ICL ME29 Series

MANAGEMENT SUMMARY

Currently consisting of two models, the ME29 represents a new family of medium-sized workstation-oriented systems designed for a variety of business and commercial applications. Installations can be flexibly configured to support not only general-purpose data processing workloads, but also the more rigorous demands of users requiring extensive storage, data base, and distributed processing facilities.

Announced by ICL on March 20, 1980, as an intended replacement for the 2903, 2904, and 2905 systems, the ME29 is upward-compatible with the 290X models and is competitive with the IBM System/38 and IBM 4300 Series.

The two ME29 models, the Model 35 and the Model 45, have the same basic architecture but differ in processor performance. An ME29 equals the performance of a 2904/50, while an ME29/45 offers 1.8 times the performance.

ME29 memory capacity ranges from 256K to one million characters, while the disc storage capacity spans from 120 million to 16,000 million characters. Users needing even more capacity can install multiple ME29 systems or upgrade to larger 2900 Series models such as the 2950/10.

A smaller Model 35, designated the 35-1, will be available in the summer of 1981. This entry-level model has reduced microcode and memory, and is comparatively limited in terms of peripheral configurability. The 35-1 is targeted for users with modest requirements who wish to retain the option for fast growth potential (e.g., as an alternative to multiple System Tens). ▷

The ICL ME29 represents a new family of medium-scale systems, replacing the 2903, 2904, and 2905 models. Competitive with the IBM System/38 and IBM 4300 Series, and upward compatible with the ICL 290X models, the microcoded ME29/35 and ME29/45's offer a number of new features including support for electronic mail. An entry level ME29/35 costs approximately £35,000 and a large ME29/45 costs about £250,000.

CHARACTERISTICS

MANUFACTURER: International Computers Ltd., ICL House, Putney, London, SW15 1SW, England. Telephone: (01) 799-7272. Telex: 22971. ICL markets its systems in 80 countries.

MODELS: ME29/35, ME29/45. The Model 35 consists of two submodels.

DATA FORMATS

BASIC UNIT: 24-bit word, consisting of four 6-bit characters plus two transparent parity bits. Characters are represented in 6-bit BCD (binary-coded decimal) format.

FIXED-POINT OPERANDS: One word (23 data bits plus a sign bit). Products and dividends are double words (46 bits plus sign). By subroutine, double-precision fixed-point operations are possible, using 46-bit-plus-sign operands and 69-bit-plus-sign products and dividends.

FLOATING-POINT OPERANDS: Two words, formatted with a 37-bit fraction and an 8-bit signed exponent; floating-point arithmetic is performed by executive subroutines ("extracode") or directly by microcode.

INSTRUCTIONS: One word. Memory reference instructions have a 12-bit operation code and 12 address bits, while ▶
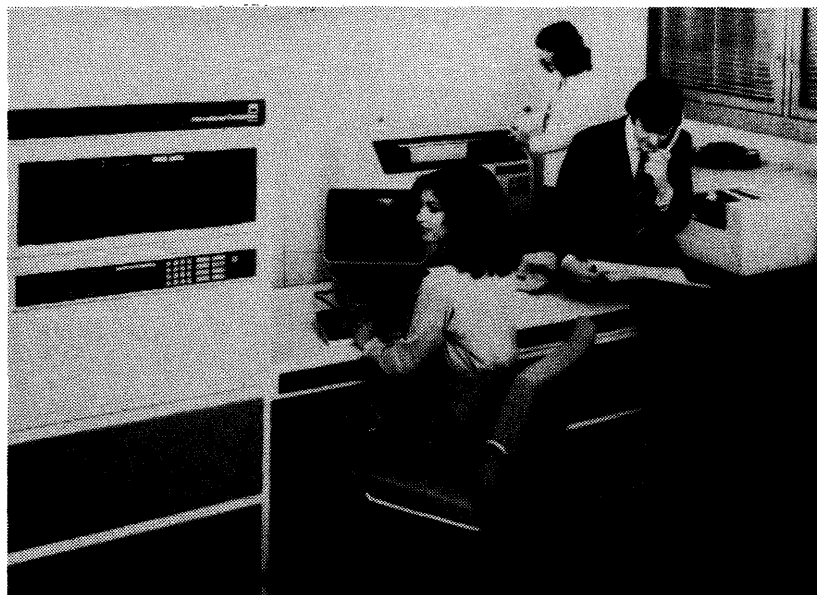
Compatible with ICL's 290X Series, the ME29 range of medium-scale, workstation-oriented business computers are highly versatile, providing extensive communications network facilities. The ME29 models use a microprogrammed processor operating at speeds in excess of three million instructions per second with data transfer rates of four million bytes per second. Main memory can be expanded to 1,024K characters, and disc storage to 16,000 million characters.

