

Introducing....

PEAC

A low cost, general purpose analogue computer of modern design, intended for the amateur or student.

A useful tool which is capable of solving complicated problems at high speed.

Can be used as a model to simulate mechanical systems and electronic networks.

Extends enormously the scope of the amateur experimenter.

This series of articles will explain in detail the design, construction, and operation of PEAC.

ANALOGUE

Most of the publicity afforded to computers favours digital equipment. However, digital methods tend to be disproportionately expensive for small installations. On the other hand, although analogue equipment is ideally suited to limited, low-cost applications, it was not until the silicon transistor had become firmly established, and enough practical published information was available, that a start could be made on designing analogue computing equipment to yield a reasonable standard of performance in the lowest possible price range.

A WORTHWHILE PROJECT

No doubt many readers will think that construction of a true computer could involve them in a great deal of time, money, and effort. They might also believe that an average understanding of mathematics would not be sufficient to equip them to operate a computer effectively. However, the amount of time and money spent building PEAC need be no more than is consumed by a home constructed hi fi outfit of normal proportions and performance, and the computer will solve even simple problems a great deal faster than the human mind or slide rule, once it has been programmed to do so.

In fact, a general purpose computer can find application in almost every sphere of technical activity, and is particularly useful in the electronic workshop, to the point of becoming indispensable after a short period of use.

UNIT CONSTRUCTION

PEAC is arranged in the form of units, and is organised in such a way that reasonably advanced computations may commence upon completion of the first unit, UNIT "A". The cost of building UNIT "A", based upon typical retail prices at the time of writing,

will not be much above £25, and yet it will solve algebraic polynomial equations, simultaneous linear equations, simple differential equations, and can also be used to simulate the behaviour of many elementary mechanisms and electronic networks.

UNIT "A" is designed primarily to satisfy a minimum user requirement, for experimental and educational work, but it also serves as a convenient starting point for the addition of further units to expand the computer to almost any desired degree of capability and complexity. The additional facilities provided by the add-on UNITS "B", "C", and "D" are described in the specification. See also the block diagram, Fig. 1.1.

A comprehensive PEAC installation, equipped with a function generator and multiplier, and with full integrating facilities for the fast solution of a range of differential equations, might finally cost around £60: not a lot to pay for an item of workshop equipment which can solve electronic formulae in 10ms, and which may also be employed as a variable waveform generator, 18 input high quality audio mixer, variable characteristic high Q audio filter, large inductance or capacitance simulator, d.c. or a.c. millivoltmeter, and many other things besides.

COMPARISON BETWEEN ANALOGUE AND DIGITAL COMPUTERS

Although popularly regarded as an inaccurate machine of limited usefulness, the analogue computer is to be found in the Polaris missile, spacecraft, aircraft, large scale chemical processes, and many automated production lines, quite apart from basic research work, where flexibility and ease of working are often considered to be more important than extreme accuracy. The analogue computer is, in most cases, very much faster than its digital counterpart, and can offer far more in the way of general facilities for a given outlay.