A FLEXIBLE APPROACH TO MICROCOMPUTER CONTROL OF IN VITRO EXPERIMENTS

N.J. Cuthbert, R.D. Elliott, M.J. Peck, R. Towart
Miles Laboratories Ltd., Stoke Court, Stoke Poges, Slough SL2 4LY, Bucks.

The use of microcomputers for automation in the pharmacology laboratory has been restricted by the apparent complexity of programming and by the practical difficulty of interfacing to syringes, pumps and transducers. However, several inexpensive microcomputer-compatible interfaces have now been introduced, mainly on the IEEE 488 standard. To test the potential of a flexible, "non-dedicated" system for automating in vitro experiments, we have coupled our "380Z" microcomputer (Research Machines, Oxford) to a commercially available "Microlink" interface (Biodata, Manchester) unit. Other microcomputer systems (e.g. Apple, Pet etc.) or other interfaces (Astech, Di-An, Rexagan etc.) would also be suitable if fitted with IEEE 488 compatible connections. A programme for automatic control and data acquisition has been developed. Our objective was to design a simple programme to give flexible control of several separate experiments. The internal clock counts seconds (see Fig.1) and the programme "scans" each experiment in turn to see if any event (i.e. measurement, injection, washing etc.) should take place at that time. At the time corresponding to the end of the cycle for experiment 1, t1 is reset to zero, and the cycle repeats automatically. In this way several separate experiments may run independently.

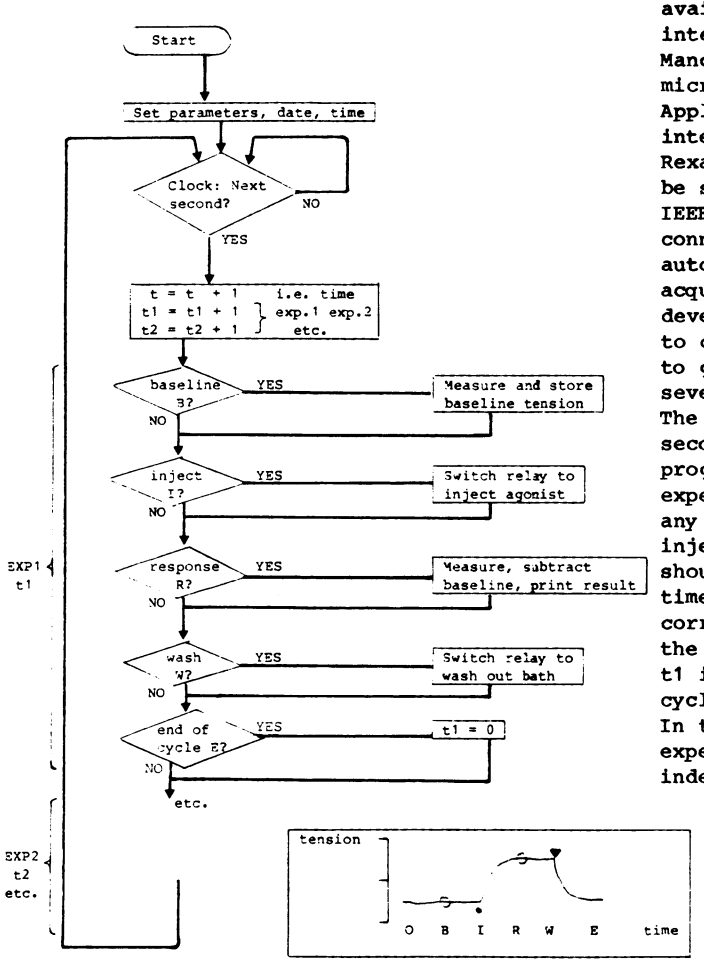

Fig.1. Simplified flow chart for a program to control an experiment (see insert) in which an agonist is injected at I seconds and washed out at W seconds. The cycle ends at E seconds and the sequence is repeated. Using this basis, refinements e.g. 2 or more washes, etc., may be added, and 2 or more independent experiments may be carried out with cycles controlled by t1, t2, t3 etc.

AN OPERATIVE SYSTEM FOR ACQUISITION AND ANALYSIS OF ELECTRO-PHARMACOLOGICAL SIGNALS

J.L. Diez, J.R.Ramon, L. Lastra and P.D. G. de Jalon. Departament of Pharmacology. Universidad Complutense. Fac. of Medicine. Madrid-3. Spain

Here within we present an operative system in BASIC language adapted to a set composed of a Tektronix 4051 microprocessor (μP),(16 K RAM), a Tektronix 7854 digital oscilloscope (4 K RAM) and a Tektronix 4662 Plotter. The system acquires, stores, processes and graphs from byoelectrical intracellular signals. The results are processed optionally again by means of fast algorithms to get statistical curves to point out several electropharmacological parameters: activation|inactivation, current|voltage relationship, doses|effect curves, etc...

The scope carries out the data acquisition by storing 2^n points per wave (usually n=9) and one of its parameters (dV|dt, Action Potential Duration, Resting Potential, etc...) The scope is programmed to do that from the μP. This information is sent to the CPU of the μP and afterwards to the magnetic storage (casette or floppy disc). The stored data is processed in the same operative system through statistical treatment by lineal regression up two exponentials. The values are forwarded to magnetic storage for further graphic representation. A routine of sigmoide treatment by the least square method is available for the graphics of activation|inactivation or dose|effect data.

The system includes routines for result corrections, for exponential modelling to compare with real data, and for graphing values .