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▷ Compatible with ICL's 290X Series, the ME29 family supports batch processing, remote job entry, time-sharing, and transaction processing. In addition, the ME29 provides extensive communications network facilities. Distributed processing capabilities include remote job entry, remote session access (permitting the operator of any interactive terminal connected to one mainframe to access, on a per-session basis, a service provided in another remote host), message distribution, application distribution, and file transfers. Any ME29 can be accessed from any local terminal, provided the users have proper authorization. Languages available include RPG2, COBOL, ALGOL, BASIC, and FORTRAN, and the available system software includes full versions and subsets of ICL's data base management system and data dictionary system. An optional Personal Data System allows non-technical personnel to define, load, and use a personal data base. ICL also offers a variety of application packages.

CONFIGURATIONS

A basic ME29/35 includes 256K characters of memory; a single integrated floppy disc drive; 128K characters of microcode store; 120 million characters of exchangeable disc storage; a 2,000-character VDU workstation (for transaction processing, time-sharing, direct data entry, system control, and remote access to other mainframes); and one matrix or band printer.

Memory can be expanded in 128K increments to a maximum of 1,024K characters, and disc storage to a maximum of 16,000 million characters. A second floppy disc drive can be housed in the processor cabinet, and a total of 24 workstations can be supported over local AMLCC (Asynchronous Multiline Communications Coupler) lines. Other maximum hardware complements include up to 16 matrix printers, three band printers, four 3551 magnetic tape clusters, four 1900 Standard Interface devices, 24 SMLCC (Synchronous Multiline Communications Coupler) local or remote communication lines, four X.25-HDLC couplers for packet-switching networks, and two 35-megabyte Module 10 disc drives.

The Model 45 comes with 384K characters of memory, and can be configured and expanded in the same manner as the Model 35.

COMPATIBILITY

An important element of the ME29 computers is their microprogrammed compatibility, which permits them to run in the 24-bit mode of the older 1900 and 290X (2903-2905) Series. Thus, the ME29 allows both 1900 and 290X users to move directly to an ME29, to take immediate advantage of the more modern hardware, and to run in 24-bit mode while they modify their software to meet ICL's "forward compatibility standards." Having met these standards, they can switch to 32-bit mode and take advantage of other 2900 Series features such as virtual memory and virtual machines. ▷

▶ branch instructions have a 9-bit operation code and 15 address bits.

INTERNAL CODE: 6-bit extended BCD.

MAIN STORAGE

TYPE: MOS.

CYCLE TIME: 650 nanoseconds per 24-bit-word read, 750 nanoseconds write.

CAPACITY: ME29/35—256K bytes, expandable in 128K-byte increments to 1,000K bytes (1 megabyte); ME29/45—384K bytes, expandable in 128K-byte increments to 1,000K bytes.

CHECKING: Two parity bits per word are standard. The processor halts upon detection of a parity error in an area of storage occupied by the executive. If an error occurs in the user program area, the program is suspended by the executive, which displays the error and its location on the video console.

STORAGE PROTECTION: None. However, since each program's addresses are relative to the contents of its own datum and limit registers (which determine relative address zero and thus assure program relocatibility), proper control of these registers' contents provides adequate protection.

RESERVED STORAGE: The initial eight words of each program's storage area are reserved for use as general registers. These are addressed by three bits of arithmetic, logical, and shift instructions. Three of these registers (1, 2, and 3) can be addressed by two bits in arithmetic, logical, and shift instructions for the purpose of modifying the address denoted in the instruction.

CENTRAL PROCESSOR

GENERAL: The ME29 uses a microprogrammed Order Code Processor (OCP) which uses pipelining techniques to overlap instruction execution, resulting in processing speeds in excess of 3 million instructions per second and an internal data transfer rate of 4 million bytes per second. The ME29/35 has a performance level approximately equal to that of the 2904/50, and the ME29/45, as a result of enhanced microcode, is 1.8 times more powerful.

CONTROL STORAGE: The ME29's currently being marketed have 128K bytes of control storage with a cycle time of 155 nanoseconds. Prefetching effectively reduces the cycle time to 93 nanoseconds and increases the processing speed to 3 million instructions per second.

