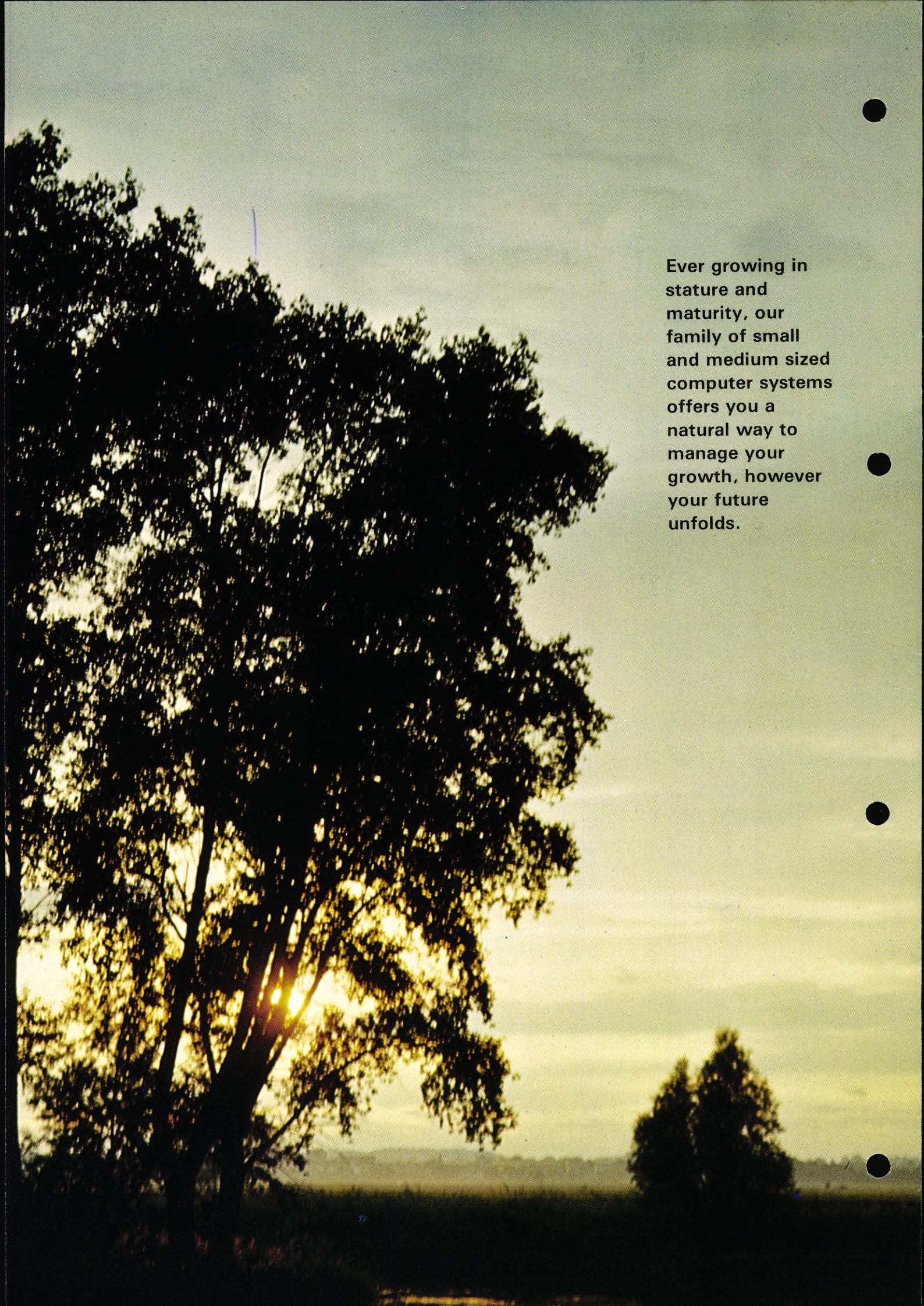
THE 2903 RANGE FROM ICL





Ever growing in stature and maturity, our family of small and medium sized computer systems offers you a natural way to manage your growth, however your future unfolds.

INTRODUCTION

The ICL 2903 Range is the most successful range of small to medium sized computer systems ever designed and produced in Europe. They have won awards for product design and export achievement. They have brought the benefits of efficient, low cost computing to thousands of ICL customers throughout the world.

Since the 2903 was first announced in April 1973, we have continued to develop its basic processing excellence, and we can now offer a range of systems developed to meet the very exacting requirements of the business user. From a small system for handling your accounts, to a powerful computer for production control and materials requirements, to a remote system linked to your group's mainframe at Head Office.

The 2903 is an integrated range of systems offering more growth, choice, facilities and power to meet your needs. A typical 2903 will handle direct key to disc data entry, multiple Visual Display Units, large magnetic disc backing storage and high speed printing. It can process several streams of work simultaneously, whilst offering terminal enquiry and transaction processing services. It can act as a host to ICL's smaller intelligent terminals, whilst also being connected as a satellite to ICL's (and other manufacturers') larger mainframe computers.

ICL provides some of the best computer services available in the world today. Because our success is built upon the success of our customers, we invest large sums of money in providing education and training, preventive and remedial engineering, as well as excellent software support and implementation services. We also ensure that the results of our continuing research and development programs are easily made available to our existing 2903 Range customers.

