

# www.mbsm.pro , Practical Electronics for Inventors, Fourth Edition

written by mahdi miled | 23 November 2017

**Practical Electronics for Inventors, Fourth Edition**

by: Paul Scherz, Dr. Simon Monk

Abstract: A fully updated, no-nonsense guide to electronics. Advance your electronics knowledge and gain the skills necessary to develop and construct your own functioning gadgets. Written by a pair of experienced engineers and dedicated hobbyists, Practical Electronics for Inventors, Fourth Edition, lays out the essentials and provides step-by-step instructions, schematics, and illustrations. Discover how to select the right components, design and build circuits, use microcontrollers and ICs, work with the latest software tools, and test and tweak your creations. This easy-to-follow book features new instruction on programmable logic, semiconductors, operational amplifiers, voltage regulators, power supplies, digital electronics, and more. Coverage includes:

- Resistors, capacitors, inductors, and transformers
- Diodes, transistors, and integrated circuits
- Optoelectronics, solar cells, and phototransistors
- Sensors, GPS modules, and touch screens
- Op amps, regulators, and power supplies
- Digital electronics, LCDs, and logic gates
- Microcontrollers and prototyping platforms
- Combinational and sequential programmable logic
- DC motors, RC servos, and stepper motors
- Microphones, audio amps, and speakers
- Modular electronics and prototypes

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Dr. Simon Monk has a bachelor's degree in cybernetics and computer science and a Ph.D. in software engineering. He spent several years as an academic before he returned to industry, co-founding the mobile software company Momote Ltd. He has been an active electronics hobbyist since his early teens and is a full-time writer on hobby electronics and open-source hardware. Dr. Monk is author of numerous electronics books, including Programming Arduino, Hacking Electronics, and Programming the Raspberry Pi.

Description: A fully updated, no-nonsense guide to electronics. Advance your electronics knowledge and gain the skills necessary to develop and construct your own functioning gadgets. Written by a pair of experienced engineers and dedicated hobbyists, Practical Electronics for Inventors, Fourth Edition, lays out the essentials and provides step-by-step instructions, schematics, and illustrations. Discover how to select the right components, design and build circuits, use microcontrollers and ICs, work with the latest software tools, and test and tweak your creations. This easy-to-follow book

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## Table of Contents

### A. ABOUT THE AUTHORS

### B. PREFACE

### C. ACKNOWLEDGMENTS

#### 1. Introduction to Electronics

#### 2. Theory

#### 3. Basic Electronic Circuit Components

#### 4. Semiconductors

#### 5. Optoelectronics

#### 6. Sensors

#### 7. Hands-on Electronics

#### 8. Operational Amplifiers

#### 9. Filters

#### 10. Oscillators and Timers

#### 11. Voltage Regulators and Power Supplies

#### 12. Digital Electronics

#### 13. Microcontrollers

#### 14. Programmable Logic

#### 15. Motors

#### 16. Audio Electronics

#### 17. Modular Electronics

#### A. Power Distribution and Home Wiring

#### B. Error Analysis

## C. Useful Facts and Formulas

Tools & Media

figure (1 036)

table (64)

Expanded Table of Contents

A. ABOUT THE AUTHORS

PREFACE PRELIMINARIES

ABOUT THE TECHNICAL EDITORS

B. PREFACE

PREFACE PRELIMINARIES

Notes about the Fourth Edition

C. ACKNOWLEDGMENTS

1. Introduction to Electronics

CHAPTER PRELIMINARIES

2. Theory

CHAPTER PRELIMINARIES

Theory of Electronics

Electric Current

Voltage

A Microscopic View of Conduction (for Those Who Are Interested)

Resistance, Resistivity, Conductivity

Insulators, Conductors, and Semiconductors

Heat and Power

Thermal Heat Conduction and Thermal Resistance

Wire Gauges

Grounds

Electric Circuits

Ohm's Law and Resistors

Voltage and Current Sources

Measuring Voltage, Current, and Resistance

Combining Batteries

Open and Short Circuits

Kirchhoff's Laws

Superposition Theorem

Thevenin's and Norton's Theorems

AC Circuits

AC and Resistors, RMS Voltage, and Current

Mains Power

Capacitors

Inductors

Modeling Complex Circuits

Complex Numbers

Circuit with Sinusoidal Sources

Power in AC Circuits (Apparent Power, Real Power, Reactive Power)