An entry-level Model 35-1, scheduled for release in the summer of 1981, comes with a reduced microcode store of 64K bytes.

REGISTERS: Only the general registers (eight per program, in the first eight words of each program's storage area) are user-addressable. Three of them can be used for indexing.

Six non-addressable registers are implemented in the processor's microcode, including a program address register, main and intermediate accumulators, instruction register, and datum register.

ADDRESSING: Like the 2903 Series computers, the ME29 systems are user-programmable only through higher-level languages. ICL does not recommend programming at the machine or assembler level and has released no details concerning the internal operations.

INDEXING: Three registers can be addressed by two bits in arithmetic, logical, and shift instructions. ▶

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CHARACTERISTICS OF THE ICL ME29 PROCESSOR MODELS

SUBMODELS	ME29/35		ME29/45
	ME29/35-1	ME29/35-2	
SYSTEMS CHARACTERISTICS			
Date of introduction	March 1980	March 1980	March 1980
Date of first delivery	Summer 1981	August 1980	Summer 1981
Number of central processors	1	1	1
Principal Operating System	TME	TME	TME
MAIN STORAGE			
Storage type	MOS	MOS	MOS
Cycle time, nanoseconds	650 read	650 read	650 read
	750 write	750 write	750 write
Minimum capacity, characters	256K	256K	384K
Maximum capacity, characters	512K	1024K	1024K
Increment size, characters	128K	128K	128K
Word length, bits	32	32	32
PROCESSING UNIT			
Relative performance	1.0	1.0	1.8
Control storage, bytes:	64K-128K	128K	128K
Control store access time, nanosec.	155, 93 with prefetch	155, 93 with prefetch	155, 93 with prefetch
SOFTWARE			
Programming Languages	COBOL, ALOGOL, RPG2, FORTRAN, BASIC	COBOL, ALGOL, RPG2, FORTRAN, BASIC	COBOL, ALGOL, RPG2, FORTRAN, BASIC

▷ **SOFTWARE**

TME (Transaction Machine Environment) is a new operating system that provides compatibility with Exec 3S and offers new capabilities. Programs written to run under Exec 3S can run under TME using the same job control instructions, even though TME has a new job control language. TME provides a new transaction processing system, but supports programs written for 290X Multiple Transaction System applications.

In addition to batch, multi-access computing (time-sharing), and transaction processing, TME supports Wordskill Manager, an electronic mail system. Promised for the future is support for X.25 packet-switched networks and for private viewdata systems which will use modified black-and-white or color TV sets as terminals.

Only a small part of TME is resident. The rest of the control software is divided into 1K leaves (pages) that are fetched when needed. Compilers, utilities, and user programs are not paged. The concept, which ICL calls the "Leaf Addressing Mode," offers many of the characteristics of virtual memory without the need for expensive hardware facilities.

User-friendly features simplify system operation. Menus allow a user to select a job from a displayed list, to enter parameters, and to run the job. Users needing more help can call up the User Guide. The Personal Data System, which runs under the transaction processing system, ▷

▶ **INSTRUCTION REPERTOIRE:** The ME29 Series uses the standard 290X instruction set which has 111 instructions, including 85 fixed-point arithmetic, branching, shifting, logical, and code conversion (between decimal and binary) instructions; 11 input/output instructions; 4 control instructions; and 8 floating-point arithmetic instructions which invoke "extracode" when the microcode option is not present.

PHYSICAL SPECIFICATIONS: The ME29 in its basic form consists of a single integrated unit designed to operate in a normal office environment. This consists of a logic and control cabinet, a table unit, and a visual display unit. The CPU is 59.1 inches high, 25.6 inches wide, and 30.8 inches deep and weighs 116 pounds. Power requirements are either 50 Hz—198V to 268V—or 60 Hz—104V to 127V. The operating temperature range is 10 to 35 degrees C., with a non-condensing relative humidity of 20 to 80 percent.

The cabinet contains the Order Code Processor (OCP), its associated microcode or control store, and the main memory, together with the data buses and couplers which effect communication between the various system components, diagnostic and self-test aids, sequence controller, and power supply. One or two floppy disc drives are also incorporated, each supporting up to one megabyte of storage capacity.

The table unit provides housing for communications connections. The top can be used as a working surface to support a multi-purpose workstation.