We understand better than most that your computer system must provide significant benefits in a short timescale and at an economic cost.

It is because of this that ICL has grown steadily and profitably, and is now the strongest European computer company. We know that our future depends on our customers; on our ability to win more customers in a very competitive business. We know that we will continue to succeed, because we listen, we care, we are dedicated.

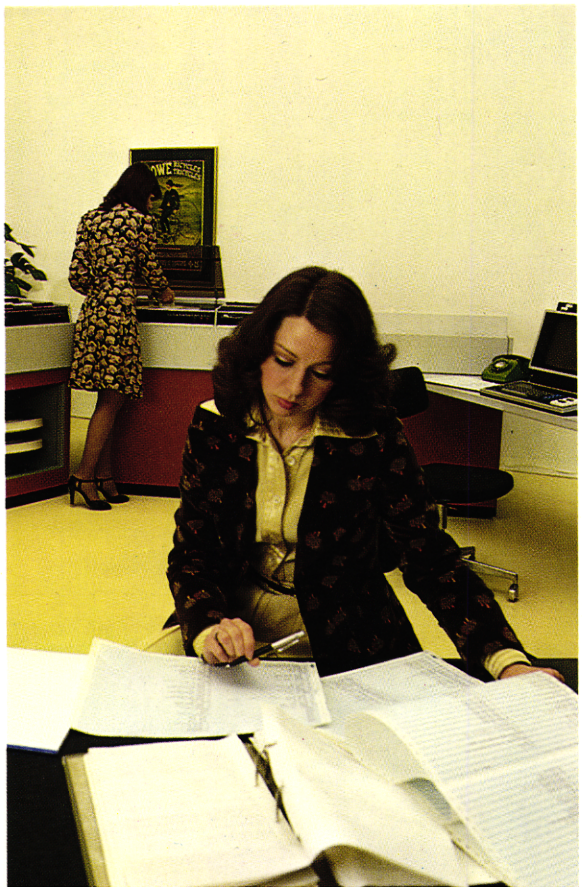
This dedication to computers and computer services is your guarantee of excellence from ICL and the 2903 Range.

CHOICE

The choice is yours
Within the range of three models, 2903/25, 2903/40 and 2904/50, you have a very wide choice for your entry point and the extent to which you can grow your system.

The speed of the processors is increased by a factor of two and a half times as you move from the 2903/25 to the 2904/50. The minimum user store for 2903/25 is 16K words and this may be increased to a maximum of 96K words on a 2904/50. A basic 2903/25 uses 10M characters of Fixed and Exchangeable Disc backing store. Whilst the largest 2904/50 can have up to 510M characters of Fixed and Exchangeable and fully Exchangeable Disc backing store. This range of hardware capacity is clearly very considerable and demonstrates the applicability of the 2903 Range to a broad spectrum of data processing requirements.

All models in the 2903 Range have a





choice of basic peripherals, including Card Readers and Line Printers, dependent upon requirements.

Magnetic Tape drives, Diskette drives, Paper Tape Readers and Graph Plotters may be added to meet the needs of specific applications. Direct Data Entry is a feature of all 2903 Range systems and either four or eight keystations may be connected, depending on the model. The 7500 Range of terminal processing systems adds another dimension to your choice of hardware and facilities. This range of compatible systems is simply connected to 2903 Range processors and can operate a variety of modes — as fully interactive, stand-alone or interactive, remote printing or Remote Job Entry systems.

The different processor/peripheral combinations are almost endless, all with hardware and software compatibility. The investment in your original choice is always protected.

The 2903 Range offers an outstanding choice of operating software with four operating systems available, Executives 0, 1, 2 and 3, with an increasing level of facilities and multiprogramming capabilities. Executive 0 is an economic single batch stream system with low level task sharing, designed for the smallest 2903/25 systems. Executives 1, 2 and 3 have full multiprogramming capabilities, able to run batch, Direct Data Entry, Remote Job Entry and interactive work simultaneously. They differ in the number of batch streams that may be run. Executive 1 may have a single batch stream, Executive 2 four streams, and Executive 3 eight streams. You are able to match the operating facilities you need with your processor and its peripherals.





For interactive operation you have the choice of two basic software systems. The Enquiry Terminal System (ETS 2) is used for the development of single application transaction systems, for all 2903 Range models. For the 2903/40 and 2904/50 the more advanced Multiple Transaction System (MTS 2) is able to run up to 40 multiple on-line applications simultaneously. Systems developed with ETS 2 or MTS 2 are highly compatible, so at any point in your interactive processing development the choice is still open to you.

Your choice is always protected in terms of your investment as the 2903 Range hardware and software is truly compatible, and your systems may develop with your applications and business requirements.

GROWTH

Since all 2903 Range processors are based on the same microprogrammed unit, the enhancement from one model to another can be carried out quickly and easily, without disruption to your routine workflow. The same basic peripherals are used for all models, so unless there is a good reason for change, they can be retained as the system grows.

The 2903 Range store structure is modular and additional store modules are quickly fitted, providing the enhanced capability to run more or larger applications.

