enormous effort to collate all of the device characteristics. It's worth the effort. The way ... [it] present[s] the data allows the reader to get terrific perspective on a lot of landscape in a single view. Nice work." John Willison, founder, Stanford Research Systems "Horowitz and Hill's third edition beautifully upgrades their earlier work, with substantial updates to detail, and without compromise to style, content, or technical quality. Like the second edition I've used for years, it is laser-focused on the working engineer. Delivered in folksy Horowitz and Hill style, it is rich with the kind of nitty-gritty information that's invaluable to circuit designers and manufacturers, much of which is absent (or difficult to find) elsewhere. This new book is a superb update, one which I'm sure will be treasured by those close to the art of analog circuitry." Walt Jung, author, IC Op-Amp Cookbook "This epic work was created by two of the best experts in the field (with many others providing information). It defines the current state of the art in electronics ... Most parts of the book will continue to be relevant for several decades. The 1124 pages (even more densely packed with highly accurate information than the pages of the second edition) will delight everyone who already knows about electronics ... It is almost certain that you will like the third edition even more than the second ... The information that is now available in the book is absolutely fantastic, both the quality and the quantity, and you should get [it] as soon as you can ..." Wise Warthog blog "If you are looking for a handy and very practical electronics reference book, this is a good one. I think you will enjoy it. Thanks to Horowitz and Hill for updating this classic." Lou Frenzel, Electronic Design (electronicdesign.com) "If you are a hobbyist or maker who wants to acquire or improve a well-rounded knowledge of electronics then The Art of Electronics is an ideal book for you. It starts from the very basics of voltage, current and resistance without getting heavily dependent on physics theory or mathematics, and proceeds to cover a huge variety of interesting topics. For electronic engineering students, [this book] ... will help you develop the intuitive understanding, which will make it easier to put the maths in context, and it will be invaluable when you do practical work for design projects. The Art of Electronics brilliantly conveys its authors' enthusiasm and experience of practical engineering and is an inspiring read. Many people have described the earlier editions as the best book on electronics, so [this third edition] had a lot to live up to; fortunately, it does not disappoint. It deserves its gold cover." Ian Bell, Everyday Practical Economics 'I believe the strength of this book stems from the authors' background in physics ... The key being that electronics is not their primary interest. This 'application perspective' is most evident in their presentation: the material is presented with the goal of understanding the behavior of electronic devices, circuits, and systems before the nitty-gritty details of calculating the behaviour ... The authors are also liberal in their use of commercially available parts in their presentation, something rarely, if ever, seen in a typical textbook. There is an abundance of warning, based on real-world experience, of the many traps that lie in wait for the practitioner of the electronic art ... In spite of the analog bent, the digital information in this book is an excellent source for the analog engineer to get started using digital systems for the control of analog circuits. All in all, a highly recommended addition to the working engineer's bookshelf. ' Greg Oshiro , Journal of the Audio Engineering Society About the Author Paul Horowitz is Professor of Physics at Harvard University, where he originated the Laboratory Electronics course in 1974, from which emerged The Art of Electronics. He was one of the pioneers of the search for intelligent life beyond the Earth, and one of the leaders behind SETI. Other research interests include observational astrophysics, x-ray and particle microscopy, and optical interferometry. He is the author of some 200 scientific articles and

reports, has consulted widely for industry and government, and is the designer of numerous electronic and photographic instruments. Winfield Hill has held positions at numerous organisations, including Harvard University's Electronic Design Center and Sea Data Corporation. Currently he is the Director of Electronics Engineering at the Rowland Institute for Science where he has designed some 250 electronic instruments. Recent interests include high-voltage RF (to 15kV) and precision high-current electronics (to 6000A).

