Computer Production Control

to ensure smoothness during the introductory stages. The importance of this aspect cannot be over-rated.

AN EVALUATION OF THE RESULTS

In terms of plain results in the “guinea pig” factory, during the period of the experiment to date, the following points indicate that, notwithstanding the upheaval of a new system, the production control department has marginally improved the general position with the procedure it is now using.

(a) The total number of items in short supply during the period has reduced from approximately 500 to 30.
(b) Production per man-hour worked has increased marginally—by an average of slightly under 2%.
(c) Part-ordering and split-batching have been reduced appreciably and the work-in-progress level is considerably lower.
(d) Partly as a result of (a) the value of finished stores stock has increased slightly. It is considered that in this case we have a better balance of stock availability than hitherto.
(e) We have had practical advantage already in the use of the bulk load technique used as a simulation to guide management decision-taking.

(f) While it is early yet to expect the “forward” look in manufacturing control to show substantial advantages, this concept in practice is making the whole task of controlling stocks a very much easier one than hitherto.

CONCLUSION

This paper was written at a time when, as will already be apparent from what has been said, we were convinced that we are on the right course—towards better control of production. Although we cannot yet say—obviously—that we have saved £x already, we are convinced that the digits replacing the “x” will eventually be substantial.

We are seriously of the opinion that within our own organization we are bringing modern equipment to the aid of a function which to date has been rather a Cinderella in the sense that much of its work—though vitally necessary—has been mundane; without much hope of relief. This aspect is now catered for by the computer, which, in addition, is providing pungent control data at the right time to enable more decisions to be more correct than hitherto—to improve Control.

Conference Paper

Symposium on Experiences with the Use of Magnetic Tape—
1 : Magnetic Tapes on a Ferranti Pegasus

by G. B. Griffiths

INTRODUCTION

Our Ferranti Pegasus computer was commissioned in February 1958, and was bought primarily for the solution of engineering design problems. In order that we might also use the computer for full-scale trials of some commercial programs (especially stock control), and to make possible some rather more advanced boiler thermal-performance and costing calculations, four Ferranti-ElectroData magnetic-tape units were added to the installation in January 1959. We use mylar tape supplied by M.M.M. and pre-addressed by Ferranti. Now that the equipment is installed and working well we use it whenever convenient for any engineering program, although its use on these occasions would not alone have justified its purchase.

APPLICATIONS

Engineering

(i) Program Storage. The 18 longest and most frequently used production programs are permanently stored on a reel of tape, and this reduces program input time from one or two minutes to a few seconds. In addition to this useful time saving, there is no longer a risk of damaging long reels of paper tape due to frequent handling. The reliability of the system has been such that, since magnetic tape became available, we have not yet had to use the paper tape versions of these programs due to magnetic tape failures.

The magnetic-tape stored program is especially valuable when running our longest program, which is too long to be read at one time on to the 4,096-word drum. When many sets of data are being run, the two parts of this program can be read over each other under program control in a few seconds. The paper tape version of this program is very much more difficult to operate as the long tapes have to be rewound quickly and frequently.

(ii) Data Storage. The storage on magnetic tape of intermediate results of matrix type programs is very much faster than punching out these numbers on paper tape and reading them back in again as required. A
Magnetic Tapes on Pegasus

ROUTINE MAINTENANCE AND TESTING

Routine testing of magnetic-tape equipment takes approximately 20 minutes per day using specially allocated tapes; these have, on occasion, been damaged, or information has been lost when faults have existed or when carrying out marginal tests.

On these units the tape runs in contact with the heads, and these are cleaned once a day when a very slight oxide deposit is usually removed. This was very much greater when, in the early stages of commissioning, the unit air-conditioning equipment was not functioning correctly.

We subject all new tapes to a read/write test, writing zeros in all sections and reading these back again. A number of our original new tapes failed this test, but replacements have all been satisfactory.

FAULTS AND CORRECTIVE ACTION

We have not yet lost any useful information from magnetic tape since commissioning five months ago, although we have used tape on every possible occasion. In the first two months of operation we experienced a number of electro-mechanical faults on the tape units necessitating replacement of motor bearings, relays, and some resistors; frequent rebedding of brushes was also necessary. We have also had wires come loose from the read/write heads on two occasions: this may have been due to their having been touched when cleaning the heads.

Having experienced no read failures I can only describe our plans to meet these troubles if and when they arise.

Master tapes containing stored programs, or commercial files that are read from and never written on, are usually kept in duplicate, sometimes by writing the same information twice on one reel of tape if this is long enough. It would always be possible to build these files up again from paper tape in the event of extreme troubles. In the case of a failure during the running of an engineering program we would, if necessary, start the run again from the beginning.

When running the stock-control program we would either restart (if near the beginning of a run), or run through the failure, when an error-detecting program would, in most cases, detect missing or erroneous data and produce some descriptive printing. This would then be the basis of corrective action the following week.

In the event of a main file breakage, we would possibly have to rebuild this file from the previous week's data. We are here prepared to learn from experience of actual failures as to whether or not we should write elaborate checking and restart programs.

In the event of a complete tape-equipment (or computer) failure we would take our tapes to another installation and run our programs there. We have already checked that it is possible to read our tapes on units at another installation.

Commercial

(i) Stock Control and Recording at Renfrew Works (Stage 1). This is a series of six programs, including sorting and merging routines that use all four tape units, this first stage running for approximately three hours per week.

Following five months of testing, all programs are now working and production will begin after final alterations to the print layout programs. There have been no tape failures so far during the file build-up operation and the detailed and lengthy testing of these programs.

(ii) A Management Accounting Program for a Subsidiary Company. This is a program that uses only one tape unit, runs for approximately one hour per month, and very appreciably speeds up this monthly clerical operation. We believe that other similar commercial programs are likely to be tackled before extending the big Renfrew stock-control program.

TAPE HANDLING

All tapes currently being used are kept in the computer room (the air in which is cooled and filtered), in the polythene bags and boxes in which they are supplied. Each tape unit has, in addition, its own temperature and humidity control.

Reels are at present identified by a serial number and name or application label stuck to the reel, and are checked manually before setting up on the units, only a senior duty programmer being permitted to do this. We do not yet make use of program checks for reel identification, but will develop such programs should they prove necessary. As there are built-in checks based on two read/write heads to ensure that information is correctly read from or written on to tape, we do not use program checks for information read from tape. A detailed log is kept of the history and performance of all reels of tape. We record number of sections, date of testing, number of times used, and details of any failures.

typical example is a heat transfer problem that takes 27 minutes using magnetic tape and 62 minutes using paper tape for storing intermediate results. A second advantage we find here is that, whereas paper tape punches are liable to produce occasional errors, we have had none when using magnetic tape.

We intend to extend the use of magnetic tape for this type of program, for we are always being urged to solve bigger pipe stress and structural problems, and in general the matrix working space tends to increase as the square of the complexity of the problem.

(iii) Program Development. Development of long programs can be speeded up by storing partially-tested programs on magnetic tape. A program can then be dumped on to tape at the end of a development run, or if more important work arrives at very short notice, and read back again later to continue the development run. This again reduces paper tape handling and input time.