Similarly, the peripheral coupler structure is also modular and more disc backing store or another printer can be connected whenever they are needed. You pay only for the facilities you need when you need them. You can grow at your own pace and level of investment. Many of the peripherals used on ICL's 1900 Series are suitable for connection to the 2903 Range. Since a similar standard interface coupler philosophy has been used for both ranges of processor, an ICL 1900 user is able to take advantage of the benefits of the 2903 Range with the minimum of investment. Such peripherals as Disc Drives, Magnetic Tapes, Card Readers and Line Printers can be carried across the 2903 Range. A further example of





ICL's declared policy of providing compatibility between its computer ranges.

For the 2904/50 user who needs to expand further and grow to a medium range 2950 system, there is a similar peripheral compatibility with the 2903 Range. The 2903 Peripheral Highway utilises technology developed with the 2950 and provides the portability of LP 720 Printer — a 2950 device — and

communications couplers. 7500 terminal processor systems are, of course, common to all three ranges of computers. ICL has been careful in all its developments to protect as far as possible its users' investment in computer hardware.

The operating systems developed for the 2903 Range, whether it be the basic Executive 0 or the full Executive 3 system, have many fundamental features in common. The same Job Control Language and operator displays are used throughout. This means operational continuity as your system grows. Operators can build on the knowledge and experience they have already gained, without expensive retraining.

All models use the same high level languages and communications software.

The 2903 Range gives you applications continuity as your system is enhanced with additional hardware and software. You change your data processing system only when you need to, not because you have changed your computer hardware.

This software compatibility does not stop with the 2903 Range. A 2904/50 operating with Executive 3 has high compatibility with a 2950 running under Direct Machine Environment. (Many 2904/50 applications will run unchanged on a 2950). So your path to the larger 2900 Series machines is clear and well defined. You are able to develop to the more advanced 2900 VME systems in your own time.

There is ample scope to grow your communications capability with the 2903 Range. For both interactive and remote job processing, the 7500 Range of terminal systems has a wide range of facilities for communicating with the processor. These systems can be sited wherever you need the particular processing capability. Additional systems can be connected when they are needed in the departments, branch offices, depots or factories requiring new additional processing power.



SPECIFICALLY

Systems concepts
The 2903 Range provides the services you need, at a very competitive price. The 2903 and 2904 can handle a variety of tasks submitted directly from many different locations. They can process the work in the most suitable way, either in batches or in fast response transaction processing. The 2904/50 can handle up to eight batch streams, Direct Data Entry, spooling of input and output, printing and a full multiple application, multiple transaction communication system — all at the same time.

You can start where you wish to, with just the facilities you need, knowing that the system overheads are being shared in the most economical fashion. You can grow your processing requirements in almost any direction — and the 2903 Range can grow to suit them.



Processor
The central processors of the 2903 Range are very fast. The store cycle time is 1140 nanoseconds. This combination allows the processor to drive complex operating systems which ensure that the system can handle your requirements in terms of processing workload and input/output facilities, in such a way that the total system is easy for you to operate and use.

Dynamic allocation
The heart of every 2903 Range system is its microprogrammed processor. To this is connected the data highway, which carries all communication with input and output peripherals, disc storage devices, interactive terminals and Data Entry keystations. Since these all operate at a wide range of speeds the microprogram controls and interleaves the priorities of access to each of the peripheral devices. In this way good peripheral simultaneity is achieved, when requests for access are made from various user programs and the operating system.

Similarly, store allocated to user programs is dynamically allocated. Your programs will only occupy the space they need, when they need it. The operating system examines the allocation of store continuously and automatically makes the re-allocation.

For on-line operation all interactive terminals are polled on a cyclic basis, examining their status for interactive activity. The rate of polling is automatically kept constant by the operating system regardless of the number of terminals in operation. The system adapts to the changing number of terminals in use and input of messages from slow and fast lines.

Communications

A major feature of the 2903 Range is its excellence in handling Visual Display Units and intelligent terminal devices. The priority interrupt design approach is ideally suited to this working environment where actual messages for processing are short, but a fast response is required.

Considerable connectivity is available so that the customer can take the power and facilities of the 2903 Range system directly to the end user, even if he is located far away from the processor. A variety of line speeds and protocols are handled with equal ease. The system also facilitates economic line usage, rapid change of line speed and the use of shared telecommunications lines.

Direct Data Entry

Many 2903 Range customers also use the Direct Data Entry system. This was designed to cut the cost normally associated with data preparation. With the 2903 Range this function is integrated into the computer, the Direct Data Entry keyboards being directly connected into the processor. The powerful 2903 Range processors provide all the facilities normally associated with the more expensive key-to-disc data preparation systems, but at less cost.

Mixed mode operation

The 2903 Range architecture and software design offers considerable versatility in the way in which the system may be used. The operating systems allow a mixed mode operation of transaction processing, batch work and data entry to be run concurrently. Alternatively, the system can be dedicated to any of these modes.

Peripherals

Similarly the peripherals used for data storage and input/output are scheduled according to the requirements of the moment. You give your processing jobs different priorities, and the 2903 Range system ensures that they are given the necessary amount of system facilities, when they are needed. Urgent work can interrupt longer, less time critical, tasks as you wish.

Besides being supplied with a range of integrated peripheral devices, the standard interface design feature allows the connection of a large selection of other ICL peripherals, including printers; magnetic tape storage and disc storage devices.

