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ICL Introduces

Your future



system

A SIMPLE, straightforward approach to computing—the factor which made the ICL 2903 such a worldwide success with the small computer user—has now been brought to the user of large computers with the introduction of the ICL 2970 and 2980 processors.

With these two new computers, ICL set out to build machines that would not just be exercises in the application of advanced technology but would meet the real needs of the users and would make computing, even at the top

end of the scale, easier to understand and easier to apply.

Using all the skill, ingenuity and expertise acquired over the years, ICL made an intellectual breakthrough — Virtual Machine Architecture a development of techniques pioneered by ICL more than a decade ago—that cuts right across conventional thinking. A complex concept, which means that every facility a user needs to gain the most from his 2900 is provided easily and efficiently. It makes the ICL 2900 series very much user's machines.

Recognising the importance of communications in present day computing, ICL

made a communications facility a basic part of the new computers' design and built it to be excellent at this aspect of its application. All facilities needed to implement large and small scale communications systems are an inherent part of the 2900 Series design so this kind of application can be operated on both machines very easily.

Choice

ICL saw that while information should be widely and readily available through communications terminals, the information provided had to be accurate and easy for the layman to find his way through. A

comprehensive Data Management system was therefore an essential part of any advanced system.

Before the introduction of these two 2900 Series machines, most users had to choose between Data Management facilities that were either too limited for his requirements or were too complex and gave more than was wanted. Now, with Data Management an integral part of the design of the 2900 Series, the user can choose the level which will meet his requirement exactly but also has the facility to grow through the various levels as and when necessary.

As yet another way of making computing more straightforward for the user, both 2900's use high level machine languages which provide powerful and wide

ranging facilities but eliminate the need to program in a complex machine-dependent language. They also provide all the tools necessary for the user to write and test his own programs effectively. The sophisticated facilities built into both machines for handling communications, data bases and file security, mean the user does not have to write these sub-systems himself, so projects which on other computers would be considered as complex and advanced are moved into the domain of the ordinary 2900 programmer.

This level of sophistication will mean that the 2900 user will be able to get his projects off the ground faster and gain benefits from his system sooner than previously possible.

In use, the 2900's Virtual Machine Architecture gives every user the impression that he has all the resources of the computer at his disposal at any one time irrespective of what other users of the machine are doing simultaneously. In reality, the 2900s share the resources between users without their being aware of it. This is done while giving

each user complete privacy and protection for his data.

Obviously with computers as advanced as the 2900 Series, the user will place great reliance on the machine which will carry an enormous responsibility for the efficient running of his business. A computer on which so much responsibility rests must provide an extremely reliable service and this is an area of design given even more attention than normal by ICL.

Both 2900 series machines use integrated circuits and multi-layer platters—technology pioneered by ICL and thoroughly proved on its most powerful existing computers. At every stage checks have been built in to ensure that no fault escapes detection. The 2900s are highly modular allowing any function, even the processor themselves, to be duplicated so the user can tailor his configuration to give the level of resilience he needs to cope with a fault and allow work to continue even in the face of a partial failure.

Resilience

Software is also protected by resilience in data file systems software and in the user's own programs. This is yet another technological breakthrough that has been incorporated in the 2900.

The built-in architecture protection is so effective in the 2900 that not only can one user not interfere with the work of another user on the same machine, but it is dedicated communication



2900—A SERIES TAILORED TO THE USER'S REQUIREMENTS

SIX years ago, the merger between ICL and English Electric Computers created the situation where the designers of the two most successful European computer systems, the 1900 Series and System 4, could pool their resources and take a completely fresh look at what kind of computing facilities users really required.

At that time, computers were still dominated by their own technology. They were designed to meet the requirements and limitations of the particular machine that they were used against. This background, and probably aside—they were seen as obstacles to the history of computing, that a team of experts with a wide range of business and scientific as well as computing knowledge were brought together to create a specification for a new machine that would be used entirely by the users needed as opposed to what was technically and economically possible.

These user requirements were determined through exhaustive surveys of a wide spectrum of users, not just our own but those using other manufacturers' computers. The results were then translated into a specification based firmly on the needs of businesses and institutions to get things done. Limitations arising from preconceptions of methods of implementation were set

to be easy to maintain in relation to their power, and it was required that, in general, it should be possible to carry out both preventive and diagnostic maintenance without interfering with the routine use of the system.

