The Economist

Electronic abacus

Mar 13th 1954|

OPINION is for the moment divided on the place of electronic calculating methods in ordinary business. A year or so ago, a suggestion that one of those thinking robots, the electronic brains, should be put to tasks so mundane as the counting of pounds, shillings and pennies for a weekly wage packet would have been greeted with general scepticism. Now that it has actually happened, preconceived opinions about the type of machine suitable for office and accounting work have received a severe jolt. For the past month, the wages of the bakery staff of J. Lyons, Ltd., and good many routine office calculations besides, have been worked out on a full-sized electronic computor at Cadby Hall. To Lyons, the introduction of electronic computing on this singularly practical scale appeared the logical step to take if the company's accounting methods were to be kept streamlined and up-to-date. As other specialists in business methods did not see eye to eye with Lyons on this matter at the time, the company was driven to designing and building its own computor (see article).

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Is this the first step in an accounting revolution or merely an interesting and expensive experiment? There are those who do not believe in the desirability of introducing anything as esoteric as electronics into business routine at all. Others believe that there is a limited field for electronic methods, provided that they fit into, and do not disrupt, established business systems. But there is a third group—of which Lyons is one—who consider that a major revolution in office methods may be possible. This revolution would involve scrapping the greater part of the established punch card calculating routine and substituting a single “electronic office” where the giant computor would perform internally all the calculations needed for a whole series of book-keeping operations, printing the final answer in and on whatever form was required.

The advantages that the computor has to offer are two; speed and some measure of intelligence. It is speed on a scale that baffles the imagination, where units are counted in millionths of a second and pulses travel through the labyrinthine circuits at the speed of light. As for the computor's intelligence, it can discriminate so that the same routine is not blindly followed on every figure that enters the machine. The co-ordinating sections of the computor will test one pattern of impulses against another, to decide what kind of operation needs to be carried out on any given piece of data. Combine this sense of discrimination with speed of operation, and it becomes apparent that the computor can store and can handle large numbers of separate items and can carry out when it becomes necessary any number of different operations upon them, without the need for any intervention by the operator.

Might electronic computors not have a valuable contribution to make to improving business efficiency?

Any business handling large numbers of figures would find such capabilities attractive. Electronic computors were essential for the development of atomic physics and are rapidly becoming a necessity for aircraft and missile development. Might they not also have a valuable, if less spectacular, contribution to make to improving business efficiency? Lyons has 33,000 employees, and when their weekly wage packets are made up, 20 different items have to be added or deducted before the net pay can be determined in numbers of notes and coins to be handed over. In addition, the company wants running totals of the amounts of coin needed, the number of insurance stamps, and of each of the 20 items that go to decide net pay. This can be done, step by step, on ordinary office machinery—or it can be done in one step by the computor. That is the real difference between mechanical and electronic accounting. To put a computor to work of this kind may seem to some minds a gross under-employment of its capabilities. So it is; but the operation, handling a single wage every second instead of one every eight minutes by existing methods, represents a significant saving in time, in staff and in office space.

To save time and labour is always worth while. But what may be more important in the long run is the prospect of doing calculations on electronic computors that would simply not be possible by normal methods because of the time they would take. This has opened up fresh fields in science; it may conceivably do the same in business. Lyons, for example, has 230 teashops carrying a wide range of perishable stocks. If stock control and ordering for these teashops is handled by the computor, it should be possible to have a much more accurate idea of the stocks carried and needed at any given moment, and the waste that is at present unavoidable could be cut down. Taken over a really wide field, it is possible, using a computor, to draw up a comparative analysis of the cost of producing individual items using different combinations of designs, of quantities and types of materials used, and of the methods followed. A final choice from a number of possible combinations is at present too often made by judgment or even guesswork because of the sheer size of the calculations involved in doing it any other way.

Many businesses, the banks among them, handle vast quantities of figures. It would be possible to handle all the account-posting operations of the banks by computors, which are quite capable of holding details of individual accounts in their memory stores and operating on them as required. Insurance companies handling large numbers of premiums and, in the United States, even national magazine companies with an impressive total of subscriptions, are considering the possibility of installing computors to handle their calculations. American mail order companies dealing with exceptionally heavy seasonal peaks handle the extra volume of ordering, stock control and mailing on a computor, and one airline booking system is run in this fashion, giving an instantaneous check on the number of seats sold and seats available on any given flight.