In order to provide large computer capabilities in a smaller system, great use is made of the low cost, large capacity disc backing store. The speed of the 2903 Range processors and the disc storage devices means that large volume data files are handled with ease, and a queue of work can be kept readily available, so that the processor is always busy.

High level languages

The speed of the processors makes them ideal for working in high level languages — that is languages which are closest to the normal written language. This speed permits the systems to have plenty of time to translate human language into the machine code for processing. This means that you can use the international computer languages such as RPG 2, COBOL and FORTRAN, or the powerful business languages such as PERT, PROSPER, FIND 2 and other parametric languages, where a page of instructions can be represented in just a few straightforward lines.

VERSATILITY

Multiprogramming

With the 2903 Range you have extensive capability to run simultaneous applications, both interactive and batch. The range of compatible operating systems and interactive software is matched to the power of the processors and the hardware facilities. You choose the way you want to operate your system. 2903 Range are genuinely the multi-function, multi-application systems.

All models have the ability to operate batch, data entry and communications jobs concurrently. The degree to which you exploit the capability of the operating systems depends on your workload and hardware resources.

The larger systems in the range can run up to four or eight job streams simultaneously, concurrent with multiple interactive applications. The Multiple Transaction System allows up to 40 interactive programs to be in operation at the same time, 8 of which can be held in the processor store. The remainder are held on disc backing store, readily available and automatically transferred to the store when needed.

These extensive operating features give you a great freedom of choice in the development of data processing applications and growth potential for new jobs.

The operating systems take care of the efficient use and sharing of all peripheral resources. But the operator still has overall control and can set his own priorities for the jobs most urgently needed.

Since the operating and software systems are compatible for all models in the Range, there is no need to carry out expensive program modifications when your system grows or new applications are added.

Batch operation

All 2903 Range systems have the capability of giving excellent performance in running batch jobs. Data files for batch processing may be created in a variety of ways, according to your choice. Data may be read from cards or input using the Direct Data Entry facility or from Visual Display Units. Alternatively, bulk data can be transmitted to the 2903 disc files from remote batch terminals or other mainframe systems.

The manipulation of bulk input data is made easy using the File Spooling feature. Bulk data may be input in an off-line mode and subsequently processed when convenient. The spooling feature may also be used for the handling of large volume output print files, the bulk printing being scheduled for times when more urgent printing has been completed. You are therefore able to schedule your batch operation to meet the day to day priorities of your business.

The 2903 Range operating systems and associated Job Control Language make it easy to run a set of routine batch jobs in sequence, with the minimum of operator intervention. Up to 8 such job streams may be handled on the 2904/50 system. These features are more usually only available on much larger and more expensive computers.

For the economic use of store, user programs can be designed to be overlaid. This means that quite large and sophisticated batch processing jobs can be run on systems with modest storage.

To further assist the user in manipulating batch data files, all models in the Range are provided with standard utility software for file sorting and merging.

Interactive operation
To match the excellent batch performance, 2903 Range systems provide equally good facilities for transaction processing systems.
ICL 7181 terminals or clustered ICL 7561 displays using 7502 terminal systems may be connected to the processor via communications couplers. These interactive devices may be situated locally to the processor or in remote locations via telecommunications lines. The number of terminals that may be attached increases up the Range, matching the processor capabilities. A maximum of 8 terminals may be connected to the 2903/25, increasing to more than 100 on a 2904/50 system.





As with batch operation, the operating system allows considerable flexibility in the handling of interactive working. You have the choice of giving high priority to an on-line program or allowing it to be transferred to user store only when required. This transfer from disc backing store uses a program roll-in/roll-out technique and copes with low activity file enquiries where the fastest response is not required.
You are able to run your 2903 Range system as a dedicated interactive facility at certain periods of the working day and subsequently switch to batch operation, processing the data created by the on-line program.
ICL have made the development of transaction processing systems for the 2903 Range a straightforward job for the programmer. The emphasis in developing the Enquiry Terminal System and Multiple Transaction System has been to make them easy to use. These systems are used in conjunction with the high level languages, RPG 2 and COBOL. Programmers experienced in batch systems can develop interactive programs with the minimum of additional training.

HARDWARE

Processors

2903/25 — Processor speed (POWU II) of 22.5 ms. Main store capacity 16,384, 20,480 or 24,576, 24 bit words, cycle time 1140 nanoseconds.
Disc backing store 9.8 to 29.4M characters using Fixed and Exchangeable Disc drives.
Integrated Card Reader operating at 300 cards/minute.
Integrated Line Printers at speeds of 150 or 300 lines/minute. Additional optional printer operating at 600 lines/minute.
Up to four Direct Data Entry keystations.
Directly connected Dual Diskette drive.
Up to 8 Visual Display Units, connected via a 7502 cluster controller. Two non-concurrent RJE links.

2903/40 — Processor speed (POWU II) of 16.8 ms. Main store capacity 24,576, 32,768, 40,960 or 49,152, 24 bit words, cycle time 1140 nanoseconds.
Disc backing store 9.8 to 29.4M characters using Fixed and Exchangeable Disc drives. Additional backing store up to 240M characters using a maximum of four Exchangeable Disc drives.
Magnetic Tape Drives 7 or 9 track NRZI or Phase Encoded.
Integrated Card Reader operating at 300 cards/minute.
Additional Card Reader operating at up to 600 cards/minute.
Integrated Line Printer operating at 300 lines/minute.