We told our designers that it must be easy for users to prepare, check, and adjust the system. It was also required that high level languages must be efficient that there must be no requirement or temptation to drop into a low level language to address a function such as communications, or to obtain particularly efficient coding. And no making a necessary change to the business systems because of the time difficulty, and expense of amending programs.

It was a major requirement that it must be easy for all our current users to move over to our new systems when they decided that the time was ripe. It was also required that the systems must be easy to use, run, and it was to be easy to use most existing peripherals, particularly communications equipment, so that our investment was protected. And all this was to be achieved without detriment to the intrinsic design excellence of the new systems! It was also stressed that the systems must be designed to meet relevant international standards.

This led to a specification that encompassed seven major areas: Communications, Data Management, Resilience, Usable Versatility, Ease of Use, Usable Power and Open Endings.

Our objective has been to create open-ended systems that the user by upgrading them can meet the requirements of his business, without having to impose artificial conventions which distort and obscure his real objectives. We have already tried out some of our ideas on the 2900 and they are proving very successful. Indeed, we are now successful on the much larger systems that we are now introducing.

Hardware reliability a key factor in 2900 design

IN ORDER to make the 2900 Series the most advanced computer system in the market place, we set ourselves some fairly formidable tasks. We decided that the system should be smaller, less power consuming, and operate without complex cooling. At the same time they had to possess high inherent reliability, be easy to install and quick to commission, and have easy access for maintenance.

A fundamental building block that we decided to use was the integrated circuit. This allowed us to use a high performance integrated circuit. Fortunately our solid-state in high speed semiconductor computer technology. It is no exaggeration to say that for many years we have led the world in the development of integrated circuits. Our work in this area has been working closely with our semiconductor suppliers, we were able to develop a proven family of devices that we were already using, which had all the required characteristics.

Dramatic

The direct results of this development were quite dramatic in that we were able to reduce the spacing between the circuits, which was necessary in order to reduce the higher performance such as chilled water or freon. We were also able to free ourselves from the necessity of having hinged cabinet doors containing logic circuitry, allowing lighter physical structures, and easier handling. We have already made up our mind to create the way for us to realize all our basic technical objectives.

Reliability

Having designed and proved the reliability of the basic technology, we turned our attention to the reliability of the complete system. This meant that we had to think about the reliability of the hardware, the software, and the people who were using it. We have already made up our mind to create the way for us to realize all our basic technical objectives.



A magnificent achievement

OUR new range of computers has taken some six years to develop and bring to the market place. I have only been associated with this development for the last two years but it is no secret that we have been working hard to make this achievement. We were going for it in ICL, that encouraged me, and others, to join the Company.

Britain has the reputation of spawning great inventions but of failing to develop them into marketable products. Users find that in the case of British inventions they are often left on the shelves. It is our aim to change this by inventiveness into a superb system that will set computing standards for years to come.

For a given investment users will get bigger, better, and faster high-speed computers than elsewhere. Our computers are designed to be used in a wide variety of applications built round the new 2900 systems are flexible to such a degree that they immediately adjust to meet changing circumstances—in a typical case we can change the system in a matter of a month and we are able to run the new systems with scarcely a hair to bother us.

The excellence of our new computers springs directly from the excellence of our current computers, since the latter have been used extensively throughout every major part of our business. We have a long and varied experience of computers that our users include some of the most demanding in the world. We have obtained from our machines, and we are equally proud of the return that these same machines have given us in the shape of our new system.

The pace of development, both in our own country and abroad, has not been slow. In the required time scale, to the needs of users. We are big enough to deploy the resources needed to crack a particular problem, without being so big that progress is hindered by an overweight bureaucracy. The new years this speed of reaction will prove immeasurably beneficial to our users.

Ed Mack
Director of Product Development

ICL
expertise
makes the
software
simple



two things. Firstly, the capabilities of the high level languages on 2900 had to be such that the user could employ them in a natural way to carry out all the required tasks. This included their use in a format that was familiar to users. It has been a general principle for us to drop into assembly level languages. Secondly, it meant that we had to provide facilities in the architecture which made it possible for the user to write programs in a highly efficient object code in an economic way.

We believed that it was imperative that the user should not find it necessary to drop down to a lower level in order to optimise his programs.

A fundamental feature of any computer system of course, is the Operating System. GEORGE 3 is a very good one. The 2900 system has been better than most in this respect. We have already been in designing and implementing a highly successful comprehensive operating system. For instance the command language—SCL or System Command Language—is independent of whether the user is using a terminal or a computer from a job control card.

