

The Design of Active Crossovers

Second Edition

Douglas Self



A Focal Press Book

The Design Of Active Crossovers By Douglas Self

Huangqi Zhang



The Design Of Active Crossovers By Douglas Self

The Design of Active Crossovers Douglas Self, 2018-03-28 Active crossovers are used by almost every sound reinforcement system and every recording studio monitoring set up but the use of active crossovers is rapidly expanding This new edition presents all the updates to loudspeaker technology and crossover design The edition expands on loudspeaker configurations and design issues sound reinforcement issues more on lowpass and highpass filters and may other filters This new edition is a must read for anyone wanting comprehensive practical knowledge

Audio Power Amplifier Design Douglas Self, 2013-07-04 This book is essential for audio power amplifier designers and engineers for one simple reason it enables you as a professional to develop reliable high performance circuits The Author Douglas Self covers the major issues of distortion and linearity power supplies overload DC protection and reactive loading He also tackles unusual forms of compensation and distortion produced by capacitors and fuses This completely updated fifth edition includes four NEW chapters including one on The XD Principle invented by the author and used by Cambridge Audio Crosstalk power amplifier input systems and microcontrollers in amplifiers are also now discussed in this fifth edition making this book a must have for audio power amplifier professionals and audiophiles

Small Signal Audio Design Douglas Self, 2020-04-17 Small Signal Audio Design is a highly practical handbook providing an extensive repertoire of circuits that can be assembled to make almost any type of audio system The publication of Electronics for Vinyl has freed up space for new material though this book still contains a lot on moving magnet and moving coil electronics and this fully revised third edition offers wholly new chapters on tape machines guitar electronics and variable gain amplifiers plus much more A major theme is the use of inexpensive and readily available parts to obtain state of the art performance for noise distortion crosstalk frequency response accuracy and other parameters Virtually every page reveals nuggets of specialized knowledge not found anywhere else For example you can improve the offness of a fader simply by adding a resistor in the right place if you know the right place Essential points of theory that bear on practical audio performance are lucidly and thoroughly explained with the mathematics kept to an absolute minimum Self's background in design for manufacture ensures he keeps a wary eye on the cost of things This book features the engaging prose style familiar to readers of his other books You will learn why mercury filled cables are not a good idea the pitfalls of plating gold on copper and what quotes from Star Trek have to do with PCB design Learn how to make amplifiers with apparently impossibly low noise design discrete circuitry that can handle enormous signals with vanishingly low distortion use humble low gain transistors to make an amplifier with an input impedance of more than 50 megohms transform the performance of low cost opamps build active filters with very low noise and distortion make incredibly accurate volume controls make a huge variety of audio equalisers make magnetic cartridge preamplifiers that have noise so low it is limited by basic physics by using load synthesis sum switch clip compress and route audio signals be confident that phase perception is not an issue This expanded and updated third edition contains extensive new material on optimising RIAA equalisation electronics for ribbon microphones summation of noise sources defining system frequency response loudness controls and much more Including all the crucial theory but with minimal mathematics Small Signal Audio Design is the must have companion for anyone studying researching or working in audio engineering and audio electronics

Audio Power Amplifier Design Handbook Douglas Self, 2006 Preface Introduction and general survey History architecture and negative feedback The general principles of power amplifiers The small signal stages The Class B output stage The output stage II Compensation slew rate and stability Power supplies and PSRR Class A power amplifiers Class D power amplifiers Class G power amplifiers FET output stages Thermal compensation and thermal dynamics Amplifier and loudspeaker protection Grounding and practical matters Testing and safety Index

Audio Engineering Explained Douglas Self, 2012-11-12 All the design and development inspiration and direction an audio engineer needs in one blockbuster book Douglas Self has selected the very best sound engineering design material from the Focal and Newnes portfolio and compiled it into this volume The result is a book covering the gamut of sound engineering The material has been selected for its timelessness as well as for its relevance to contemporary sound engineering issues