Thevenin's Theorem in AC Form

Resonant Circuits

Lecture on Decibels

Input and Output Impedance

Two-Port Networks and Filters

Transient Circuits

Circuits with Periodic Nonsinusoidal Sources

Nonperiodic Sources

SPIICE

3. Basic Electronic Circuit Components

CHAPTER PRELIMINARIES

Wires, Cables, and Connectors

Batteries

Switches

Relays

Resistors

Capacitors

Inductors

Transformers

Fuses and Circuit Breakers

4. Semiconductors

CHAPTER PRELIMINARIES

Semiconductor Technology

Diodes

Transistors

Thyristors

Transient Voltage Suppressors

Integrated Circuits

5. Optoelectronics

CHAPTER PRELIMINARIES

A Little Lecture on Photons

Lamps

Light-Emitting Diodes

Photoresistors

Photodiodes

Solar Cells

Phototransistors

Photothyristors

Optoisolators

Optical Fiber

6. Sensors

CHAPTER PRELIMINARIES

General Principles

Temperature

Proximity and Touch

Movement, Force, and Pressure

Chemical

Light, Radiation, Magnetism, and Sound

GPS

7. Hands-on Electronics

CHAPTER PRELIMINARIES

Safety

Constructing Circuits

Multimeters

Oscilloscopes

The Electronics Laboratory

8. Operational Amplifiers

CHAPTER PRELIMINARIES

Operational Amplifier Water Analogy

How Op Amps Work (The "Cop-Out" Explanation)

Theory

Negative Feedback

Positive Feedback

Real Kinds of Op Amps

Op Amp Specifications

Powering Op Amps

Some Practical Notes

Voltage and Current Offset Compensation

Frequency Compensation

Comparators

Comparators with Hysteresis

Using Single-Supply Comparators

Window Comparator

Voltage-Level Indicator

Instrumentation Amplifiers

Applications

9. Filters

CHAPTER PRELIMINARIES

Things to Know Before You Start Designing Filters

Basic Filters

Passive Low-Pass Filter Design

A Note on Filter Types

Passive High-Pass Filter Design

Passive Bandpass Filter Design

Passive Notch Filter Design

Active Filter Design

Integrated Filter Circuits

10. Oscillators and Timers

CHAPTER PRELIMINARIES

RC Relaxation Oscillators

The 555 Timer IC

Voltage-Controlled Oscillators

Wien-Bridge and Twin-T Oscillators

LC Oscillators (Sinusoidal Oscillators)

Crystal Oscillators

Microcontroller Oscillators

11. Voltage Regulators and Power Supplies

CHAPTER PRELIMINARIES

Voltage-Regulator ICs

A Quick Look at a Few Regulator Applications

The Transformer

Rectifier Packages

A Few Simple Power Supplies

Technical Points about Ripple Reduction

Loose Ends

Switching Regulator Supplies (Switchers)

Switch-Mode Power Supplies (SMPS)