Additional Line Printers at speeds of 600 and 1500 lines/minute.
Up to 8 Direct Data Entry keystations.
Directly connected Dual Diskette drive.
Communications lines for linking the ICL range of terminal equipment, giving a connectivity in excess of 100 VDU's.
Two lines may be used for non-concurrent RJE links.

2904/50 — Processor speed (POWU II) of 9.0 ms. Main store capacity from 49,152, to 98,304, 24 bit words, cycle time 1140 nanoseconds.
Disc backing store 9.8 to 29.4M characters using Fixed and Exchangeable Disc drives.
Additional backing store up to 480M characters using a maximum of eight Exchangeable Disc drives. Other peripherals and communications connectivity as for 2903/40.

System Peripherals

Disc drives

2822/1 integrated Fixed and Exchangeable Disc drive and 2822/2 and 2822/3 additional drives.
2822/1 and 2822/2 9.8M characters capacity (4.9M fixed and 4.9M exchangeable)
2822/3 4.8M characters capacity (exchangeable)
Peak transfer rate 416,000 characters/second.

Exchangeable Disc drives

2814 (EDS 30) 30.7M characters capacity.
2815 (EDS 60) 61.5M characters capacity.
(Both fully exchangeable packs).
Peak transfer rate 416,000 characters/second.

Magnetic Tape storage

1971 — 7 track NRZI recording.
200/556 bits per inch.
2510/2511 — 9 track Phase Encoded (NRZI optional) recording.
1600 bits per inch (800 bits per inch, NRZI).

Line Printers

2412/1 and 2412/2 150 and 300 lines/minute, 132 print positions.
Maximum four copies.
2423 (LP720) Band printer 600 lines/minute, 132 print positions.
Maximum six copies.
2430/2 High speed train printer 1500 lines/minute, 132 print positions.
Maximum six copies.

Card Readers

2108/2 Integrated Card Reader 300 cards/minute, 400 cards hopper capacity.
2104/1 Card Reader 600 cards/minute, 1000 cards hopper capacity.

Data Entry keystations

254 character screen
7 lines of 32 characters and 1 line of 30 characters. May be sited up to 100 metres from the processor.

Dual Diskette drive

2830/12 Two drives each of 256K bytes capacity. Transfer rate approximately 31K bytes per second.

Communications Terminals

7502/10 Interactive system with up to 8 Visual Display Units (1920 or 960 character screens) and four Hard Copy Printers.
7502/15 Interactive/stand-alone system with up to six Visual Display Units, four Hard Copy Printers and Dual Diskette drive (½ M byte).
7502/20 Remote printing terminal with 7556 Video Console and 300 lines/minute line printer.
7502/25 Remote Job Entry terminal with 300 cards/minute Card Reader and 300 lines/minute Line Printer.

Terminal systems are connected to the 2903 Range mainframe via Communications Couplers on the Peripheral Highway.
Up to three 7500 Range systems may be cascaded to form an economic single line connection to the 2903 Range mainframe.



SOFTWARE

Operating systems

There are four operating systems available to the 2903 Range user. Each is designed to control program running, peripheral transfers and the operation of the total system. Each has a range of facilities to match a particular processor and the peripheral devices connected. The operator communicates with the system via a Video Console and keyboard, using concise but meaningful input messages. The status of all jobs being run by the system is immediately accessible from the Video Console.

Executive 0

Uses minimum user store, available for 2903/25 only. Allows the running of a single batch stream.
Files enquiries from the Video Console or DDE keystations are allowed using the roll-in/roll-out technique.
Alternatively, Executive 0 can run a system dedicated to Direct Data Entry.

Executive 1 (for 2903/25, 2903/40, 2904/50)

A full multiprogramming system. Allows the concurrent running of a single batch stream, Direct Data Entry, input/output spooling, Remote Job Entry and interactive programs.

Executive 2 (for 2903/40 and 2904/50)

This system has similar facilities to Executive 1 but allows up to four batch streams to be run concurrently.

Executive 3 (for 2904/50)

Executive 3 includes many features which are common to ICL's 1900 Series Executives and ICL's Direct Machine Environment on 2950. It is therefore a highly useful transition aid.
The characteristics are similar to Executives 1 and 2 but with the concurrent running of up to 8 batch streams, two input/output spooling slots and a milltimer.



Languages

The majority of programs developed for the 2903 Range use high level languages. For the commercial user, programs are developed in RPG 2 or COBOL. These are the two most common languages used for the development of data processing systems throughout the world. The ICL implementation of the languages follow closely those found from other manufacturers, providing high compatibility and easy transfer of work to a 2903 Range computer.
For the scientific user, the FORTRAN language is the most commonly used and ICL have provided a version for the 2903 Range which has facilities in common with most other implementations.

Utilities

The standard software for a 2903 and 2904 includes a very comprehensive set of utilities for system maintenance and file manipulation. Important functions included are:

- Disc file initialisation.
- File copying.
- Direct Access utilities.
- Magnetic Tape utilities.
- File reorganisation utilities.
- Sort and Sort/Merge programs.

Data Entry

The Direct Data Entry system consists of a suite of programs as follows:

A System Generator.
Format Program Compiler.
Data Entry Program.
Maintenance Program.
Format Program file creation.
Format Program file update.