Customer Reviews Most helpful customer reviews 165 of 169 people found the following review helpful. An old friend, rejuvenated. By Peltio "They're back!" Since the publishing of the acclaimed second edition, the field of electronics has witnessed a few (ahem) little advancements. Switching power supplies have conquered the world (also polluting it with all sorts of electrical noise), voltages have gone way down, frequencies have gone up through the roof, data communications have turned seriously serial and computers are no longer a goal, but a means to embed and distribute intelligence in all sorts of devices. An update of what is deemed to be the single tome "Bible of Electronics" was thus in order. It took a couple of decades to complete, but now the wait is over: Horowitz and Hill are back! The first question that comes to mind is "what has changed from the second to the third edition?" The short answer is: an awful lot. The more I read it, the more I realize this is a completely different book. In the way it appears, to begin with: the wider pages, the smaller fonts and the uniform-styled pictures do away with the informal textbook style and make it look more like a deluxe encyclopedia. The writing style is still the same, though: informal, clear and to the point (I believe this to be the only university level textbook I know to use the word "bulls***" right in the preface). As an aside, the new format allows for some 33% more text per page, so know that had this book been printed with the same typeface and layout of the second edition, it would span some 1500 pages. One word on the pictures: device characteristics are handed out by the dozen on each diagram for ease of comparison. While this was known to happen in the previous edition too, it is now the norm throughout the whole textbook. And this is a reflection of what I perceive as the real aim of this book: giving designers a means to find the optimal, yet pragmatic, solution for *real world* circuits. The Art of Electronics plays the role of the senior designer in a R&D department, the one who is always busy giving advice on how to turn circuits made of ink on paper into real working hardware. In this third edition Horowitz and Hill have not only greatly expanded the application topics, but have also managed to bring them to a higher level altogether. The topics are more logically laid out and real world top-notch examples ("Designs by the Masters") are used to drive home key concepts in electronic design. The old friend I knew as TAoE2 has not only rejuvenated, but it has also matured to a level it will take me time to fully comprehend. As a quick aid for the owners of the previous edition, here's the list of chapters along with a *very rough* indication of their changes with respect to TAoE2 (= means "roughly equivalent", the numbers tell which chapter treated the same material in the previous edition, with a and b to signify chapter splitting; a "+" means a different or greatly revisited chapter) Chapter Title Differences wrt 2nd Ed. ---------- ---------- ONE: Foundations (=) TWO: Bipolar Transistors (=) THREE: Field-Effect Transistors (=) FOUR: Operational Amplifiers (=) FIVE: Precision Circuits (7a+) SIX: Filters (5a+) SEVEN: Oscillators and Timers (5b+) EIGHT: Low-Noise Techniques (7b+) NINE: Voltage Regulation and Power Conversion (6+) TEN: Digital Logic (8) ELEVEN: Programmable Logic Devices (+) TWELVE: Logic Interfacing (9a+) THIRTEEN: Digital meets Analog (9b+) FOURTEEN: Computers, Controllers, and Data Links (10+) FIFTEEN: Microcontrollers (+) The first four basic chapters have retained their pedagogical structure. They have been updated to reflect the disappearance of obsolete and discontinued devices (uA741, anyone?) and the introduction of new, better or more widely available components. Something has been changed, something has been moved to other more specific chapters (for example, Comparators have moved from the Op Amp chapter to the Logic Interfacing chapter). Personally, I kind of miss the very extensive table 4.1 that concentrated in a single point (well, if it's possible to call 'point' a dozen pages) the basic features of scores of op amps. It appears that content of this type will be made available in the upcoming

addendum "The X chapters" (more on that later). Oh, well, in the meantime there are other, more specialized tables in the applicative chapters and then, I still have the second edition... The "old" 5th chapter ("Active filters and oscillators") has been split into the two distinct and enhanced chapters six: "Filters" and seven: "Oscillators and timers". Likewise, the "old" 7th chapter ("Precision circuits and low-noise techniques" has doubled up into chapter five: "Precision circuits" and chapter eight :"Low-noise Techniques". These two chapters alone are worth buying the book. The old chapter 6 is now the ninth chapter "Voltage regulation and power conversion". This is the sample chapter that can be downloaded from the publisher's website. It has been expanded and rewritten, and switching power supplies are treated in detail. Let's hope that having this chapter available for free worldwide will somehow help in reducing the number of awfully badly designed wall-warts. The universe of digital electronics has changed a lot since the age of 8 bit microprocessors and so have the part of The Art of Electronics devoted to it. While the "fundamentals chapter" on Digital Logic has remained essentially the same, the old chapter 9 of the 2nd edition, "Digital meets Analog", has now been split into chapter twelve "Logic interfacing" and the greatly enhanced chapter thirteen - still named "Digital meets Analog" - that touches all kind of ADCs you can dream of (oh, yes, it still contains sections on PLLs and random noise generators). The treatment of the digital part of The Art of Electronics is now no longer focused on microprocessors, but has widened to embrace PLDs and microcontrollers, each of which earn a dedicated chapter. Gone is the Microprocessor chapter on the venerable 68008 (and its elegant instruction set), and a new conclusive chapter on microcontrollers highlights the increasingly important role of these devices "at the heart of today's [] electronics products" (to quote note 1 of chapter fifteen, in turn quoting Maxim's application note 3967). Possibly even more important - and in some way a tad less prone to obsolescence - is the electronics that allows these systems to speak with each other and with their sensors and actuators. And so, in chapter fourteen, after the description of the basic principles of computer architecture, some twenty pages are devoted to discussing the various parallel and serial buses that make up today's computers and controllers networks (from SPI to Ethernet, passing