# Computers and the small firm: 3

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This paper describes the third stage of the project 'Computers and the small firm', being carried out by the University of Liverpool Data Processing Research Unit for the Ministry of Technology. Some extensions of the proposed system are presented.

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## Introduction

The first of these papers (Hunt et al., 1968), which will be referred to below as paper 1, described the techniques and preliminary results of a survey of the management information systems employed by small firms in the Merseyside area. In particular, paper 1 reported that the information systems for the great majority of such firms could be described by two skeleton procedures and portrayed the skeleton procedure for the larger of these two groups (Class A).

The second paper (Buckle et al., 1969) referred to as paper 2, reported further results of the survey, which confirmed the preliminary results, and described the skeleton procedure for firms which are wholly or partly service firms (Class B), the smaller of the two main groups. Paper 2 also presented a preliminary version of a system, which could be used by firms of Class A with only relatively minor changes in their current operations. This system is card based, and revolves about the stock control function. It is designed so that the use of a computer proper is not essential.

In this paper, a preliminary version is presented of a system suitable for firms of Class B. To avoid unnecessary repetition, the reader is assumed to be familiar with papers 1 and 2, and the description concentrates on noting the changes which must be made in the system proposed for firms of Class A. The basic description is given, as in paper 2, by means of flow diagrams.

Both the basic systems proposed are intended to be open-ended, and to make it possible for the firm to start with a simple basic system, and add, in time, a number of management techniques. The most fruitful of these for this type of firm, from the point of view of returns, would appear to be forecasting. Accordingly an investigation of the survey type has been attempted in order to discover what software is available to small users from bureaux and manufacturers and what types of forecasting problems have been attempted. Preliminary results are presented below.

## Proposed basic system for firms of Class B

The design of the basic system for firms of Class B has been approached in the same manner, and with the same principles in mind as those used for the design for firms in Class A.

A macroscopic view of the proposed system for firms of Class B is given in **Fig. 1** and should be compared with the corresponding diagram for firms of Class A in Fig. 1 of paper 2. The difference between the two systems lies essentially in an additional box, in the sales/receipts route (route 2), which allows for job costing.

The costing function is here used in the broad sense, and includes the costing of the labour element of the job, the costing of the materials involved, and the updating of a profit and loss sheet, as well as possible additional routines such as manpower utilisation analyses. This
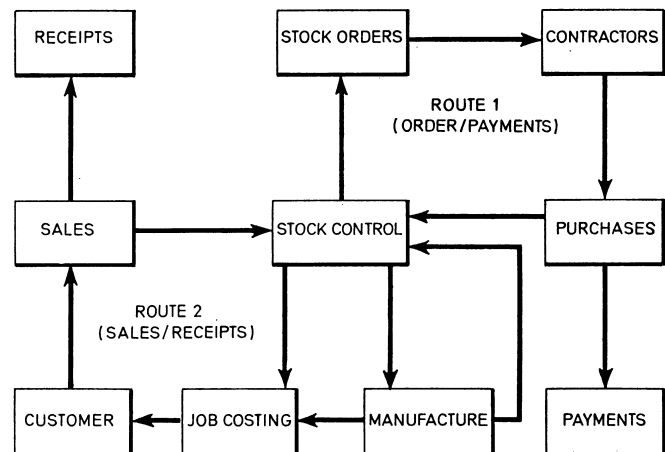


Fig. 1. Proposed system for firms of class B

form of costing is here regarded as distinct from the more usual accounting costing of the firm as a whole, for capital, labour and materials, although the same basic data is frequently needed for both. It should be noted that, in firms of this size, *estimating* the cost of a job with a view to quoting a price to the client is nearly always done from past experience before the system is activated. While the estimating process may use information held in the system, it very often uses information which is not. It is assumed here that the estimating process has been completed before the system is activated.

### Flow diagram for proposed system for Class B firms

As in paper 2, the proposed system is most easily presented by means of flow diagrams, and **Fig. 2** shows the version of the sales/demand route, and of the customer goods-received route, which obtain for firms of Class B. The chief effect on the system is the addition of two boxes between Despatch Goods and Invoice Customer stages in the process.

The first of the two extra boxes, described as Cost Job,

involves the use of information from payroll, and from stock records. The procedures envisaged are most easily described by a further flow diagram, **Fig. 3**, which presents this box in rather more detail.

As can be seen from Fig. 3, it is proposed that the manpower timesheets and the material (value and price) sheets, for each job, being costed separately, will be translated into Job Cost Cards, one set for manpower and one set for materials. Both manpower and materials cards can be used to show the cost elements for each job.

