Architecture of the ICL System 25

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Abstract

The organisation and operation of the hardware of the ICL System 25 small-business machine is described. The relation to the existing System Ten, with which it is compatible, is indicated.

1 Introduction

System 25 is a physically small, powerful and versatile computer aimed primarily at the needs of commercial data-processing. It is compatible with the ICL System Ten which has proved a very popular and successful small-business machine and of which approaching 10,000 are in use world-wide. System Ten was designed in 1968, since which time there have been considerable advances in both physical technology and concepts of computer architecture. The design of System 25 exploits these advances to give a machine which is in every sense more powerful and versatile than System Ten while retaining all the good features of the earlier machine, especially its ease of use. In essence, the aim of the new design is to provide in a single small system, and simultaneously if required, all the various services which are being requested in business operations, such as batch, transaction and distributed processing, word processing, and control of such devices as Point-of-Sale and Factory Data Collection terminals.

The machine is shown in Plate 1.

Particular features of System 25 architecture are as follows:

(i) Features derived from the Primitive Level Interface, which is the definition of the prime interface between the software and the hardware and includes the instruction set, store map, data and arithmetic standards etc. It is based on that for System Ten with extensions for handling 8-bit data and new high-capacity discs, maintaining exact compatibility wherever possible so as to allow direct transfer of programs. The main features here are:

(*a*) Partitioned store, to allow multi-programming with guaranteed independence and protection for the programs

(*b*) Decimal arithmetic and decimal addressing; this allows computation on input data without the need for time-consuming decimal-to-binary conversion, and also makes the use of the machine easier and more natural.

(*c*) Variable-length store-to-store operations, to allow efficient use of main-store space.

(ii) Support for a number of communication protocols, allowing System 25 to be used as a secondary station to ICL and IBM mainframes or as a primary station driving remote peripherals.

(iii) Means for supporting a wide range of peripherals via either System 25 standard interfaces (carried over from System Ten) or various Industry Standard interfaces. The main slow peripheral interface, for example, will allow the connection of up to 10 peripherals at distances of up to 1500m.

(iv) The System 25 Bus, which is the key feature of the hardware organisation and on which the above features depend. It is a set of physically separate bussed highways, used to interconnect the modules which make up the system. Each highway is designed for its particular purpose, resulting in cost-effective system modules and efficient transfer of data within the system; and the architecture provides ample scope for the incremental introduction of future enhancements.

The present paper describes in some detail the organisation and operation of the hardware and the means by which these and other features are realised. It concludes with a short note on the main software packages which are provided for support of the hardware; these will be dealt with in more detail in a second paper, to be published in the next issue of this Journal.

2 Hardware Organisation

2.1 Summary

The key to the System 25 hardware organisation is a set of bussed highways collectively known as the System 25 Bus, which is used to interconnect a number of modules to create a system as shown in Fig. 1.

A system contains at least one of the following system modules, each of which consists of one or more boards interconnected via the backplane containing the System 25 Bus:

- a Control Processor which is responsible for the overall supervision of the system and for data transfers from slow peripherals
- an Instruction Processor which executes the System 25 Instruction Set
- a Store module
- a Disc Controller plus its associated Disc Adaptor which is responsible for fast I/O transfers
- a Slow Peripheral Coupler to drive an external slow peripheral interface for the connection of peripherals such as VDUs, printers.

There are two external slow peripheral interfaces supported by System 25, which have been carried over from System Ten. The main slow peripheral interface is the MTIOC interface (Multi Terminal Input Output Channel), which allows connection of up to ten slow peripherals onto a single twisted pair. The MDIOC interface