Kinds of Commercial Power Supply Packages

Power Supply Construction

12. Digital Electronics

CHAPTER PRELIMINARIES

The Basics of Digital Electronics

Logic Gates

Combinational Devices

Logic Families

Powering and Testing Logic ICs

Sequential Logic

Counter ICs

Shift Registers

Analog/Digital Interfacing

Displays

Memory Devices

13. Microcontrollers

CHAPTER PRELIMINARIES

Basic Structure of a Microcontroller

Example Microcontrollers

Evaluation/Development Boards

Arduino

Interfacing with Microcontrollers

14. Programmable Logic

CHAPTER PRELIMINARIES

Programmable Logic

FPGAs

ISE and the Elbert V2

The Elbert 2 Board

Downloads



Drawing Your FPGA Logic Design

Verilog

Describing Your FPGA Design in Verilog

Modular Design

Simulation

VHDL

15. Motors

CHAPTER PRELIMINARIES

DC Continuous Motors

Speed Control of DC Motors

Directional Control of DC Motors

RC Servos

Stepper Motors

Kinds of Stepper Motors

Driving Stepper Motors

Controlling the Driver with a Translator

A Final Word on Identifying Stepper Motors

16. Audio Electronics

CHAPTER PRELIMINARIES

A Little Lecture on Sound

Microphones

Microphone Specifications

Audio Amplifiers

Preamplifiers

Mixer Circuits

A Note on Impedance Matching

Speakers

Crossover Networks

Simple ICs Used to Drive Speakers

Audible-Signal Devices

Miscellaneous Audio Circuits

17. Modular Electronics

CHAPTER PRELIMINARIES

There's an IC for It

Breakout Boards and Modules

Plug-and-Play Prototyping

Open Source Hardware

## A. Power Distribution and Home Wiring

### APPENDIX PRELIMINARIES

#### Power Distribution

#### A Closer Look at Three-Phase Electricity

#### Home Wiring

#### Electricity in Other Countries

## B. Error Analysis

### APPENDIX PRELIMINARIES

#### Absolute Error, Relative Error, and Percent Error

#### Uncertainty Estimates

## C. Useful Facts and Formulas

### APPENDIX PRELIMINARIES

#### Greek Alphabet

#### Powers of 10 Unit Prefixes

#### Linear Functions ( $y = mx + b$ )

#### Quadratic Equation ( $y = ax^2 + bx + c$ )

#### Exponents and Logarithms

#### Trigonometry

#### Complex Numbers

#### Differential Calculus

#### Integral Calculus

1

1. <https://www.amazon.com/Practical-Electronics-Inventors-Fourth-Scherz/dp/1259587541> [back]