The manpower job cost cards can also be used for any special payroll routine that may be necessary or desirable, (e.g. overtime computations, piece rates) as well as for such relatively sophisticated applications as manpower utilisation analyses. Job cost analyses will take place as required, and a job cost summary will be produced on completion of the job.

The second of the two boxes described in Fig. 2 as Update Department Profit and Loss Sheet is then entered. Here the direct job costs are augmented by an amount (usually calculated as a percentage of direct labour costs) in respect of overheads to produce a total cost figure.
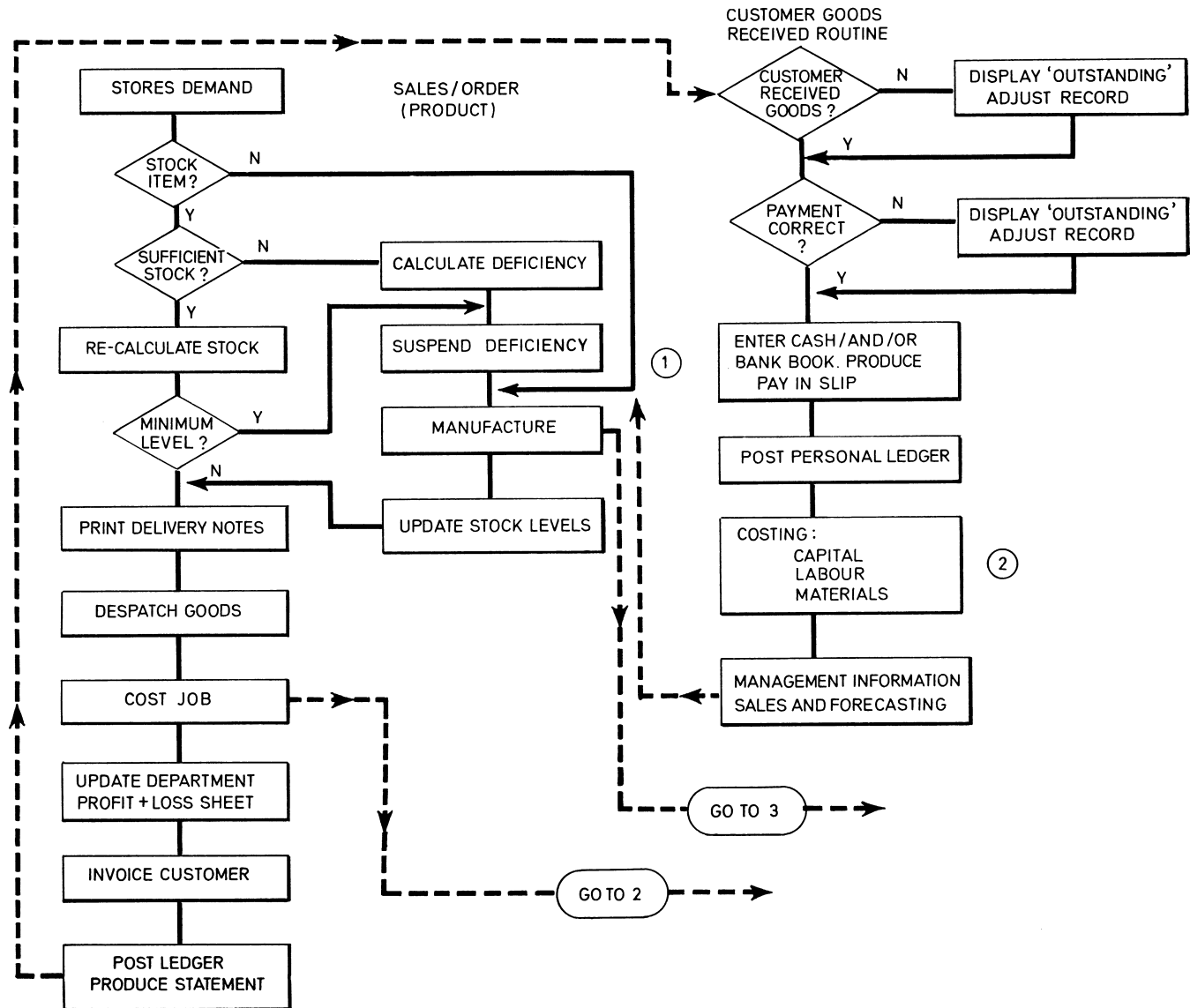
**Fig. 2. Route 2 (sales/receipts) in greater detail**

The final invoice price is determined either by adding the appropriate profit margin to this total cost or by honouring any quotation which has previously been sent to the client. Actual profit or loss can thus be assessed easily.

