

The Book of 555 Timer Projects

Over 45 Builds for the Legendary 555 Chip (and the 556, 558)



Dogan Ibrahim



The Book of 555 Timer Projects

Over 45 Builds for the Legendary 555 Chip (and the 556, 558)

Dogan Ibrahim



This is an Elektor Publication. Elektor is the media brand of Elektor International Media B.V.

PO Box 11, NL-6114-ZG Susteren, The Netherlands

Phone: +31 46 4389444

• All rights reserved. No part of this book may be reproduced in any material form, including photocopying, or storing in any medium by electronic means and whether or not transiently or incidentally to some other use of this publication, without the written permission of the copyright holder except in accordance with the provisions of the Copyright Designs and Patents Act 1988 or under the terms of a licence issued by the Copyright Licencing Agency Ltd., 90 Tottenham Court Road, London, England W1P 9HE. Applications for the copyright holder's permission to reproduce any part of the publication should be addressed to the publishers.

Declaration

The authors and publisher have used their best efforts in ensuring the correctness of the information contained in this book. They do not assume, and hereby disclaim, any liability to any party for any loss or damage caused by errors or omissions in this book, whether such errors or omissions result from negligence, accident or any other cause.

- ISBN 978-3-89576-624-4 Print
 ISBN 978-3-89576-625-1 eBook
- © Copyright 2024 Elektor International Media www.elektor.com

Prepress Production: D-Vision, Julian van den Berg

Editor: Jan Buiting, MA

Printers: Ipskamp, Enschede, The Netherlands

Elektor is the world's leading source of essential technical information and electronics products for pro engineers, electronics designers, and the companies seeking to engage them. Each day, our international team develops and delivers high-quality content - via a variety of media channels (including magazines, video, digital media, and social media) in several languages - relating to electronics design and DIY electronics. **www.elektormagazine.com**

Contents

Pre	face
Cha	apter 1 • Introduction
	1.1 Overview
	1.2 Types of 555 timer chips
	1.3 555 timer chip specifications
	1.3.1 The NE555P chip
Cha	apter 2 • Operation of the 555 Timer Chip
	2.1 Block Diagram
	2.2 Astable Circuit Operation
	2.2.1 Using a nomogram
	2.2.2 555 astable online calculator
	2.2.3 Astable circuit with duty cycle less than or equal to 50%
	2.2.4 Astable circuit with duty cycle adjustable from 0% to 100%2
	2.2.5 Component values for required frequency and duty cycle range
	2.2.6 A simpler circuit for 50% duty cycle
	2.3 Monostable Circuit Operation
	2.3.1 Using a nomogram
	2.3.2 555 monostable online calculator
	2.4 Bistable Circuit Operation
	2.4.1 Using the Reset input
	2.4.2 Using pins 2 and 6
	2.5 Online Calculator Program for Designing 555 Astable and Monostable Circuits 3
	2.6 555 Timer Output Current
	2.7 Driving Heavy Loads
	2.7.1 Using bipolar transistors
	2.7.2 Using a MOSFET transistor
	2.7.3 Using a relay
Cha	apter 3 • 555 Timer Projects
	3.1 Overview
	3.2 Project 1: Flashing LED

3.3 Project 2: Police Car Emergency Lights — Alternately Flashing Two LEDs 36
3.4 Project 3: Changing the LED Flash Rate
3.5 Project 4: Changing the LED Brightness
3.6 Project 5: Touch Sensor On/Off Switch43
3.7 Project 6: Pushbutton On/Off switch
3.8 Project 7: Switch-Off Delay46
3.9 Project 8: Switch-On Delay48
3.10 Project 9: Light-dependent Sound
3.11 Project 10: Darkness Sensor52
3.12 Project 11: Light Sensor54
3.13 Project 12: Astable Frequency Generator
3.14 Project 13: Tone Burst Generator
3.15 Project 14: Drawer/Cupboard Light Switch
3.16 Project 15: Long Duration Timer with Decade Counter
3.17 Project 16: Long Duration Timer with Binary Counter
3.18 Project 17: Chasing LEDs
3.19 Project 18: LED Roulette Game
3.20 Project 19: Simple Traffic Lights Controller
3.21 Project 20: Professional Traffic Lights Controller
3.22 Project 21: Sine Wave Output
3.23 Project 22: Continuity Tester76
3.24 Project 23: Simple Logic Probe
3.25 Project 24: Electronic Lock — Bistable Mode
3.26 Project 25: Electronic Lock — Monostable Mode
3.27 Project 26: Extending the Monostable Duration — Retriggering
3.28 Project 27: Switch Contact Debouncing
3.29 Project 28: Schmitt Trigger Circuit
3.30 Project 29: Monophonic Toy Electronic Organ
3.31 Project 30: 8-Tone Electronic Organ90
3.32 Project 31: Multiple Sensor Alarm Circuit
3.33 Project 32: Monostable with Selectable Durations

3.34 Project 33: Electronic Metronome95		
3.35 DC Voltage Multipliers		
3.35.1 Project 34: DC Voltage Doubler97		
3.35.2 Project 35: DC Voltage Tripler99		
3.35.3 Project 36: DC Voltage Quadrupler		
3.36 Project 37: 7-segment LED Counter		
3.37 Project 38: 2-digit, 7-segment LED Counter		
3.38 Project 39: LED Dice		
3.39 Project 40: 7-segment LED Dice		
3.40 Project 41: DC Motor Control		
3.41 Project 42: Servo Motor Control		
3.42 Project 43: Temperature Alarm Circuit		
3.43 Project 44: Temperature Controller		
3.44 Project 45: DC Motor H-bridge Control		
3.45 Project 46: Fastest Finger First Quiz Circuit — Two Participants		
3.46 Project 47: Fastest Finger First Quiz Circuit — Six Participants in Three Groups 124		
3.47 Using The 555 Timer Control Pin		
3.47.1 Project 48: Voltage Controlled Oscillator		
3.47.2 Project 49: Simple British Police Siren		
3.48 Project 50: More Elaborate British Police Siren		
Chapter 4 • The 556 and 558 Timer ICs132		
4.1 Overview		
4.2 The 556 Timer IC		
4.3 The 558 Timer IC		
Chapter 5 • The CMOS Version of the 555 Timer		
5.1 Overview		
5.2 The LMC555 CMOS Timer		
Chapter 6 • List of Components Used in the Projects		
Appendix • Bibliography139		
Index		