

Developing Subject Knowledge in Design and Technology: Systems and Control

Reviewed by Chris Snell, Consultant, Snell Eigendynamics

This book is intended for use as part of initial teacher training for Design and Technology, aimed at Key Stage 3. It is one of the set texts for the new modular specialist secondary teaching qualifications of the Open University. Content is structured on 'knowledge and understanding of systems and control' and what pupils should be taught - as addressed in the National Curriculum for Design and Technology in England. Topics referred to are:

1. Systems
2. Electronics systems
3. Microprocessor control systems
4. Computer control systems
5. Logic systems
6. Logic sub-systems
7. Pneumatic systems
8. Introduction to basic electronics

The end of the book contains information on related websites, and answers to questions from each topic.

A small number of 'Activities' are given (boxed for easy identification), for example: "Obtain a range of different potentiometers and examine their construction. If possible, take them apart and ...".

When any of the above eight topics can command treatment in books of some length, in a small book of this size (100 pages) from necessity, some topics are treated sparsely. The section on 'Microprocessor control systems' - an increasingly popular medium for projects, gets barely a page and a half, including a block diagram of a microprocessor. Pneumatics, in a dozen pages, provides insight into its systems potential, with good, clear diagrams and careful explanations of conventions and functions of associated components.

The longest topic is 'Introduction to basic electronics', treated in some thirty pages. It is included for those with no background knowledge of systems and

control and might have been a useful chapter (especially for Resistant Materials specialists, intimidated at the thought of pupils embarking on projects involving electronics), BUT it contains serious and confusing errors throughout! These might be due to mistakes at the publishing end, or careless proof reading. For example, the section headed 'The voltage divider' on p78, has a diagram (Fig. 7) with three labelled resistors, R2 and R3 in series, and the third, R1, in parallel. Fine, but the text states there are only two, R1 and R2 and refers to them as the pair in series! It goes on to develop the formula for these two resistors in series dividing the voltage across them in the ratio of their resistances, but the reasoning in places is dimensionally inaccurate, i.e., a voltage is shown as the product of another voltage and a resistor, divided by the product of two resistances (rather than their sum). Also the number 1 and upper case I are both used to denote the same current, when 1, of the same size, is also used as a suffix (as opposed to subscript) to V. Within the same sequence of algebra a lower case curly Greek 'ex' - used as a multiplication symbol on one line - is replaced by a more conventional symbol on a later line. Even if this does not matter too much, for consistency alone I would have thought it important. Another line has $V_1/R_1 = V_s / (R_1 + R_2)$! Obviously an '=' was intended between I and V1. Since the back cover states that this, together

with the other three books in the series - Food; Structures; Developing, Planning and Communicating Ideas - have been awarded the Teacher Training Agency kite mark, these are serious faults that need addressing and give no credibility to the kite system. There are also mistakes of a similar nature elsewhere, e.g., in the treatment of the summing amplifier p99, giving $i_{in} = V_{out}/R_1$ instead of $i_{in} = V_{out}/R_f$. On p94 the positions of the variable resistor and LDR should be interchanged to make the calculation valid if the transistor is to switch on when the LDR is illuminated. A typical examination trap question!

This is disappointing, since other topics/chapters receive appropriate attention, giving clear and lucid accounts - liberally augmented with diagrams - typical of the high standard normally associated with Open University publications. Would-be purchasers of this book might be well advised to combine it with that of one of the many useful books available on D & T Electronic Products, e.g., the Collins and Stanley Thornes books. They will find the subject well dealt with there.

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