Provision is made in the basic unit to support a range of peripheral devices including discs, magnetic tapes, and line printers.

The standard ME29 workstation includes a 2,000-character display that can be adjusted for the operator's comfort, and a cable-connected typewriter keyboard with separate numeric ▶

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allows a user to build a personal data base and to retrieve data from it in tabular form.

COMMUNICATIONS

ME29 models can support the attachment of multiple synchronous links for communications with an ICL or IBM mainframe or with another ME29 system, but only one at a time may be active. In addition, ICL 7500 range intelligent terminal systems can be concurrently supported for bulk data transfers. Protocols available include 7500 emulation for communicating with a larger ICL system and IBM 2780 or HASP emulation for communicating with an IBM mainframe. Interactive terminals are supported on multiple lines using ICL Basic Mode procedures.

COMPETITION

The ME29 competes with systems such as the IBM System/38 and 4300 Series, as well as with Sperry Univac's System 80 and Honeywell's DPS 4.□

pad and control keys. Up to 24 workstations can be connected to the processor. The visual display unit is 15.75 inches high, 14.25 inches wide, and 15.50 inches deep and weighs 40 pounds. The keyboard is 20.8 inches wide, 7.5 inches deep, and weighs 6.0 pounds.

Also available are five new disc drives offering from 35 to 500 megabytes of secondary storage, and three line printers offering printing speeds of 360, 720, and 1120 lines per minute.

INPUT/OUTPUT CONTROL

I/O CHANNELS: The main input/output bus ("X2 highway") is the connection point for all peripheral devices and subsystems. Each peripheral type has an associated microprogram-controlled coupler for handling communications, allowing data and control information to be sent to or from the device or line via the bus.

The following devices can be supported by the I/O bus: a floppy disc drive coupler, a printer coupler, a universal disc coupler, an Asynchronous Multiline Communications Coupler (AMLCC), and a Synchronous Multiline Communications Coupler (SMLCC).

Up to 3 AMLCC and 3 SMLCC's may be fitted to each processor. The AMLCC supports up to 8 local lines, and the SMLCC can support up to 8 local or remote communications lines. The ability to connect multiple lines to one coupler releases some of the backplane slots to be used for other peripheral devices, thus increasing system configurability. A special interface links up to 8 telephone lines to one SMLCC port, allowing a maximum of 192 viewdata television sets to be linked to each ME29 computer.

CONFIGURATION RULES: The minimum Model 35-1 hardware configuration comprises:

● CPU and video console
● 256K bytes of main memory
● 64K bytes of control store
● One floppy disk drive
● One Asynchronous Multi-Line Communications Coupler
● One matrix or band printer
● One Module 10 fixed disc drive

The maximum Model 35-1 hardware configuration consists of:

● CPU and video console
● 512K bytes of main memory
● 128K bytes of control store
● Two floppy disc drives
● Three Asynchronous Multi-Line Communications Couplers
● A total of 24 workstations and matrix printers
● Two 3551 magnetic tape clusters
● One band printer
● Three Synchronous Multi-Line Communications Couplers
● 24 communications lines
● Three X.25-HDLC couplers
● Two Module 10 fixed disc drives

The minimum Model 35-2 and Model 45 configurations consist of the following:

● CPU and video console
● 256K bytes of main memory (384K bytes with Model 45)
● 128K bytes of control store
● One floppy disk drive
● One Asynchronous Multi-Line Communications Coupler
● One Synchronous Multi-Line Communications Coupler
● Print band shuttle Coupler
● One matrix or band printer
● Modular Disc System Coupler
● Two large disc stores chosen from EDS 60s or Module 20s or Module 20/40 or Module 40 or Module 120

The Model 35-2 and Model 45 can be enhanced to contain the following maximum hardware complement:

● CPU and video console
● 1024K bytes of main memory
● 128K bytes of control store
● Two floppy disc drives
● Three Asynchronous Multi-Line Communications Couplers
● A total of 24 workstations and matrix printers
● Four 3551 magnetic tape clusters
● Three band printers
● Three Synchronous Multi-Line Communications Couplers
● 24 communications lines
● Four X.25-HDLC couplers
● Two Module 10 fixed disc drives
● An extension cabinet which houses a second MDS coupler and provides up to 10 more slots for peripheral couplers
● 32 large disc drives
● Four 1900 Standard Interface devices

MASS STORAGE

Five new disc drives are available:

MODULE 10: As the basic storage device for smaller ME29 systems, the Module 10 is a 35-million-character disc unit that contains 3 discs and records data on 5 surfaces with 570 tracks per surface. Average access time, including rotational delay, is 50.3 milliseconds, and the transfer rate is 737,000 characters/second. One or two Module 10 units may be connected to a system.