Designing Audio Power Amplifiers Bob Cordell, 2019 This comprehensive book on audio power amplifier design will appeal to members of the professional audio engineering community as well as the student and enthusiast Designing Audio Power Amplifiers begins with power amplifier design basics that a novice can understand and moves all the way through to in depth design techniques for very sophisticated audiophiles and professional audio power amplifiers This book is the single best source of knowledge for anyone who wishes to design audio power amplifiers It also provides a detailed introduction to nearly all aspects of analog circuit design making it an effective educational text Develop and hone your audio amplifier design skills with in depth coverage of these and other topics Basic and advanced audio power amplifier design Low noise amplifier design Static and dynamic crossover distortion demystified Understanding negative feedback and the controversy surrounding it Advanced NFB compensation techniques including TPC and TMC Sophisticated DC servo design MOSFET power amplifiers and error correction Audio measurements and instrumentation Overlooked sources of distortion SPICE simulation for audio amplifiers including a tutorial on LTspice SPICE transistor modeling including the VDMOS model for power MOSFETs Thermal design and the use of ThermalTrak tm transistors Four chapters on class D amplifiers including measurement techniques Professional power amplifiers Switch mode power supplies SMPS design Static and dynamic crossover distortion demystified Understanding negative feedback and the controversy surrounding it Advanced NFB compensation techniques including TPC and TMC Sophisticated DC servo design MOSFET power amplifiers and error correction Audio measurements and instrumentation Overlooked sources of distortion SPICE simulation for audio amplifiers including a tutorial on LTspice SPICE transistor modeling including the VDMOS model for power MOSFETs Thermal design and the use of ThermalTrak tm transistors Four chapters on class D amplifiers including measurement techniques Professional power amplifiers Switch mode power supplies SMPS the use of ThermalTrak tm transistors Four chapters on class D amplifiers including measurement techniques Professional power amplifiers Switch mode power supplies SMPS

The Design of Active Crossovers Douglas Self, 2012-08-06 The Design of Active Crossovers is a unique guide to the design of high quality circuitry for splitting audio frequencies into separate bands and directing them to different loudspeaker drive units specifically designed for handling their own range of frequencies Traditionally this has been done by using passive crossover units built into the loudspeaker boxes this is the simplest solution but it is also a bundle of compromises The high cost of passive crossover components and the power losses in them means that passive crossovers have to use relatively few parts This limits how well the crossover can do its basic job Active crossovers sometimes called electronic crossovers tackle the problem in a much more sophisticated manner The division of the audio into bands is performed at low signal levels before the power amplifiers where it can be done with much greater precision Very sophisticated filtering and response shaping networks can be built at comparatively low cost Time delay networks that compensate for physical misalignments in speaker construction can be implemented easily the equivalent in a passive crossover is impractical because of the large cost and the heavy signal losses Active crossover technology is also directly applicable to other band splitting signal processing devices such as multi band compressors The use of active crossovers is increasing They are used by almost every sound reinforcement system by almost every recording studio monitoring set up and to a small but growing extent in domestic hifi There is a growing acceptance in the hifi industry that multi amplification using active crossovers is the obvious next step and possibly the last big one to getting the best possible sound There is also a large usage of active crossovers in car audio with the emphasis on routing the bass to enormous low frequency loudspeakers One of the very few drawbacks to using the active crossover approach is that it requires more power amplifiers these have often been built into the loudspeaker along with the crossover and this deprives the customer of the chance to choose their own amplifier leading to resistance to the whole active crossover philosophy A comprehensive proposal for solving this problem is an important part of this book The design of active crossovers is closely linked with that of the loudspeakers they drive A chapter gives a concise but complete account of all the loudspeaker design issues that affect the associated active crossover This book is packed full of valuable information with virtually every page revealing nuggets of specialized knowledge never before published Essential points of theory bearing on practical performance are lucidly and thoroughly explained with the mathematics kept to an essential minimum Douglas background in design for manufacture ensures he keeps a wary eye on the cost of things Features Crossover basics and requirements The many different crossover types and how they work Design almost any kind of active filter with minimal mathematics Make crossover filters with very low noise and distortion Make high performance time delay filters that give a constant delay over a wide range of frequency Make a wide variety of audio equaliser stages shelving peaking and notch characteristics All about active crossover system design for optimal noise and dynamic range There is a large amount of new material that has never been published before A few examples using capacitance multipliers in biquad equalisers opamp output biasing to reduce distortion the design of NTMTM notch crossovers the design of special filters for filler driver crossovers the use of mixed capacitors to reduce filter distortion differentially elevated internal levels to reduce noise and so on Douglas wears his learning lightly and this book features the engaging prose style familiar from his other books The Audio Power Amplifier Design Handbook Self on Audio and the recent Small Signal Audio Design