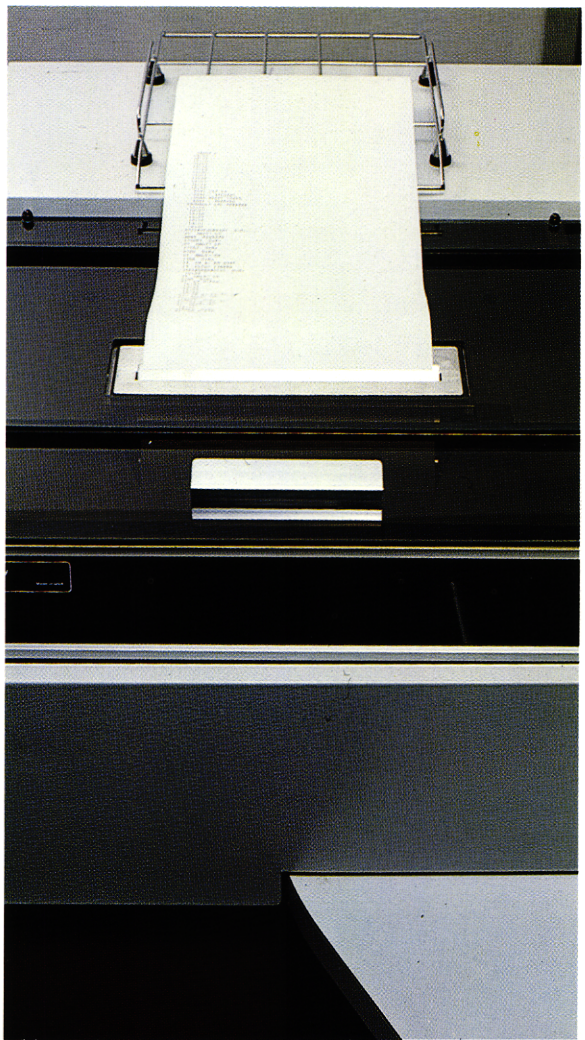
Once the DDE system has been set up using the Generator and Format definition programs, the keystation operators use the Data Entry programs for the normal functions of keying data. The operator selects the input data document format from the previously set up Format Program file. A sequence of formats can be automatically displayed on the screen in the order of the source documents. In Data Entry mode the system carries out the following functions:

Entry.
Verification.
Correction.
Inspection.
Append.
Deletion.

Comprehensive data validation checks are carried out at the time of data entry. These include arithmetic total checks, check digit verification, range and alpha-numeric value tests. The user may include his own special checks if required. The DDE keystations are interfaced with a special part of the microprogram which ensures very fast response for Data Entry use. The DDE system is supported by all 2903 Range Executive operating systems.

Transition aids

To assist users in transferring programs and data files from other ranges of computer equipment both of ICL and other manufacturers a number of transition aids have been developed.
For IBM users with RPG 2 programs a comprehensive conversion package is available to transfer jobs quickly and easily to the 2903 Range.
For the 1900 user there is a NICOL to COBOL translator, the PLAN compiler and the Executive 3 operating system.
For transition from other ranges of equipment, the 2903 Range high level languages provide considerable compatibility. There are also special utilities for the conversion of data files from many other computers. Customer Centres are able to give every possible help in solving transition problems.



COMMUNICATIONS SOFTWARE

Enquiry Terminal System (ETS 2)
ETS 2 is designed for the development of single application interactive programs and consists of a set of routines for inclusion in RPG 2 and COBOL programs.
There are three basic sets of routines:

- Common and Console Enquiry routines, required for all interactive programs.
- Video terminal routines, used when writing programs for 7181 terminal or 7502 interactive terminal systems.
- Direct Data Entry routines used when DDE keystations are used as interactive terminals.

By virtue of the differences in structure of RPG 2 and COBOL programs, the implementation of interactive operations differ slightly. However, the structure of an interactive operation falls into three major phases:

- Initial set-up
- Message processing
- Closedown

Routines are provided for each of these three operations and are compiled with normal high level language coding for the other processing requirements.
The message processing phase uses routines which are designed to handle messages from specific types of terminal device, e.g. the Video Console.





Remote Job Entry
The bulk data communications facility of the 2903 Range enables links to a wide range of other computers, both from ICL and IBM. The 2903 Range can communicate with ICL 1500 Series, System Ten, 1900 Series, System 4, 2900 Series in addition to 7500 Range terminals operating in bulk mode. A 2903 Range processor can also communicate with any other 2903 or 2904.

Executives 1, 2 and 3 have facilities for controlling and monitoring Remote Job Entry facilities. These are associated with utility programs designed for each particular processor connection.

The 2903 Range has the capability to link with IBM 360/370 and System 3 computers. Two methods of connection are available, using either IBM 2780 or HASP multileaving workstations procedures. The 2903 Range software utilities are designed to implement the full operation of these two types of line control procedure.

Multiple Transaction System (MTS 2)
MTS 2 is a more extensive system than ETS 2 and has the capability of handling multiple application interactive programs. Up to 40 on-line programs may be in operation concurrently. Eight of these can be held in user store for immediate access and the remaining 32 on disc backing store accessed using the roll-in/roll-out technique when required. MTS 2 consists of three major elements:

- A Message Router program to which all terminals are notionally connected.
- A 2903 Range Executive which provides an interface between Message Router and the interactive programs.
- MTS 2 message handling routines which are compiled into RPG 2 or COBOL programs.

