

RHdb - An Explanation

Radio Hobbyist's Designbook or RHdb (for short) was designed to guide you into design of electronics apparatus that relates to radio. It assumes you know something about electronics but you can skip Chapters which cover familiar subjects. Mathematics needed in design is down to simple algebra and trigonometry. Topics cover the frequency spectrum of DC through VHF.

You must supply the brainpower. But RHdb can be your main reference, a guidance to reaching your personal hobby goal. RHdb is written in a sort of Reader's Digest format: Short and to-the-point, covering things simply with a minimum of words. Grouping is in 5 sections as given below with a synopsis of Chapters:

BASICS - [Click to download \(5.1MBytes .pdf\)](#)

Title page, dedication, brief history of origin, Table of Contents

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| Chapter 1: | Bare bones of what is needed to do design at home, a common-sense approach |
| Chapter 2: | Mathematics needed in design, often-used constants; Greek letter common |
| Chapter 3: | Waveforms, Heterodyning, Mixing; with easier form of mixings' spurious products |
| Chapter 4: | Bandwidth, Modulation, Noise; Shannon's Law, John Carson's original formula |

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| Chapter 5: | Basic sources, E-I-R, DC laws; a review of basic DC with Kirkhoff's Laws |
| Chapter 6: | Passive R-L-C Components; a quick look at AC Laws and basic component values |
| Chapter 7: | Resonance, single and multiple; more on AC Laws and introduction of Q. |
| Chapter 8: | Two-component matching circuits; going into complex arithmetic and circuits |
| Chapter 9: | Three-component matching circuits; some control of bandwidth versus Q, stability |
| Chapter 10: | Basic L-C Filters; Based on Modern Network Design, the Lowpass Prototype |
| Chapter 11: | Bandpass, Highpass, Bandstop Filters; Transforming Lowpass Prototype into |
| Chapter 12: | Resonator bandpass filters; easier-to-calculate relatively narrow bandpass filters |
| Chapter 13: | L-C Practicality and Stagger-Tuning; Limits on L and C practical values; using |
| Chapter 14: | Quartz crystal units and Narrowband bandpass filters; basics of quartz units |
| Chapter 15: | Variable L-C Tuning methods; Changing tuning spans of variable capacitors |
| Chapter 16: | Low Frequency Transformers; Practical construction of E-I Core transformers |
| Chapter 17: | Wideband Transformers and BALUNs; General wideband transformers, types |
| Chapter 18: | Transmission Lines; General discussion of lines, characteristic impedance, losses |
| Chapter 19: | Homebrewing, Construction, Packaging; Where to do it, suggested workshop |

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| Chapter 20: | Vacuum Tubes; General discussion, types from diode through pentagrid; |
| Chapter 21: | Semiconductor Basic Applications; biasing, major connections, typical circuit |
| Chapter 22: | Basic Power Supplies; AC Mains powered capacitive-input rectifiers, half-wave |
| Chapter 23: | Digital Logic Basics; from Relays through TTL to Advanced CMOS, basic Gates |
| Chapter 24: | Selection, Arithmetic, Switching Logic; Forms of gate arrangements with and |
| Chapter 25: | Flip-flops, Counters, Dividers, Registers; how they work with emphasis on Inverters |

- Chapter 26: Pseudo-Random Shift Generators; Lengths, periodicity, tables of feedback, Other Stables: Monostable (one-shot) and Astable (free-run) multivibrators, Position, Detection, Conversion Logic; Gray Code, methods of detecting motion, Oscillators; Common types shown for L-C and quartz crystal control of frequency, VFA, CFAs, and Related; Operational Amplifier circuits of Voltage feedback.

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- Chapter 31: Switching Converters; types and value calculations of switching power supplies, PLLs and DDSs; Phase-Lock Loops and Direct Digital Synthesis types for phase lock, Modulation and Demodulation; Methods of the basic types in hardware and software.

Chapter 34:

- Miscellaneous Subjects; Various terms and formulae of older laws that have been largely superceded in modern times, PIC Microcontrollers; General treatise and command set of the Microchip Technology PIC, Elemental Metrology; Analog meter circuits, differentiation of Response and Error, Advanced Metrology; More complicated test equipment and circuits, Military Radio Systems and History; A look at military radio from 1938 to present.

PROJECTS - [**Click to download \(6.9MBytes .pdf\)**](#)

- Chapter 39: A TRF receiver for WWVB on 60 KHz; With construction details of a Loop antenna, Genesis of a SW BC Receiver Project; Largely from memory and notes of 1960s, Requiem and Resurrection of the SW BC Receiver; Describes the general failure of the design, Multi-Band Converter; Front end for any low-HF Monoband receiver to reach the 10m band, Monoband Receiver; a converted ARC-5 receiver from WWII surplus modified to 10m band, Regulated Voltage Supplies; All those required for the Chapter 41 to 43 receivers, A Microcontroller for the LF-MF-HF Receiver; A PIC microcontroller with high performance, Finesse in Microcontroller Programming; A step-by-step method of successively adding features, A Discrete-IC Digital Dial; Frequency Read-Out function of the Chapter 45 receiver, Evolution of the Monoband Receiver; Various specialty ICs that can incorporate, An All-Semiconductor Monoband; A solid-state version of the Monoband of the Chapter 45 receiver, Re-Building the LF-HF Receiver; That of Chapters 41 through 43 re-built into a single unit, Simplest-Control SW BC Receiver; Design details never fully built to show the concept, Converting a Heath SB-300 series receiver; An intellectual exercise to examine the design, Simple RF Generator for Testing; Making a frequency-control-by-switches type of generator, A Conclusion; Some personal commentary on commercial electronics products.

That's it for RHdb...as it is this date. There may be more things added later. Those who build things from this book collection have the resources to figure out operation with aid of resources listed. Sorry, but I cannot spend the time to answer general questions by mail or post; there is only so much time left each day. There may be some slight errors here which I will acknowledge despite prolonged and thorough self-editing; those will be posted as they are discovered. This is, after all, a free set of comprehensive information for all to use for their own purposes.

Radio Hobbyist's Designbook

Written by Hans Summers

Thursday, 26 June 2014 00:07 - Last Updated Sunday, 29 June 2014 12:24

Happy hobby to you all,

Leonard H. Anderson, K6LHA, 20 June 2014

Note: Emails sent via the [Contact Page](#) in regard to this book, will be forwarded to the author.