through PC104 and CAN). And let's not forget chapter twelve (Logic Interfacing) and appendix H on Transmission Lines and Impedance Matching. Chapter fifteen, "Microcontrollers" wraps up the tome and leaves the reader begging for more. It appears the final chapters of the second edition that did not make it into this massive 1100 pages (excluding the appendices) tome, will remain frozen in their 1989 timeframe. While few might miss the old twelfth chapter ("Electronic construction techniques"), I bet there could be a market for what were chapter 13 ("High-frequency and high-speed techniques"), chapter 14 ("Low-power design") and chapter 15 ("Measurements and signal processing"). Should they get the same fattening treatment the other 'applicative' chapters have undergone, they would make a nice addition - a gospel, perhaps? - to this Bible. In the preface to the third edition, the authors mention the forthcoming publishing of an upcoming volume titled "The Art of Electronics: The X-Chapters" that will include, and I quote, "some additional related material that [the authors] had hoped to include in this volume (on real-world properties of components and advanced topics in BJTs, FETs, op-amps and power control)". Publication date for this work is still fuzzy (it might take years, if it follows the example of the main text). The student manual for the third edition, instead, has already been published with the title "Learning the Art of Electronics". According to what is written in the preface, the "Circuit Ideas and Bad Circuits" grayed sections of the book will be available on the updated book's website along with the (sadly for first printing owners) extensive errata and a searchable pdf index. This is a first useful step toward a search function that will make up for the lack of an electronic edition of the third 'installment' of this Bible. A simple web search engine where one could search the entire body of text for a given string would be even better. I can even see an App for "Search TAoE": flipping through the index is so last century... In conclusion, this third edition of The Art of Electronics is definitely worth buying even if you already have the second edition (but a reader who managed to read this far already knew that from the start). Besides, from the way is has changed (they did add and subtract!), it appears it will peacefully coexist with its older sibling on my bookshelf. As a conclusive note, the book opens with a dedication to the memory

of the late Jim Williams. A suggestion for the rookies: kids, if you are new to the field of electronics, look him up on the Web - just type "Reading Jim Williams" in the search field and then download the freely available application notes he authored. There's a lot to learn from him. And while you are at it, look up Bob Pease (R.A.P.), too. You won't regret it. One more thing. The yellow triangle on the cover. What the heck were they thinking? (*Edited to expand a few points, correct some (but not all of the) grammar and acknowledge the points made by one of the authors in the comments below - further edited with the same aim*) 119 of 125 people found the following review helpful. Don't throw away the 2nd ed By davez I read the 2nd edition from cover to cover in about 10 years. And I just read the 3rd edition in about one week. I used to say everything I knew about electronics I could find in AoE. Now I probably do know a few things that are not covered in the book. The book cover has been upgraded from silver to flashier gold color. I don't fault them for considering it as the gold standard in books on electronics. This book deserves a 5 star rating. The true value of the book is that it is not an academic text book. It contains a wealth of practical information, in charts, tables, and graphs, no other books come close. The jewel of the crown is the chapter on precision circuits. The chapter on noise is equally rich. However, I did not like the elimination of the circuit ideas section and replacing it with a chapter review. Omitting the circuit construction is also a loss because prototyping and making the circuit board are an essential art that separates practitioners from theorists. I also lament the elimination of the chapter on RF. This book constantly refers the reader to the so-far unavailable "The x-Chapters" book; it is somewhat irritating to me that I'll have to get another book. I wish it had fewer annoying trivial errors (how can you not catch a flipped diode on Fig 1.78?) ; 25 years ought to be enough to get it perfect. So if you are a newcomer, you could still choose the 2nd edition because you can probably find a bargain now. But I won't let go my 2nd edition. The new edition is 0.7" wider, 67 pages more with smaller font and narrower margin. 9 of 9 people found the following review helpful. The most important and inspiring book on electronics there is. By Todd M. Bailey To me, there is no one more important book in my life than H&H. I certainly do not know of a better electronics text (and I like electronics texts). Further, I believe my career in engineering boils down to a few distinct pushes in that direction before it was in my blood (and therefore too late). One of the big ones was getting a copy of AoE 2nd Edition in school. So, I would have bought the 3rd edtion no matter what. Incredibly, the 3rd edition has expanded many of the things I loved about the 2nd edition. The section on low noise design is much better and much more useful and it was pretty great before. The digital stuff is obviously much more relevant (although it may not stay that way). The "circuits from the masters" sections and the case studies of specific circuit designs are fascinating and useful (although I do miss the hilarious "bad circuits" sections). Finally, and most importantly, you can tell that H&H themselves were active engineers in the world between the last edition and this one -- building circuits and solving problems and reading other works and being influenced by the work and scholarship and generally just continuing to rule. The dedication to Jim Williams showed that like me and all other analog nerds I know out there, they had been eagerly reading all his stuff. The section on microcontrollers exactly parallels some of the design ideas, biases, and gut feelings that I and other embedded engineers have taken the past fifteen years developing by plowing through all the exciting architecture and tool changes that have happened from EEPROM PICs to ARMs. Finally, the intellectual integrity, raw practicality, and HANDS-ON-ness of this book are unparalleled. If everybody were required to read this book before designing circuits, there would be a lot fewer crappy circuits out there. Oh, yeah. And it's fun, too. See all 464 customer reviews...