performed. Inverting the remaining relations yields the following predictor equations

$$\text{NOUT} = 1{\cdot}00276X_5 - 352{\cdot}72\,,$$
$$\text{NITER} = 7{\cdot}4349X_9 - 0{\cdot}6411X_5 - 592{\cdot}27\,,$$
$$\text{NTAP} = 111{\cdot}1111X_{11} - 111{\cdot}11\,, \text{ and}$$
$$\text{NDIS} = 11{\cdot}7647X_{12} - 1552{\cdot}95\,.$$

5. Summary

The use of statistical experimental design methodology in calibration experiments involving synthetic jobs can be quite beneficial. It costs no more in most cases to conduct a carefully designed experiment than it does a poorly designed one. The results obtained, however, are worth any added cost in time or effort.

Appendix 1

This appendix describes the two synthetic jobs designed as part of this study. The first job was developed to emulate the resource demands of Autobatch jobs. The resource descriptor set used to characterise the demands of Autobatch jobs contained only three elements, and hence the synthetic job is quite simple. The second job was designed to emulate the resource demands of Batch jobs. The expanded resource descriptor set used to characterise the Batch jobs necessitates a more complex synthetic job. Both programs contain features that make them somewhat system-dependent. For example, the random number generator depends on overflow in a 32-bit integer, while the Autobatch job is critically sensitive to the efficiency of implementation of the Sin and Cos Routines.

The synthetic job designed for Autobatch jobs is designed to allow the user to specify indirectly the number of lines printed and the total CPU time used by setting two parameters: NRLIN and NITER. The appropriate settings for these parameters may be determined using predictor equations established in an earlier section. A loop control parameter LIMIT = Maximum {NRLIN, NITER} is first calculated. The main loop is then executed a total of LIMIT times. The first NRLN times through the loop, an output line is produced. Other actions accomplished each time through the loop include calculating two pseudorandom numbers using a multiplicative congruential scheme and performing some simple calculations on the second of these two generated numbers. The particular implementation of the job used in this study (WATFIV) is shown in **Fig. 1.**

The synthetic job designed for Batch jobs is somewhat more complex than the one designed for Autobatch jobs. Four parameters: NITER, NOUT, NTAP and NDIS are specified to control the resource usage. NITER controls the number of times the 'compute' loop is executed, NOUT controls how many lines of output are produced, NTAP controls how many records are read from a tape file, and NDIS controls how many records are read from a disc file.

The first task accomplished is to establish the loop control parameter LIMIT = Maximum {NITER, NOUT, NTAP, NDIS}. Within the main loop a pseudorandom number is produced. In addition, the first NOUT times through the loop a line is output; the first NTAP times through the loop a record is read from the tape file; the first NDIS times through the loop a record is read from the disc file; and the first NITER times through the loop a computer routine is invoked. The compute routine involves filling two 5 × 5 matrices with random numbers and then calling a routine to multiply the two matrices to form a third 5 × 5 product matrix. The appropriate settings for the parameters to produce a given demand pattern can be determined from predictor equations established in an earlier section. The particular implementation of the job used in this study (PL/I) is shown in **Fig. 2.**

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