The Message Router is a special communications program which resides in user store while on-line processing is in operation. This program routes messages according to a user specification of the terminal of origin and message contents. It also provides a location for all input and output buffers.

The Message Router program is generated by a special utility from a Routing Definition written in a simple macro language.

The message handling routines are similar to those used for ETS 2. They have high compatibility, enabling programs developed using ETS 2 to run unchanged under MTS 2.
Executive operating systems designed to operate with MTS 2 include an adaptive terminal polling mechanism. Where possible all terminal devices in the terminal network are polled on average once a second. This is not affected by a mixture of fast and slow lines.
MTS 2 includes routines for Central File Handling, allowing concurrent file access from more than one interactive program, with lockout when a transaction is in progress.
Message passing between transaction programs is permitted, giving added flexibility in developing transaction systems.



BUSINESS APPLICATIONS

To meet the diverse business requirements of the growing number of 2903 Range users, ICL and ICL Dataskil have developed applications software to provide ready-made solutions to business problems.

Order Processing
Sales order processing is an important application for most business operations. The 2903 Range On-line Order Entry package enables enquiries and orders to be dealt with efficiently as they arise. Local or remote Visual Display Units input order details, stock enquiries or customer file enquiries. Input data is validated by the terminal operator on entry, reducing errors. Advice notes and invoices can be produced on-line via a Hard Copy Printer adjacent to the terminal or printed in bulk by the mainframe printer. The Order Entry system uses a common stock master file with the Stock Control package. Order transactions can up-date the stock file directly.

Stock Control
The Stock Control package provides a ready-made solution to many stock management problems for 2903 Range users.
The system is modular in design and provides routines for:

- Stock file creation and maintenance.
- Stock recording.
- Stock analysis and valuation.
- Stock allocation.
- Stock ordering.
- Forecasting.

Immediate access to the stock situation for any item is made easy using Visual Display Units for stock enquiries.
The Stock Control system can be integrated with the Order Entry package to fulfil a major data processing requirement.

Data management
ICL's Integrated Data Management System, IDMS, is implemented on the 2903 Range for the creation, processing and administration of a sophisticated database. IDMS is an implementation of a subset of the COBOL database facility proposed by the Codasyl Committee. The system manages data in the most natural way to match the business organisation and COBOL file processing techniques. A network structure is used to define relationships between types of records and is therefore free from the restrictions of conventional file structures.

IDMS consists of two main elements:
A Data Description Language (DDL) for easy specification of data relationships.
A Data Manipulation Language (DML) which provides statements for inclusion in COBOL programs to process the database as required.



Production Control

A comprehensive On-line Manufacturing Control system (OMAC) has been developed for the 2903 Range, providing a total modular system for production control in small to medium size factories using up to 50,000 parts. OMAC is comprised of five free-standing modules:

- Bill of Materials.
- Stock Control.
- Requirements Planning.
- Work in Progress Monitoring.
- Product Costing.

The modules may be implemented in any order, using as many modules as are needed to solve a particular problem. The user is able to implement his computer based control system in a planned and economic way. The programs have many on-line monitoring features putting the control of the production operation in the hands of the staff directly responsible. High level languages have been used in the development of OMAC so that replacement or additional modules may be included to meet specific user requirements.

Business languages

To make it easy for the non-specialist user to benefit from the power of the 2903, easy to use business language systems have been developed.
FIND 2 is one of ICL's most successful packages and offers a flexible facility for file interrogation and report generation. It includes a simple enquiry language for data manipulation and retrieval specification. The package uses data files created by standard 2903 Range housekeeping programs. The flexible output format facilities make it possible to generate special reports very quickly. Up to 96 enquiries are allowed in one retrieval processing run.

PROSPER is designed for users requiring an aid for financial modelling. The package is used for such calculations as budget and cash flow forecasting, corporate planning, investment appraisal and risk analysis. PROSPER has been designed for simple use by financial specialists rather than computer experts. ICL Dataskil also offer an interactive version of the package for the rapid development of financial models.
PERT is for managers concerned with the planning, co-ordination and control of projects using activity network analysis techniques. The package employs advanced critical path analysis techniques which form the basis for resource allocation and cost control.
The 2903 Range software makes it easy for the user to concentrate on making management decisions rather than concerning himself with computer problems.

Other business software

In addition to the important business applications already described, ICL Dataskil also offer a further range of standard software for the 2903 Range user:

- DATAVIEW and DATADRIVE for the development of sophisticated Data Entry and Enquiry applications.
- APPLICATIONS MANAGER for the simplified development of interactive and batch applications.
- GINO-F for the development of Computer Aided Design applications.

ICL and ICL Dataskil provide full support and maintenance of the business software that has been described briefly. Consultancy and implementation services are available for the 2903 Range user's maximum benefit from the available applications systems.

SUPPORT SERVICES

Training
ICL offers a comprehensive range of training services which can be arranged to suit all the requirements of new 2903 Range users. Training is given in all aspects of 2903 Range hardware and software in the form of residential courses. Training for management, systems and programming staff is also provided at various local centres throughout the world. At the many Customer Centres, training in basic 2903 Range facilities is given on a continuous basis, including hands-on experience for operators and programmers.
ICL's Education and Training Division can provide experienced staff to run courses on your own premises if this is more convenient to you. These may be the standard 2903 Range courses or specially developed to fulfil your particular needs.
For added flexibility in your training arrangements audio training packages are available for your staff to obtain self-instruction.