We have also built into the operating system features such as disc organisation and indexing that have previously been regarded as separate housekeeping functions.

The same is true to a large extent in the compiling area, where the existence of the Source and Message Manager in the 2900 system is a major feature. The Source Manager is concerned with compiling source programs and with a series of separate compilers. In practice the end of compilers are all very similar, so we can combine the common features into one common compiling program that is interfaced by separate translators. This means that we can have a simple case of not wanting error messages from a COBOL compiler to the omission of an RJE option on an operating system. Yet he will still be left with a rounded system from the point of view of the job that needs to be done.

An extension of the stability concept is an aspect known as SAMM—Source and Message Manager—which will enable the user to manage the messages out of a message file, and which will enable him to use his own special-purpose messages as well as, or instead of, the standard messages.

The 2900 series is oriented strongly towards high level languages and, in developing our software, this is a

back without prejudgment on which features should be provided by software assets, which we had two tremendous assets—our unparalleled experience in the major techniques that would be required, particularly in the area of communications, and our ability to overcome the limitations of all machines that were current in the market place.

Among the fundamental factors that must be considered in introducing a new range of computers are the numeric ranges of the various components that make up the system—how many peripherals can be attached, how many channels are available, and so on. It is extremely important that the limits on these numeric ranges—and there must be limits—are well thought out. This applies to software as well as hardware, and one particular area where it is common to suffer a limitation is in the addressing range. Users will find that an important aspect of the way that

Modularity

Another technique that will ease the installation is the ability to record all the details of the software in a database, not just the coded bricks but the procedures that glue them together as well. Modularity will not just make it easier for the user to write and modify his own programs. The modularity concept is extended to the systems level so that the user will be able to modify the system without the need for a complex case of not wanting error messages from a COBOL compiler to the omission of an RJE option on an operating system. Yet he will still be left with a rounded system from the point of view of the job that needs to be done.

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Independent

We have therefore designed our larger systems round twin processors which are electrically independent, and which can operate in either dual or single mode. These, and all other major systems, are made up of new, high speed, operated switches so that the whole system can be rapidly reconfigured to allow essential work to continue.

The new 2970 and 2980 processors use semiconductor memories, and incorporate single-bit error correction capability. This adds to the vastness of the hardware costs, but this feature represents such an asset to the user in terms of improved reliability that we had no doubt it must be included.

Diagnostic

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Communications

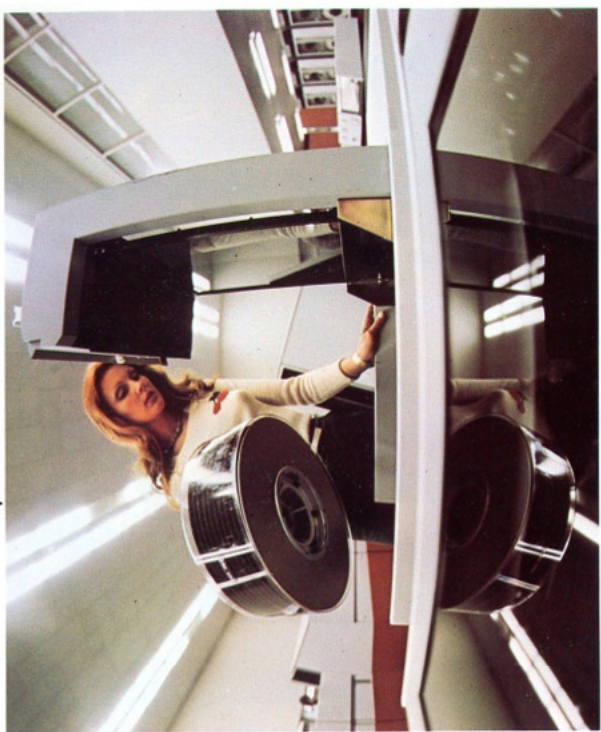
The emphasis on communications in our new systems also demanded a new concept in relation to reliability. It was no longer acceptable for the system to come to a halt due to a momentary malfunction. It must make every attempt to restore itself to the normal by outside assistance and without jeopardizing any work already in the system. Further it was required that in the event of an isolated "solid" fault, it must be possible to rapidly reconfigure the system in such a way that processing of vital communications should not be interrupted. This could be achieved by rapid fault isolation, had to be rapid and straightforward. The systems had

Privacy

Because new systems would be accessible, it was important that each should have access only to the information which he was entitled, and there should be levels of privacy—so that while a user might be allowed to go to a particular file he would be restricted in what he could do with it. It was also important that one user should not be able to corrupt the stored data or programs of another, and that if trouble should occur anywhere on the system it could be immediately sealed off by a "firewall" so that its effects were localised.