When the machines fail, companies could be thrown into chaos

For practical business purposes, it can be assumed that there is no limit to the computors' appetite for work; half a day should be sufficient to handle Lyons' entire payroll for the week. But there is this drawback: a full-sized computor carries 4,000 to 5,000 valves and thousands of other small electronic components. Although there are no moving parts to go wrong, the law of averages seems to dictate that some of the myriad components will occasionally fail, and scientists who work regularly on computors rely on the machine being available for at best only 80 per cent of its theoretical working time. Repairs are usually quick and easy, but it becomes obvious that should there be a major breakdown, business routine could be thrown into chaos, since by no stretch of imagination could the staff make up for the work lost on the computor. This is not a serious handicap where the computor is engaged on research, or on special jobs such as cost or mortality analysis. But it may mean that a minimum of two computors would have to be installed before essential routine functions such as account-posting or wage calculations could be entrusted to these techniques. This raises the question of cost. Ferranti Ltd., the principal suppliers of computors in this country, puts the installed cost of a full-scale-computor at close on £100,000. Office machinery costs are high, but there are not many cases when they will run to as much as £200,000 for an installation.

Computor developments are being followed with interest and with some understandable apprehension by the companies that now supply the bulk of the business machines in use. If Lyons' example were to be followed widely, a big section of their market would be cut from beneath them. Their answer has been to produce a poor man's computor, a machine that calculates electronically, but has neither the ability to store data nor the power to plan its own operations that are peculiar to a full-sized electronic brain. These less ambitious machines have their place in office routine, especially when the calculations involve sterling. The idiosyncrasies of British currency make calculations, carried out mechanically, slow and difficult, and they hold up the other high-speed machines in a modern office. Electronics eliminate the bottleneck. Both International Business Machines and Powers-Samas have had some success in selling these calculators. Lloyd's underwriters and Coventry City Council will both use the IBM machine; Sainsbury, and several motor manufacturers are using Powers-Samas. In the IBM machine each new set of instructions is fed into the machine on punch cards before the work starts; in the Powers' machine, the instructions are provided in the form of pre-set circuits and the operator switches from one to another. Their cost works out at between £100-£200 a month for rental or £6,000 for outright purchase.

These calculators are typical of the one-machine-one-job principle on which office mechanisation has so far proceeded, and it is a principle that some consider totally unsuited to electronic techniques. The business machine companies argue from their long experience of the market that more complicated and versatile computors are unnecessary unless the most abstruse scientific calculations are involved, and they offer instead—or will shortly offer—calculators that can be given a fixed but limited programme to follow, on the lines of the wage calculations now being done at Lyons. If necessary, the work can be put through the calculator more than once, and there will still be an impressive saving in time. But these limited programme machines will cost in the region of £25,000, and computor engineers do not believe that machines incapable of doing more than the one job will be worth that expense. The exciting feature of an electronic office is its flexibility; the computor is an all-purpose machine that can switch from one type of work to another in the time in which it takes to erase the pulses of the old job from its memory. It will do all the work of a business, its scientific calculations, its routine office accounting, and its occasional costing analyses as each comes round, and it will take in its stride all the awkward exceptions that crop up in every batch of routine calculations. These are the arguments that led Lyons to opt for a full-sized computor, and experience during four years of often difficult experiment has not disproved them.

If Lyons' enthusiasm for the electronic office should prove infectious, a number of new names will enter the office machine business. Ferranti Ltd., has already sold eight computors to universities, the Government and industry, and plans to open a computor centre in London before the end of the year where the system can be demonstrated and computor time hired. English Electric Ltd. is putting into production a computor based on a design of the National Physical Laboratory. The National Research Development Corporation is sponsoring the smaller Elliot computor. British Tabulating Machine Company has plans for building a really small model. And, apart from this, it is not too difficult a task for a company to build its own computor. Finally, there is Lyons' own Leo—"Lyons Electronic Office." This has the distinction of being the only one of the lot specifically planned for office use, where information has to be fed in and out at higher speeds than in the laboratories. Lyons' possible willingness to supply versions of Leo to interested customers introduces competition from a totally unexpected source. It has a precedent in the introduction of the Powers punch card system into this country by the Prudential, and the subsequent creation of Powers-Samas to make the machines. The electronic office might mean a revolution in methods just as remarkable, and a great deal more violent, than that which followed the Prudential's experiment.