This variation can be produced in the form of a sub-system which can be slotted in to the original Class A system (paper 2), to produce a routine which meets the needs of the companies in Class B. In a similar manner it is envisaged that other program packages will, at a later stage, be slotted into the system so that small companies will introduce management science techniques. For instance, forecasts of future demand based on something other than guesswork will enable them to make more economic use of their labour force, or reduce the amount of capital tied up in raw material stock. To determine what new packages are required in this field, it is first of all necessary to discover what packages are already available.

## Existing Management Science Software

The principal sources of these programs are the computer manufacturers, computer bureaux, and the software houses. Five manufacturers and fifteen bureaux and software houses have so far been approached, with some surprising results.
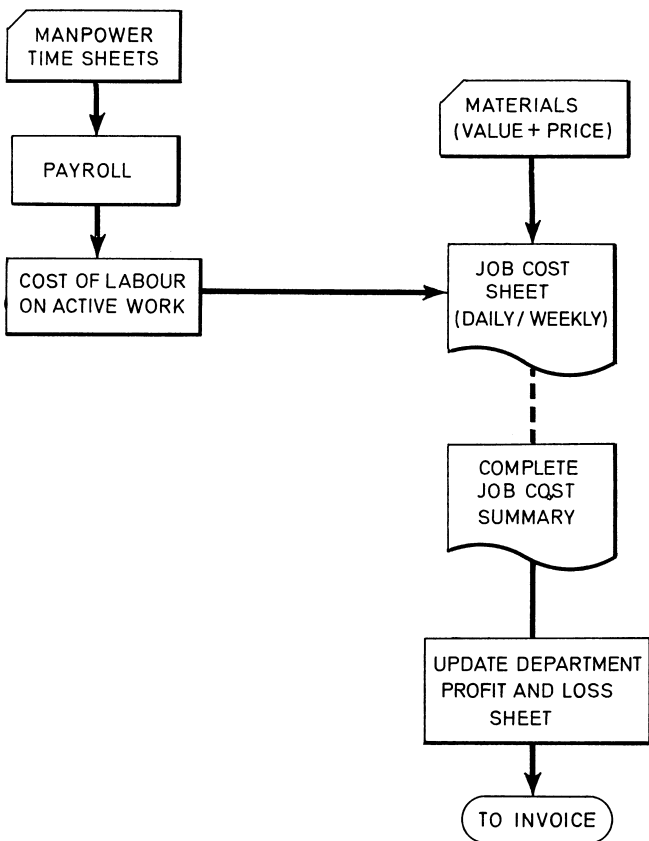
The smallest of the manufacturers (at present producing small special purpose machines, but developing a larger general purpose equipment) and another which has lost its identity due to a merger, were most helpful and willingly supplied all the information for which they were asked. The others have not deigned to reply. It had been half expected that the principal computer manufacturers would supply only sales literature instead of the details required, but even the sales literature did not materialise.

Of the fifteen independent bureaux, etc., five did not reply. Another five said they did not have management science packages, and three advised that they offered all the packages that the manufacturer of their particular computer equipment had available. Only two appear to have produced any programs of their own for this field.

At this stage effort is being concentrated on forecasting programs. Nearly all of them use exponential smoothing to obtain a moving average from historical data, by means of a simple formula relating the current moving average to the previous value and the latest demand. In most cases this is sufficiently accurate. One routine, however, goes into more detail by using the Box-Jenkins relation. In order that good predictions be obtained from this package it is essential that the user appreciates the basic assumptions on which the equation relies. Amongst companies of the size that have been surveyed such a package could be dangerous because there would be a tendency to use it for all forecasting work irrespective of whether or not the basic conditions were satisfied.

Both of these techniques rely on having several years data available as a base, and assume that there has not been any marked change in external influences. The latter condition is often not satisfied because such things as tax changes in the Budget, for example, can upset demand, and although companies experienced in the use of forecasting have the expertise to make allowance for this, the small company usually has not. Moreover the small company is much more vulnerable, and markedly incorrect forecasts could have disastrous results.

None of the packages examined so far have been suitable for sparse data, which means that many small companies are again at a disadvantage. The testing of a number of techniques which may overcome this problem is at present being undertaken and it is hoped to report the results of these tests and the examination of other packages at a later date.

## Acknowledgements

Fig. 3. Detail of 'Cost Job' operation

## References

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