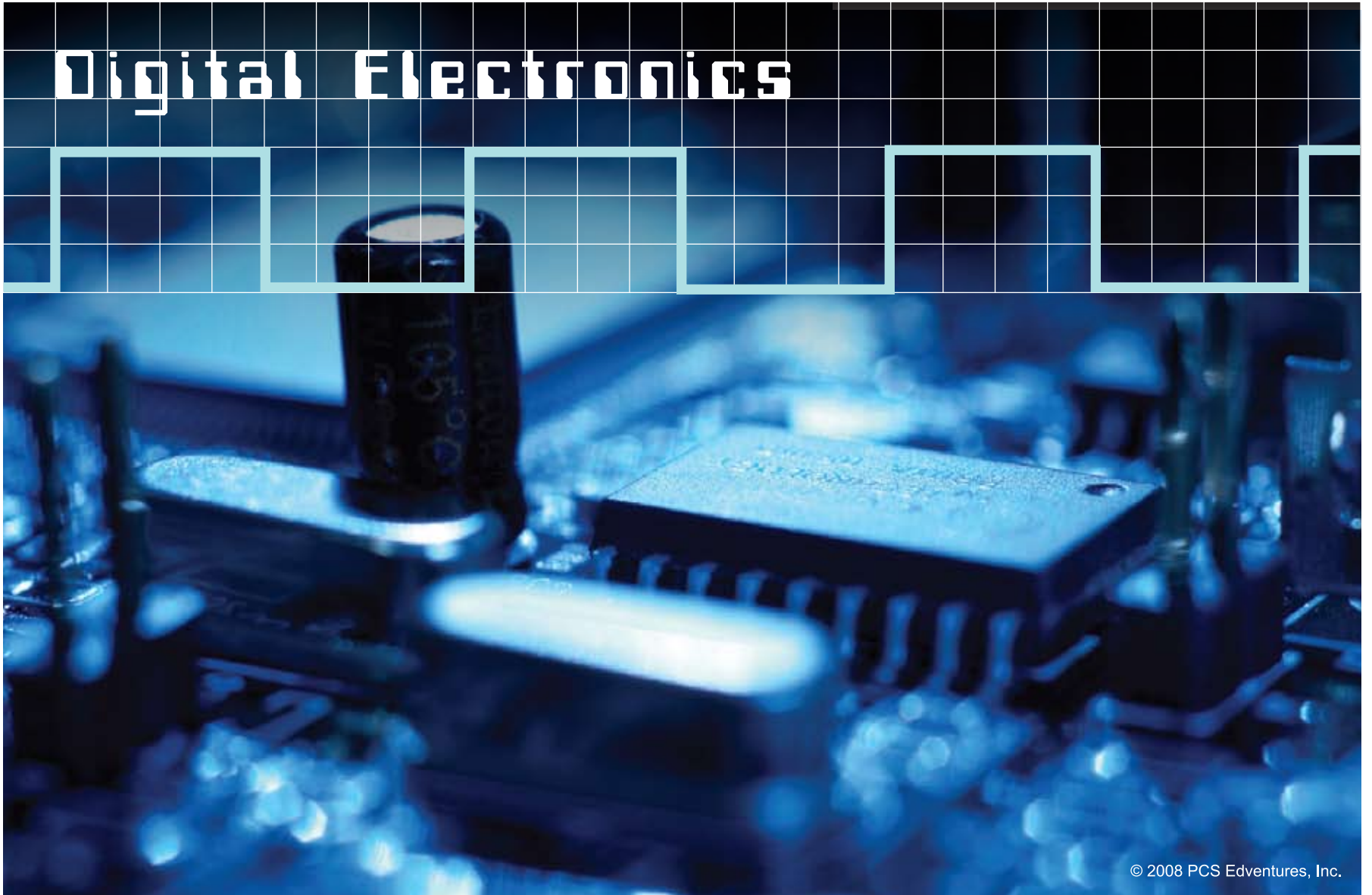


# Digital Electronics



### PCS ACADEMY OF ELECTRONICS SUGGESTIONS FOR TEACHING

#### OBJECTIVES

Upon completion of this series, the student should be able to:

1. Learn the name, symbols, Boolean equations, and the function of the truth tables.
2. Learn to combine logic gates to create clocks, flip -flops, memories, and timers.
3. Learn how to use digital displays, decoders, and multiplexers.
4. Learn how to read and use timing diagrams.
5. Learn how to use a Schmitt trigger.
6. Learn how to convert binary to decimal.
7. Learn the functions of a operational amplifier.
8. Learn the Pin-Outs and how to use CMOS ICs: LM324, 4011B, 4013B, 4015B, 4027B, 4029B, 4051B, 4093B, AND THE 4511B.
9. Learn how to build a digital divider.
10. Learn how to build gates with discrete components.
11. Learn how to use a shift register.
12. Learn how to build various circuits.

Each PCS Academy of Electronics unit has the same basic components. As you become more comfortable with the materials, the activities can be tailored to meet your teaching style and student needs.

#### SUGGESTED SCHEDULE

Each class project could be organized as follows:

- (a) A short discussion or demonstration (approximately 10-30 minutes)
- (b) Hands on project or activity (approximately 10-30 minutes)
- (c) Project assessment and clean up time (approximately 10-20 minutes)
- (d) End-of-class group review and discussion (approximately 10 minutes)

Projects should be performed in the order they are presented in the book.

The instructor is responsible for checking students completed circuits.

### TEACHER GUIDE

- Standards: Alignment to educational standards.
- Objective: Specific objective of the lesson.
- Materials: General materials list for the lesson.
- Background: General background information of the unit.
- Observations: What students should observe by building the circuit and performing the activity.
- Vocabulary: Key vocabulary used in activity. Definitions can be found using the PCS Edventures Term Library on the PCS Edventures web site.

### PROJECT PLANS

- Steps: General steps in the activity.
- Important Fact: A fact, or some historical information related to the project.
- Inventory List: Required electronic components for the project.
- Project Plan: Includes construction graphic, circuit schematic, step-by-step building instructions, and procedures.

### ASSESSMENT

- A short assessment sheet for the student to fill out after constructing the circuit.

### PRECAUTION

- Remember that safety comes first!
- Never wire the components with the battery connected to the circuit. Always troubleshoot the circuit with the battery disconnected.

## PROJECT PLANS

Digital vs. Analog . . . . .	1	8-Output Demultiplexer Circuit . . . . .	92
Digital Terminology . . . . .	4	Digital Chasing Lights Circuit . . . . .	96
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LED Logic Indicator Circuit. . . . .	10	Touch Activated Pulse Generator . . . . .	105
'AND' Logic Gate . . . . .	14	555 Pulse Train Generator . . . . .	110
'OR' Logic Gate . . . . .	19	Yes/No Decision Maker Circuit . . . . .	114
'NOT' Logic Gate . . . . .	24	Yes/No/Maybe Circuit . . . . .	119
'NOR' Logic Gate . . . . .	29	Stop Action Timing Circuit. . . . .	123
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NAND Logic Gate Timer. . . . .	44	Digital Light Activated Counter . . . . .	137
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