2903 Range implementation
To help you prepare for the delivery of your new 2903 Range system, ICL have built up a network of Customer Centres throughout the world. Your local Centre will provide expert guidance in implementing your system. Program testing facilities are available to help you develop your system. This means you can get productive work from your own computer very soon after its installation. In addition, a number of conversion aids are there to help you transfer work from other processors.
For new users requiring additional help in developing new data processing systems, a complete range of services is offered by ICL Dataskil, from minor program modifications to complete system development and turnkey operations. You choose the amount of assistance that ICL provides, dependent on the level of expertise of your own staff.

We have experienced staff who will understand your business problems and discuss them in a way that will avoid computer technicalities.

As well as the wide range of services that ICL has to offer, many external software houses have taken advantage of the success of the 2903 Range by acquiring system expertise and developing business packages. Many have acquired their own computer system to provide a full customer implementation service.



Customer support
ICL have been very careful to build up a network of system support experts in all parts of the world.

Your local ICL sales office has the expertise to ensure you get maximum benefit from your 2903 Range system. ICL staff are always available to discuss and solve your computing problems. Since the 2903 Range is under continuous development to meet new market needs, our local staff have the secure backing of ICL's central software development experts. ICL has made the investment to give its 2903 customers first-class support and takes pride in achieving a high level of customer satisfaction.

2903 Range systems achieve high levels of hardware reliability everywhere they are installed. This is the result of excellent engineering support in all parts of the world. There are local preventative maintenance and spares centres within easy reach of your installation. This local engineering support also helps you to prepare the site of your new system, ensuring that the installation can be carried out as smoothly as possible. Environmental checks are made to investigate any special requirements that may be required.

SUCCESS

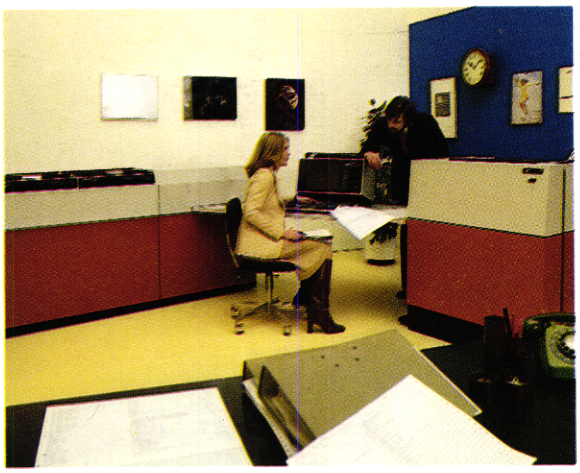
2903 Range success

Since its first announcement in 1973 the 2903 Range has proved to be one of ICL's most successful ranges of computer equipment. All over the world there are over 2,000 highly successful installations giving a first class data processing service to a wide spectrum of business organisations. They range from small private companies to large multi-national enterprises. Many have chosen them in preference to competitive systems because they offer:

More cost/effective computing.
A wider range of facilities.
Security of investment.
Ease of implementation and use.

A very significant feature of 2903 Range success has been its potential for growth within a single range of processor hardware and its associated compatible software systems. Our customers' scope for expansion of their data processing capabilities to meet their own expanding needs is very considerable. This is achieved without the expensive operation of completely changing central processor and associated peripherals.





The 2903 has been under continuous development since its first introduction, providing the software and hardware facilities to meet the evolving requirements for small business computers. High levels of service are available for all types of applications systems — in transaction processing, in batch processing, in communications and distributed processing. It is this ability to handle a wide range of applications using a single processor that makes the 2903 Range so acceptable in a sector of the computer market where there are innumerable systems offered by many other manufacturers.

Development of the 2903 Range is on-going but with all new developments carefully planned to protect our existing users' investment in hardware and system development. They are able to take advantage of any new features without the need to replace their basic hardware or become involved in expensive reprogramming.

ICL — The worldclass computer company

ICL is Europe's most successful and fastest growing computer company. The organisation is dedicated exclusively to computer development, manufacturing, sales and services. It offers a total range of computers from the small 1500 to one of the world's largest systems, the 2980. The total range of computer services available include:

System consultancy.
Technical and engineering support.
Training.
Software house and bureau services.
Installation services.



ICL is growing rapidly, with a customer base that has doubled in the last two years. The company has also expanded in the world computer market, through sales offices and dealerships in over 80 countries. Manufacturing and assembling capacity has expanded in the UK, France and the USA.

This expansion has taken place with continuing financial success. Turnover and profits both continue to rise every year. The significant achievements in computer development have been funded from revenue. These developments have all been directed towards producing new computers at lower cost. The 2903 Range is an excellent example of this.

ICL is a large and secure company with over 30,000 employees worldwide and an annual turnover well in excess of £400M. Any investment you make in ICL equipment is backed by the strength and security of a financially successful and well managed company. ICL's success has been built on the success of its customers in using ICL computers. You have the opportunity to be part of this continuing success story by joining the very many users of the 2903 Range.



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