Practical Audio Amplifier Circuit Projects Andrew Singmin, 2000 Practical Audio Amplifier Circuit Projects builds on the introduction to electronic circuits provided in Singmin's innovative and successful first book Beginning Electronics Through Projects Both books draw on the author's many years of experience as electronics professional and as hobbyist As a result his project descriptions are lively practical and very clear With this new volume the reader can build relatively simple systems and achieve useable results quickly The projects included here allow a hobbyist to build amplifier circuits test them and then put them into a system Progress through a graduated series of learning activities culminates in unique devices that are nevertheless easy to build Learn the basic building blocks of audio amplifier circuit design and then apply your knowledge to your own audio inventions Targets the intermediate to advanced reader with challenging projects that teach important circuit theories and principles Provides a ready source of audio circuits to professional audio engineers Includes an electric guitar pacer project that lets you jam with your favorite band

Audio Reality Bruce Rozenblit, 1999 Are you confused about which accessories to buy Have you ever wondered how they work Do claims made in advertisements seem too bizarre to be real This book will give you the knowledge needed to answer these questions yourself By using simple analogies with clear explanations the author equips the reader with the science that governs the operations of these devices without using any math By replacing myths with facts the reader acquires essential information that yields the greatest value from your purchasing dollar and not be taken advantage of Topics include conductors connectors skin effect impedance interconnects speaker cables balanced lines transmission lines power cords isolation transformers damping systems feedback vacuum tubes acoustics and much more Become your own expert Back cover

Passive, Active, and Digital Filters Wai-Kai Chen, 2018-10-08 Culled from the pages of CRC's highly successful best selling The Circuits and Filters Handbook Second Edition Passive Active and Digital Filters presents a sharply focused comprehensive review of the fundamental theory behind professional applications of these complex filters It supplies a concise convenient reference to the key concepts models and equations necessary to analyze design and predict the behavior of large scale systems that employ various types of filters illustrated by frequent examples Edited by a distinguished authority this book emphasizes the theoretical concepts underlying the processes behavior and operation of these filters More than 470 figures and tables illustrate the concepts and where necessary the theories principles and mathematics of some subjects are reviewed Expert contributors discuss general characteristics of filters frequency transformations sensitivity and selectivity low gain active filters higher order filters continuous time integrated filters FIR and IIR filters and VLSI implementation of digital filters among many other topics Passive Active and Digital Filters builds a strong theoretical foundation for the design and analysis of a variety of filters from passive to active to digital while serving as a handy reference for experienced engineers making it a must have for both beginners and seasoned experts

Self on Audio Douglas Self, 2006-06-29 Whether you are a dedicated audiophile who wants to gain a more complete understanding of the design issues behind a truly great amp or a professional electronic designer seeking to learn more about the art of amplifier design there can be no better place to start than with the 35 classic magazine articles collected together in this book Douglas Self offers a tried and tested method for designing audio amplifiers in a way that improves performance at every point in the circuit where distortion can creep in without significantly increasing cost Through the articles in this book he takes readers through the causes of distortion measurement techniques and design solutions to minimise distortion and efficiency Most of the articles are based round the design of a specific amplifier making this book especially valuable for anyone considering building a Self amplifier from scratch Self is senior designer with a high end audio manufacturer as well as a prolific and highly respected writer His career in audio design is reflected in the articles in this book originally published in the pages of Electronics World and Wireless World over a 25 year period An audio amp design cookbook comprising 35 of Douglas Self's definitive audio design articles Complete designs for readers to build and adapt An anthology of classic designs for electronics enthusiasts Hi Fi devotees and professional designers alike

Speculative Everything Anthony Dunne, Fiona Raby, 2013-12-06 How to use design as a tool to create not only things but ideas to speculate about possible futures Today designers often focus on making technology easy to use sexy and consumable In *Speculative Everything* Anthony Dunne and Fiona Raby propose a kind of design that is used as a tool to create not only things but ideas For them design is a means of speculating about how things could be to imagine possible futures This is not the usual sort of predicting or forecasting spotting trends and extrapolating these kinds of predictions have been proven wrong again and again Instead Dunne and Raby pose what if questions that are intended to open debate and discussion about the kind of future people want and do not want *Speculative Everything* offers a tour through an emerging cultural landscape of design ideas ideals and approaches Dunne and Raby cite examples from their own design and teaching and from other projects from fine art design architecture cinema and photography They also draw on futurology political theory the philosophy of technology and literary fiction They show us for example ideas for a solar kitchen restaurant a flypaper robotic clock a menstruation machine a cloud seeding truck a phantom limb sensation recorder and devices for food foraging that use the tools of synthetic biology Dunne and Raby contend that if we speculate more about everything reality will become more malleable The ideas freed by speculative design increase the odds of achieving desirable futures