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Enhancements to 7500 series will boost communications facilities



ENHANCEMENTS just announced for the 7500 Range of Modular Terminal Systems now make it extremely easy and economical for ICL users to operate 'clusters' of video terminals at sites remote from their mainframe computers. A new low cost 'desk-top' terminal measuring only 15 x 15 x 7 inches — the 7502 — is now available which can be used to connect up to eight videos and four hard copy printers to the mainframe via modems and a Post Office line.

For those users who also have remote job entry requirements for bulk data, the 7503 remote job entry terminal announced last year has been enhanced to include facilities for the control of up to 24 videos and eight hard copy printers.

Both the 7502 and 7503 are 'intelligent' terminals incorporating their own program controlled processors, so that validation and editing routines can be implemented at the terminal.

Program

Programs are supplied by ICL and are entered on magnetic cassette in the case of the 7503 or through a 'Teleload' facility on the 7502 i.e. the required program is transmitted from

the mainframe to the 7502 over the communications line that links the two.

The terminal enhancements are complemented by the introduction of new videos which can be added to a system for less than £1000 per unit. They have separable keyboards and are available with either 960 or 2000 character displays.

Security options are available where it is necessary to prevent unauthorised access to the computer files. The new hard copy printers have an operating speed of 60 characters per second and are based on the quiet and well proven mechanism of the ICL Termiprinter.

In order to ensure maximum reliability and contin-

uity of operation for all ICL terminal users, dedicated terminal service centres are to be established throughout the United Kingdom which in due course will provide a four hour emergency service. Similar high grade terminal support will also be provided overseas.

Servicing

Servicing of the 7500 terminals will be aided by software diagnostic routines

which utilise the power and flexibility of the integral processors, and it will be possible to test individual videos without affecting the operation of other units connected to the system.

Modular

The new terminal facilities and low cost videos will make it beneficial for many more ICL users to operate interactive video terminal systems at locations remote

from their mainframe computers. Warehouses, spares depots, regional sales offices, satellite factory installations, Local Government departments, and many other decentralised operations can benefit from the instant access to centralised computer files and the instant control of their own operations that can be provided by remote video systems.

Where time means money, and in industry time *always* means money, the use of interactive videos can knock days off the time taken by conventional routines. Any

competent accountant will be able to calculate what this means to a business in terms of a direct improvement in the cash flow position and this alone will often justify the installation of remote interactive videos.

Benefits such as the overall increase in the efficiency of the business and the improved service that can be provided for customers are less easy to quantify, but in the opinion of many managers they are even more important than those for which precise values can be established.

2900 Series

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The 2900 series represents a revolution in computing, designed to meet the challenge of the 1980s. Only by building such an advanced computer could ICL produce a system which would keep ahead of the advanced applications of our existing users and would prove irresistible to competitive users. But, while the 2900 machines are advanced, existing ICL users can easily change to the new machines as existing 1900 and System 4 programs will run unchanged on the 2900s. In addition, ICL provides the most extensive range of conversion aids ever produced to safeguard existing applications and enable the user to gain full advantage from his machine.

Both the hardware and the software of the 2900 series are highly modular in

design and this means that ICL can steadily improve its facilities and incorporate new technologies as they become available. So, the 2900 series will change in line with current developments ensuring the user of the best possible cost/performance ratio. The user himself is protected from these changes and is only aware that he is given a stable environment within which he can continue his own developments.

The 2900 series is truly open ended. In many ways it ushers in the final generation of computers and so, for many competitive users and for all existing users, the 2900 series offers a secure future, one which can accept any challenge that the future may hold. The 2900 series is YOUR FUTURE SYSTEM.

Equipment described in this document is still subject to testing and modification in accordance with ICL's policy of constant improvement. ICL reserves the right therefore to alter the particulars of both the product and services, but at the time of ordering any relevant considerations may be confirmed and agreed. ICL's prices and terms and conditions of business are published and available at ICL sales offices.

