Abstract of Paper Submitted to Datafair 71

1. Title: A Versatile Multi-User Language System for a Mini-Computer

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4. Date of Submission: 20th June, 1970

5. Significant Features and Classification of P3 Software for Small Computers

A multi-user terminal-oriented system for the Digico Micro-16 based on a greatly extended version of Dartmouth College BASIC.

Extension of interest in their own right including SNOBOL-like string-handling and pattern matching. Of particular interest is a technique of "reversible-compilation" in which command codes and user-defined data-names are reduced to pointers, but symbol-tables retained at run-time. Program execution approaches speed of compiler-generated code, but retains interactive advantages of interpreter-based system.

All editing and job-control commands may be executed in the program. All program commands may be executed directly at the keyboard.

By using the macro-facilities and within program coding facilities of the language it is possible to write an interpreter or compiler for an arbitrary language in the extended BASIC to execute directly or compile into BASIC for later execution programs in another language.

6. Abstract

Under contract to NRDC a multi-user time-sharing system has been developed for the micro-16 computer. The implementarion is based upon statement by statement execution of programs in a single user language, a greatly extended version of Dartmouth College BASIC.

This paper describes the design objectives for the system, particularly those related to its non-numeric data-processing capabilities, facilities for the emulation of other languages, interactive control and modification of programs in the run phase, and utilisation by users without prior computing knowledge. The reasons for the popularity and ease of use of BASIC are analysed, and the direction of extension derived.

The implementation is notable for a number of features - the source is reversibly compacted during the run phase, so that the syntax analysis of the interpreter is also that of the compiler; programmer-defined data -names are compacted to single pointers, as are processor calls, enabling higher speeds to be obtained than in a purely interpretive system; all job-control and editing commands may be executed in a program; all program commands may be directly executed.

The extensions to BASIC include macro facilities and pattern-matching string operations. The disadvantages of a line-numbered system are overcome through a symbolic-naming facility.

A single-user system on the micro-16 occupies less than 4k or core, leaving 4k free for user program on an 8k system. The system is currently in use for interactive record-keeping, psychological testing, interactive data-analysis, and language development.

8. Clearance for NRDC available.

(1968). NRDC backs low-cost computer. Electronics and Power 14, 81.

NRDC backs low-cost computer

The UK National Research Development Corporation recently announced that it is giving backing to a new low-cost miniature computer which is claimed to be the most versatile British design for its size. Although smaller computers have been constructed for specialised applications, and machines with similar specifications are available at higher prices, NRDC and the makers—Digico Ltd. of Welwyn Garden City, Herts.—claim that the *Micro 16* digital computer offers the best cost effectiveness, in price for computing ability, available in the UK, and that it fills a large gap in the British computer industry's range.

Digico Ltd. was set up in February 1966, and the *Micro 16* is the company's second computer. It is designed as a 'desk-top' machine that can easily be transported from one location to another, and its computing power can be increased by the addition of modules which stand on the top of the main cabinet. The price of the basic unit, which is little larger or heavier than a professional tape recorder, is expected to be about £4000. The computer, which in its production models will employ British-made microcircuits throughout, works as a real-time machine with interrupt facilities, and has an expansible store ranging in capacity from 1024 to 65536 words. Serial–parallel techniques are used, to give a compromise between speed and cheapness.

The first *Micro 16* ordered will have an 8000bit store in conjunction with a $250s^{-1}$ paper-tape reader and a 16000-word backing drum.

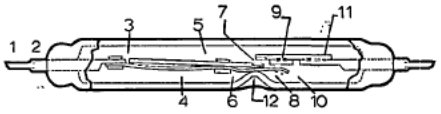
Among applications envisaged for the machine are scientific computation, on-line industrial process control, data logging, stock taking, and education. As it requires no special installation or air-conditioning facilities, it can be switched from one plant to another very rapidly.

Reed switch for power applications

Using similar techniques to those developed for reed switches in low-current applications such as electronic telephone exchanges, Brookhirst Igranic (Thorn Group) has developed *Powereed*—a reed switch which will switch power circuits, thus bringing the advantages of reed switches—long life, reliability, high-speed operation and the ability to withstand adverse environment—to industrial applications. *Powereed* can handle inductive loads with 'make' currents of 15A and 'break' currents of 3A at 125V a.c. At 250V a.c. these ratings become 10A and 2A, respectively. Its life is claimed to be greater than five million operations for switching a 100hp contactor, and more than 25 million operations for a 10–15hp contactor.

The size of the switch is not much greater than that of a conventional low-capacity reed switch; its overall length (including terminals) is 79·4mm, and the diameter of the glass envelope is 6·35mm.

In operation, magnetic flux generated by an electromagnetic coil is induced into the ferromagnetic portions of the reed members. As the internal overlapping ends of the ferromagnetic elements assume opposite polarity, they attract each other, closing the contacts. Removing the magnetising force opens the contacts.

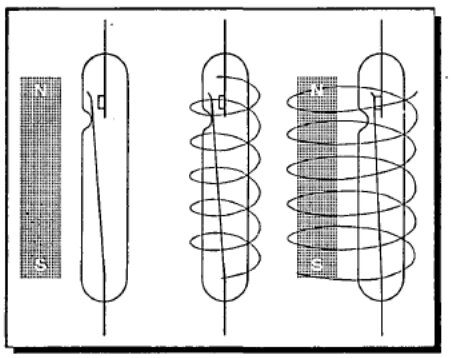


Powereed switch: 1—terminal; 2—hermetic glass-metal seal; 3—permanent gap for clean 'dropout'; 4—armature-return spring; 5—armature; 6—contact spring; 7—special tips on moving members; 8—moving contact; 9—fixed contact; 10—'ski'-tip heat sink; 11—fixed-contact carrier; 12—backstop for moving contact

The reed switches have been incorporated into two types of relay, primarily designed for printed-circuit applications. Each relay incorporates a d.c.-operating coil and a magnetic shield, which allows relays to be mounted side by side. For industrial applications a multipole panel-mounting relay has been designed. It is intended to replace conventional relays in control schemes requiring the highest degree of reliability over the longest possible life span.

The design is such that the relays look, mount and connect like conventional electromechanical relays, and can therefore easily be integrated into existing schemes and designs.

The relay will be marketed as a shell complete with operating coil and, for a.c. operation, the necessary rectifier equipment. Normally open or normally closed poles may be ordered and fitted as required. For pockets not occupied by poles a pocket cover is provided. Owing to the absence of visual movement when the relay operates, an 'on/off' indicator is built into the relay.

The price is expected to be about 50% more than that of the equivalent electromechanical relay, but this increase is more than offset by the claimed performance; its life is quoted as 10–20 times that of an equivalent electromagnetic relay, with a better switching time.

Operation of *Powereed* switch; magnetic flux generated by an external permanent magnet or an electromagnetic coil is induced into the ferromagnetic portions of the reed members. Since the internal overlapping ends of the ferromagnetic elements assume opposite polarity, they attract each other, closing the contacts. Removing the magnetising force opens the contacts