Guidelines for Design and Operation of Nighttime Traffic Control for Highway Maintenance and Construction James E. Bryden, Douglas J. Mace, National Cooperative Highway Research Program, 2002

Loudspeaker Modelling and Design Geoff Hill, 2018-09-03 In this book Geoff Hill demonstrates modern software and hardware being applied to the processes behind loudspeaker design and modelling Modern computing power has progressed to the point that such analyses are now practical for any interested individual or small company *Loudspeaker Modelling and Design A Practical Introduction* examines the process from initial concept through specifications and theoretical simulations and onto detailed design It demonstrates the processes of design and specification by using detailed simulations of a loudspeaker driver sufficient to give reassurance that a design is practical and will perform as expected This book brings together many different strands of modelling from electro magnetic through to mechanical and acoustic without getting bogged down in theoretical discussions and arguments This practice based book shows the techniques used in designing modern loudspeakers and transducers

Loudspeakers Philip Newell, Keith Holland, 2018-10-26 Loudspeakers For Music Recording and Reproduction Second Edition is a comprehensive guide offering the tools and understanding needed to cut out the guesswork from loudspeaker choice and set up Philip Newell and Keith Holland with the assistance of Sergio Castro and Julius Newell combine their years of experience in the design application and use of loudspeakers to cover a range of topics from drivers cabinets and crossovers to amplifiers cables and surround sound Whether using loudspeakers in a recording studio mastering facility broadcasting studio film post production facility home or musician s studio or if you simply aspire to improve your music production system this book will help you make the right decisions This new edition provides significant updates on the topics of digital control calibration and cinema loudspeaker systems

Self on Audio Douglas Self, 2015-10-05 Self on Audio The collected audio design articles of Douglas Self Third Edition is the most comprehensive collection of significant articles in the technical audio press This third edition features 45 articles that first appeared in *Elektor Linear Audio* and *Electronics World* Including expanded prefaces for each article the author provides background information and circuit commentary The articles cover both discrete and opamp preamplifier design mixing console design and power amplifier design The preamplifier designs are illuminated by the very latest research on low noise and RIAA equalization The famous series of 1993 articles on power amplifier distortion is included with an extensive commentary reflecting the latest research on compensation and ultra low distortion techniques This book addresses the widened scope of technology that has become available to the audio designer over the last 35 years New materials include Prefaces that explain the historical background of the articles why they were written and the best use of the technology of the day Extensive details including schematics of designs that preceded or followed the design in each article giving an enormous amount of extra information and a comprehensive overview of how author s design approaches have evolved New directions for the technology describing new lines of thought such as curvilinear Class A

The Audiophile's Project Sourcebook: 120 High-Performance Audio Electronics Projects G. Randy Slone, 2001-11-20 THE AUDIOPHILE S PROJECT SOURCEBOOK Build audio projects that produce great sound for far less than they cost in the store with audio hobbyists favorite writer Randy Slone In The Audiophile s Project Sourcebook Slone gives you Clear illustrated schematics and instructions for high quality high power electronic audio components that you can build at home Carefully constructed designs for virtually all standard high end audio projects backed by an author who answers his email 8 power amp designs that suit virtually any need Instructions for making your own inexpensive testing equipment Comprehensible explanations of the electronics at work in the projects you want to construct spiced with humor and insight into the electronics hobbyist s process Complete parts lists The Audiophile s Project Sourcebook is devoid of the hype superstition myths and expensive fanaticism often associated with high end audio systems It provides straightforward help in building and understanding top quality audio electronic projects that are based on solid science and produce fantastic sound THE PROJECTS YOU WANT FOR LESS Balanced input driver receiver circuits Signal conditioning techniques Voltage amplifiers Preamps for home and stage Tone controls Passive and active filters Parametric filters Graphic equalizers Biamping and triamping filters Headphone amplifiers Power amplifiers Speaker protection systems Clip detection circuits Power supplies Delay circuits Level indicators Homemade test equipment

