

# Translation by Machine in the USSR

ACCORDING to the method of dating, Russian or British, the science of machine translation is either 27 or 13 years old. During the latter part of this period, the popular press has, from time to time, announced the arrival of a new translating machine but unfortunately all of these announcements have been without foundation in fact. At the moment of writing no actual translating machine exists and all of the quite extensive work which forms the basis of some of the past publicity has been carried out either by human beings simulating some hypothetical machine or on an automatic digital calculator.

At the moment, both the Americans and the Russians are in the design or early constructional stages of special translating machines, whilst the British, having, as usual, pioneered the subject, are pursuing a policy of masterly inactivity as regards actual construction work.

Up to 1956, the West was largely unaware of Soviet activity in the field of machine translation but, in that year, I. S. Mukhin read his now well-known paper to the computer conference of the IEE and thus showed that his group had already made considerable progress.

Panov's book\* gives, for the first time, a detailed explanation of the principles which underlie the Russian work. As usual, there is an introductory chapter in which the history of the subject is traced and it is from this that the 27 year old history, mentioned above, is derived. This is based upon a patent grant made to P. P. Troyansky in 1933, the title page of which is reproduced in the book. It would be exceedingly interesting to see the remainder of this document, because Panov says that "... at the time he (Troyansky) did not succeed in carrying his project through. This is understandable, since at that time automatic installations suitable for the purpose had not yet been created," which makes it hard to imagine just what sort of detail was contained in Troyansky's proposals.

From this historical introduction Panov goes on to discuss, firstly the way in which a human translator goes to work, secondly the peculiar characteristics of scientific and technical material, and thirdly the structure of electronic computers and their

application to the problem of translation.

The latter chapter is almost exclusively concerned with the early Russian computer BESM which is now used exclusively for work on translation.

These preliminary chapters are followed by discussions on the mechanisation of a dictionary and of the use of code numbers to indicate grammatical characteristics. All of this leads up to a detailed description of a programme for English-Russian translation and an account of some results which have been obtained in practical trials. The main part of the book ends with a discussion of

character recognition as applied to such languages as Chinese, the value of synthetic languages, both for logical analysis and as intermediate languages in multi-lingual translation, and the use of machines for stylistic analysis.

There is an appendix which discusses in detail the mechanical analysis of the following English sentence: *This is true certainly of the vast category of problems associated with force and motion.*

The book is well written and the translation and production are excellent. It can be thoroughly recommended as a most readable introduction to Russian work on this subject.

A. D. Booth

## British Analogue Computers

from page 307

### Interaction of variables

If the output impedance of an amplifier is high, and it supplies several loads, any change in one of them may appreciably influence the functioning of the others. If problem-changing is frequent, it may be important to use amplifiers of which the output impedance is as low as possible.

It may be necessary also to take the output impedance of the amplifier into account when using generators of non-linear functions, because the load may vary appreciably with the value of the function.

Interaction of variables is always a nuisance.

There are circumstances in which it may be justifiable to isolate one variable by using a buffer amplifier to feed it, and another to invert the phase back to normal. If the function generator is to be readjusted frequently, the saving in setting-up time may justify the use of a unit which includes several separate high-gain amplifiers in order to ensure that there is no interaction between controls.

### The table

In preparing the table of British analogue computers published with this article, it was necessary to reduce to a common system the data about equipment intended for different purposes.

Computers which have no built-in display have been described as having an external output; this may be used

either for control or display purposes.

As there is no standard definition of the circumstances in which drift is measured, claims regarding drift must be interpreted as applying in the circumstances in which the particular design is intended to be used.

Special function units mentioned include both those in the basic design, and those available when required. As the accuracy of the whole computer will depend upon the order of the errors in the approximations to non-linear functions, the number of segments for which there is provision on a single panel, is stated: but for greater precision, two or more panels of most designs can be used for approximating a single function.

One or two firms supply units from which they, or a customer, can assemble a custom-built computer. Building blocks of this kind are included in the same way as additional units available with use with standardised computers.

It must be remembered that most of these designs are subject to so much variation, according to the needs of the particular application, that statements such as the number of amplifiers, or the price, are merely typical figures, applying to the basic equipment. Many computers can be extended by addition of further basic units. With many of the simpler designs, two computers can be coupled together to extend their range, so that an initial investment in an apparently limited equipment does not preclude its extension later.

\* *Automatic Translation* by D. Yu. Panov, Pergamon Press, London, 1960, 21/-.