

Basic Electronics Series

12-303 Magnetic Devices

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.

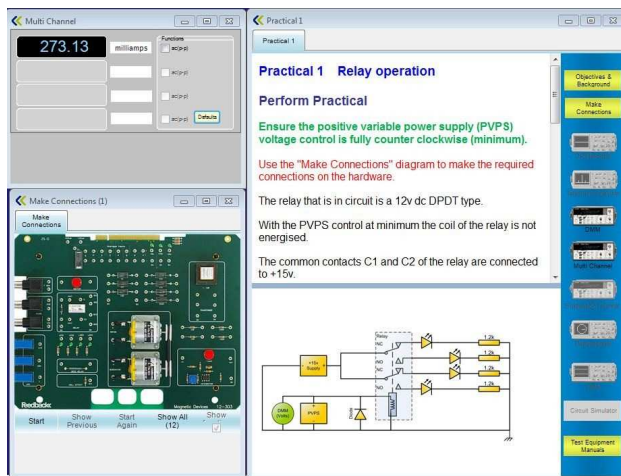
The 12-303 board teaches how electro-magnetic components work and what their applications are. This follows on from the fundamentals introduced in the electromagnetic induction section on board 12-301. The board enables students to learn by hands-on and using pre-constructed circuit elements that may be connected in different ways to perform a series of assignments.

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. There is the potential to edit assignments or create completely new teaching material.

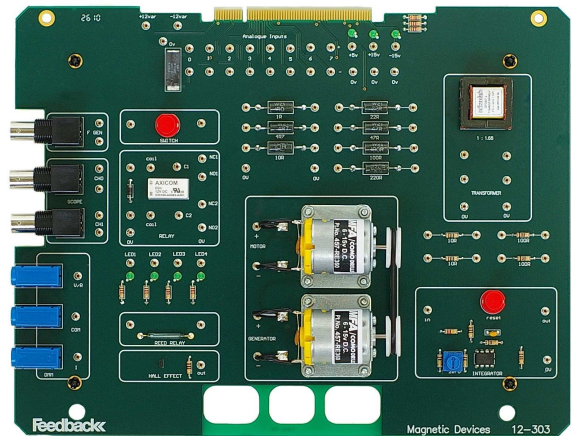
ESPIAL software provides a flexible and versatile learning environment where students can use the available resources in ways that are most suitable for them.

Magnetic Devices

The principles of operation of the most common electro-magnetic components are covered by taking a hands-on approach and the student is then able to perform practical tests using ESPIAL software. Transformers are covered in detail, with practical experiments relating to the efficiency, phase shift and turns ratio. The use of the transformer to convert the impedance of a load is also demonstrated.



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.



The concept of D.C. motors and generators are demonstrated by an experiment designed to see the effect on the generating motor has on the driving motor. The student also learns how to calculate the efficiency of a generator by measuring the power in and power out.

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



Basic Electronics Series - 12-303 Magnetic Devices

Magnetic Principles

- The properties of a magnetic field and electro-magnetism
- Construction and operation of a solenoid
- Applications of electro-magnets

Transformers

- Introduction to mutually coupled coils
Transformer action and turns ratio Step-up and step-down configurations
- Factors that affect transformer efficiency
- Eddy currents and hysteresis
- Impedance transformations using a transformer
- BH loops and their relevance



Magnetic Components

- Electro-magnetic relays, different types and configurations
- Principles of operation of a relay Latching and non-latching modes Operation and applications of reed relays Principles of the Hall effect device

Motors and Generators

- Motor construction
- Rotor, stator and the principle of commutation D.C. drive to a motor and directional control
- The principle of electrical generation
- Loading of electrical generator
- Electrical efficiency of a generator

NI ELVIS Console

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

Specifications for 12-303 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