Audio Engineering: Know It All Douglas Self, Ben Duncan, Ian Sinclair, Richard Brice, John Linsley Hood, Andrew Singmin, Don Davis, Eugene Patronis, John Watkinson, 2009-03-06 The Newnes Know It All Series takes the best of what our authors have written to create hard working desk references that will be an engineer's first port of call for key information design techniques and rules of thumb. Guaranteed not to gather dust on a shelf. Audio engineers need to master a wide area of topics in order to excel. The Audio Engineering Know It All covers every angle including digital signal processing, power supply design, microphone and loudspeaker technology, as well as audio compression. A 360 degree view from our best selling authors. Includes such topics as fundamentals, compression and test and measurement. The ultimate hard working desk reference, all the essential information, techniques and tricks of the trade in one volume.

Brand Relevance David A. Aaker, 2011-01-25 Branding guru Aaker shows how to eliminate the competition and become the lead brand in your market. This ground breaking book defines the concept of brand relevance using dozens of case studies: Prius, Whole Foods, Westin, iPad and more, and explains how brand relevance drives market dynamics which generates opportunities for your brand and threats for the competition. Aaker reveals how these companies have made other brands in their categories irrelevant. Key points: When managing a new category of product, treat it as if it were a brand. By failing to produce what customers want or losing momentum and visibility, your brand becomes irrelevant and creates barriers to competitors by supporting innovation at every level of the organization. Using dozens of case studies, shows how to create or dominate new categories or subcategories, making competitors irrelevant. Shows how to manage the new category or subcategory as if it were a brand and how to create barriers to competitors. Describes the threat of becoming irrelevant by failing to make what customers are buying or losing energy. David Aaker, the author of four brand books, has been called the father of branding. This book offers insight for creating and/or owning a new business arena. Instead of being the best, the goal is to be the only brand around, making competitors irrelevant.

Electronics for Vinyl Douglas Self, 2017-08-15 Electronics for Vinyl is the most comprehensive book ever produced on the electronic circuitry needed to extract the best possible signal from grooves in vinyl. What is called the vinyl revival is in full swing and a clear and comprehensive account of the electronics you need is very timely. Vinyl reproduction presents some unique technical challenges: the signal levels from moving magnet cartridges are low and those from moving coil cartridges lower still, so a good deal of high quality, low noise amplification is required. Some of the features of Electronics for Vinyl include: integrating phono amplifiers into a complete preamplifier; differing phono amplifier technologies covering active, passive and semi-passive; RIAA equalisation and transconductance; RIAA stages: the tricky business of getting really accurate RIAA equalisation without spending a fortune on expensive components such as switched gain MM MC RIAA amplifiers that retain great accuracy at all gains; the effects of finite open loop gain; cartridge preamplifier interaction and so on; noise and distortion in phono amplifiers covering BJTs, FETs and opamps as input devices; hybrid phono amplifiers; noise in balanced MM inputs; noise weighting and cartridge load synthesis for ultimately low noise archival and non-standard equalisation for 78s etc; building phono amplifiers with discrete transistors; subsonic filtering covering all pole filters, elliptical filters and suppression of subsonics by low frequency crossfeed including the unique Devinyliser concept; ultrasonic and scratch filtering including a variety of variable slope scratch filters; line output technology including zero impedance outputs on level indication for optimal setup and on specialised power supplies and description of six practical projects which range from the simple to the highly sophisticated but all give exceptional performance. Electronics for Vinyl brings the welcome news that there is simply no need to spend huge sums of money to get performance that is within a hair's breadth of the best theoretically obtainable. But you do need some specialised knowledge and here it is.

Reviewing **The Design Of Active Crossovers By Douglas Self**: Unlocking the Spellbinding Force of Linguistics

In a fast-paced world fueled by information and interconnectivity, the spellbinding force of linguistics has acquired newfound prominence. Its capacity to evoke emotions, stimulate contemplation, and stimulate metamorphosis is truly astonishing. Within the pages of "**The Design Of Active Crossovers By Douglas Self**," an enthralling opus penned by a highly acclaimed wordsmith, readers set about an immersive expedition to unravel the intricate significance of language and its indelible imprint on our lives. Throughout this assessment, we shall delve into the book's central motifs, appraise its distinctive narrative style, and gauge its overarching influence on the minds of its readers.

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