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FOURTH EDITION

# PRACTICAL ELECTRONICS FOR INVENTORS

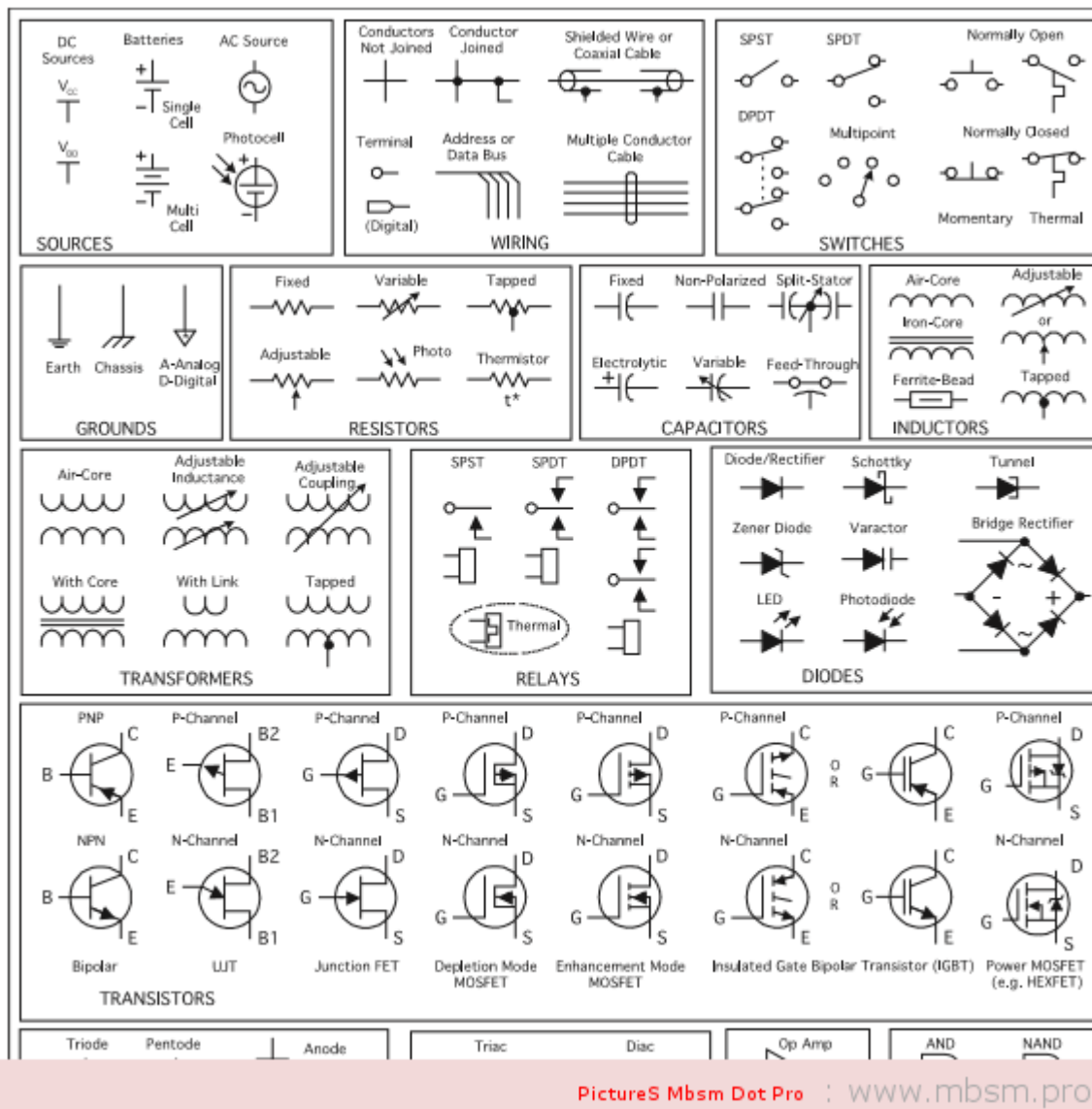


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### Resistor Labels

**Conversion Calculator**

k = 1,000 ; M = 1,000,000

1MΩ = 1,000,000 Ω = 1 x 10<sup>6</sup>Ω

1kΩ = 1,000 Ω = 1 x 10<sup>3</sup>Ω

**Examples:**

3.3 kΩ = 3,300 Ω = 3.3 x 10<sup>3</sup>Ω

22 kΩ = 22,000 Ω = 22 x 10<sup>3</sup>Ω

2 MΩ = 2,000,000 Ω = 2 x 10<sup>6</sup>Ω

1.68 MΩ = 1,680,000 Ω = 1.68 x 10<sup>6</sup>Ω

#### Resistor Color Code

Color	Sig. Fig.	Decimal Multiplier	Tolerance (%)
Black	0	1	-
Brown	1	10	1
Red	2	100	2
Orange	3	1,000	-
Yellow	4	10,000	-
Green	5	100,000	0.5
Blue	6	1,000,000	0.25
Purple	7	10,000,000	0.1
Gray	8	100,000,000	-
White	9	1,000,000,000	-
Gold	-	0.1	5
Silver	-	0.01	10
No Color	-	-	20

#### Body Color

The body color of a resistor typically doesn't carry meaning, except in some instances where it may specify temperature coefficient. However, if you find resistors within a circuit that are white/gray or blue in color, they may be non-flammable or fusible resistors. Care must be taken when entering such resistors.

### 4-Band Resistor Code (Most Common)

**Label Meaning**

Red Black Orange Gold  
20 x 1,000 = 20k Ω ± 5%

First Digit Second Digit Multiplier (x of zeros) % Tolerance

---

### 5-Band Resistor Code (3-digit)

**Label Meaning**

Purple Blue Green Brown Brown  
675 x 10 = 6750 Ω ± 1%

First Digit Second Digit Third Digit Multiplier (x of zeros) % Tolerance

---

### 5-Band Resistor Code (Reliability)

**Label Meaning**

Yellow Purple Green Silver Brown  
47 x 100,000 = 4.7 MΩ ± 10%

1% Reliability/1000 Hr — Brown

Color	Reliability (%/1000 Hr)
Brown	1
Red	0.1
Orange	0.01
Yellow	0.001

First Digit Second Digit Multiplier (x of zeros) Reliability % Tolerance

---

### 6-Band Resistor Code

**Label Meaning**

Purple Red Black Blue Brown Red  
276 x 1 = 276Ω ± 1%

TC of 50 ppm — Red

Color	Temp. Coeff.
Brown	100 ppm
Red	50 ppm

First Digit Second Digit Third Digit Multiplier (x of zeros) Temp. Coeff. % Tolerance

### Surface Mount Resistor Code

#### 3-digit Label

**Label Meaning**

101 10 and 1 zero = 100 Ω

105 10 and 5 zero = 1,000,000 Ω

224 22 and 4 zeros = 220,000 Ω

1R0 1.0 and no zeros = 1 Ω

22R 22.0 and no zeros = 22 Ω

R10 0.1 and no zeros = 0.1 Ω

The first two digits represent significant figures; the last digit specifies the multiplier. For values under 100 Ω, the letter R is substituted for one of the significant digits and represents a decimal point.

---

#### 4-digit Label

**Label Meaning**

1001 100 and 1 zero = 1000 Ω

22R0 22.0 and no zeros = 22 Ω

The first three digits represent significant figures; the last digit specifies the multiplier. R represents a decimal point.

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#### Tolerance Label

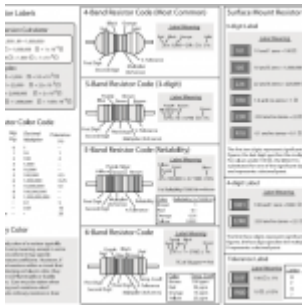
**Label Meaning**

101F 100 Ω ± 1%

Letter	Tolerance
D	±0.5 %
F	±1.0 %

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