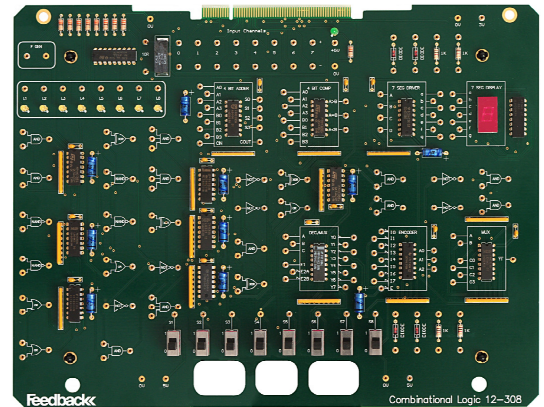


Basic Electronics Series - 12-308 Combinational Logic

Introduction

With over 50 years of experience in the design, manufacture and supply of high quality educational products, Feedback's 12-300 series of innovative workboards and ESPIAL software set new standards in the teaching of basic electronics.

The 12-308 board provides an introduction to combinational digital logic systems using pre-constructed circuit elements that may be connected in different ways to perform the assignments. The board connects to the NI ELVIS II/II+ console which provide power and signal acquisition.

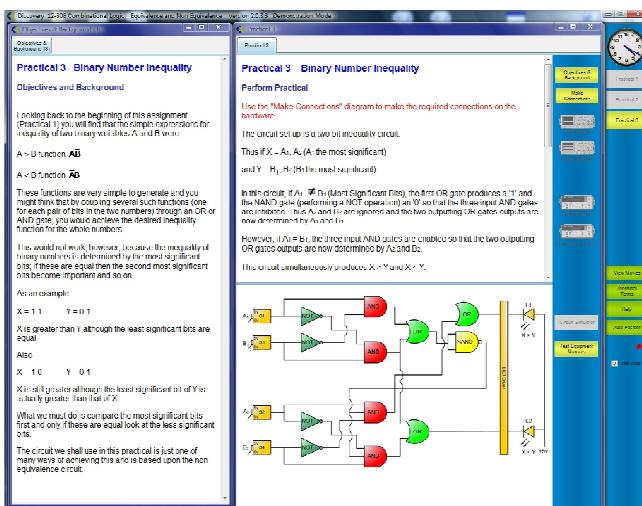


Teaching material and pc based instrumentation are delivered by Feedback's own ESPIAL software, which teaches the student the necessary theory in order to complete the practical experiments. On-screen instructions guide the student through the set-up of the boards and the use of the on-screen instrumentation enables students to observe parameters in real time and to record their results.

ESPIAL software provides a flexible and versatile learning environment where students can use the available resources in ways that are most suitable for them. This makes the 12-300 series suitable for a wide range of courses including degree foundation and vocational learning.

Combinational Logic

Combinational Logic describes the branch of electronics in which the output of a given digital network is always a predetermined function of the input. These circuits are implemented with devices called logic gates which perform the operations of Boolean algebra, which enable basic arithmetic operations to be carried out.



It is assumed that the student has some knowledge of the principles of digital electronics (from using the introduction to digital electronics board 12-307). The student is introduced to combining logic gates together and learns how to manipulate Boolean algebra expressions. This leads onto techniques for reducing logic gate count for a given circuit using Karnaugh mapping and De Morgan's theorem.

The student is able to refer to the "Concepts" section of the ESPIAL software to reinforce their understanding of the principles of the subject before conducting the practical experiments.

Screen showing the Feedback interactive ESPIAL software, enabling the student to learn the principles of the subject and then implement practical experiments using on-screen instruments.

espi

POWERED BY
**NATIONAL
INSTRUMENTS**

Basic Electronics Series - 12-308 Combinational Logic

Familiarisation

- Practical 1: Navigating the ESPIAL Software
- Practical 2: Introduction to the NI ELVIS and the Logic and Digital Systems work-boards
- Practical 3: Introduction to the Basic Logic Circuits work- board and the components on it
- Practical 4: Test circuit to check function of the NI ELVIS and the Combinational Logic work-board

Logic Gates and Boolean Algebra

- Practical 1: NOT, AND, NAND, OR and NOR Logic Gates
- Practical 2: Working with Logic Gates
- Practical 3: Substituting Logic Gates
- Practical 4: Boolean Algebra and Logic Gates

Boolean and De Morgan's Theorem

- Practical 1: De Morgan's Theorem
- Practical 2: More Boolean Algebra
- Practical 3: De Morgan's Sum and Products

Minterms and Maxterms

- Practical 1: Minterms
- Practical 2: Maxterms

Karnaugh Mapping

- Practical 1: Karnaugh Maps (Two Variables)
- Practical 2: Karnaugh Maps (Three Variables)
- Practical 3: Karnaugh Maps (More than three variables)
- Practical 4: Redundant States

Binary Addition and Subtraction

- Practical 1: Binary Addition (Half Adder)
- Practical 2: Binary Addition (Full Adder)
- Practical 3: Binary Addition (Multi Digit Numbers)
- Practical 4: Binary Subtraction

Equivalence and Non Equivalence

- Practical 1: Practical Template
- Practical 2: Binary Number Equality
- Practical 3: Binary Number Inequality

Magnitude Comparators

- Practical 1: One Bit Magnitude Comparator
- Practical 2: Four Bit Magnitude Comparator

Binary Coded Decimal Encoders\Decoders

- Practical 1: Binary Coded Decimal (BCD) Encoders
- Practical 2: 8 to 3 line Priority Binary Coded Decimal (BCD) Encoder
- Practical 3: 2 to 4 line Binary Coded Decimal (BCD) Decoder
- Practical 4: 3 to 8 line Binary Coded Decimal (BCD) Decoder



Basic Electronics Series - 12-308 Combinational Logic

Code and Converters

Practical 1: Code Conversion

Multiplexers/Demultiplexers

Practical 1: Multiplexers

Practical 2: Multiplexer Integrated Circuits

Practical 3: Demultiplexer Circuits

Digital Displays

Practical 1: Seven Segment Displays

Programmable Logic Devices (PLD) Introduction

Practical 1: Introduction to PLDs

NI ELVIS Console

The National Instruments ELVIS II/II+ console provides the platform for the 12-300 series, also supplying power and signal acquisition. Contact your Feedback representative for more information.

Specifications for 12-308 board

Supply voltage: From NI ELVIS II/II+ console

Dimensions: 280 mm (w) x 20 mm (h) x 215 mm (d)

Specifications for NI ELVIS II/II+ Console

Supply voltage: 110 – 230 V a.c.

Dimensions: 343 mm (w) x 76 mm (h) x 280 mm (d)



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Feedback reserves the right to change these specifications without notice.