The following four modules use the same peripheral coupler. There is normally one such coupler per system, but a second coupler can be provided in the extension cabinet for improved reliability and performance. Certain combinations of the different modules are allowed, but in that event, the maximum number of each type of module is reduced.

MODULE 20: Module 20 is an exchangeable disc store with a capacity of 60 million characters. Data is recorded on 803

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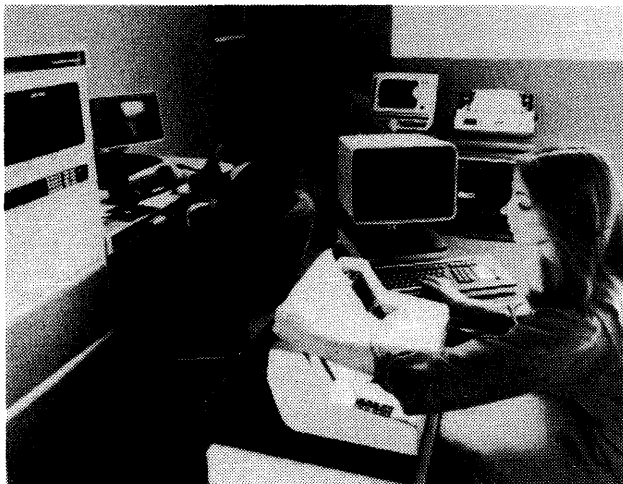
Shown in the ME29 configuration above are a 180 character per second matrix printer (foreground); the processor cabinet (left) containing the central processor and up to one megabyte of main memory, a microcode store, and either one or two floppy disk drives for data and software input; two new multi-purpose workstations (center); and an ICL 7700 Information Processing System (background).

▶ tracks on each of 5 surfaces. Average access time, including rotational delay, is 38.3 milliseconds, and the peak transfer rate is 1,200,000 characters/second. A standard feature of Module 20 is Rotational Position Sensing, which allows increased use of the disc controller channel for data transfer. Module 20 discs reside in a cabinet capable of housing two such units. Up to 16 Module 20's can be connected to a system controller, and the capability to support up to 32 modules is provided by the inclusion of a second controller in an additional cabinet.

MODULE 40: Module 40 is a fixed disc store with a capacity of 120 million characters. It has two recording heads per surface, and also features Rotational Position Sensing. There are four discs per unit, with five available data recording surfaces. Average access time, including rotational delay, is 43.3 milliseconds, and the peak transfer rate is 1,200,000 characters per second. Each disc pack is housed in a cabinet capable of holding two Module 40's. Up to 16 Module 40's can be connected to a system controller, and a second controller can be provided in an additional cabinet.

MODULE 20/40: Module 20/40 is a 180-million-character system combining a Module 20 disc pack drive and a Module 40 fixed disc drive in a common cabinet. Up to 8 such cabinets can be connected to a system controller, and a second controller can be configured in the system.

MODULE 120: Module 120 provides storage for up to 500 million characters. Containing 12 discs, the Module 120 records on 20 surfaces, 816 tracks per surface. Average access time, including rotational delay, is 33.3 milliseconds, and the peak transfer rate is 1,200,000 characters/second. Up to 32 Module 120's can be configured on an ME29.

EDS60: This 290X disc subsystem can be attached to the ME29 system. The EDS60 exchangeable disc drive contains 11 discs, recording on 406 addressable tracks. EDS60 packs hold 60 million characters each, and a maximum of 8 EDS60 devices can be connected for a total disc storage capacity of 480 million characters. The EDS60 has an average access time of 37.5 milliseconds, including rotational delay, and a data transfer rate of 416,000 characters per second.

INPUT/OUTPUT UNITS

ME29 MULTI-PURPOSE WORKSTATION: The ME29 Multipurpose Workstation provides the interface between the user and a variety of facilities available on the ME29 range of computers: Direct Data Entry (up to 12 stations can be used in this mode), Transaction Processing, Multi-Access Computing (time-sharing), systems control, and a user guide, which provides general information on how to use the ME29.

The workstation is usually connected to the system via a 5 meter cable, but users may order up to 300 meters of cable if they want to connect the workstations beyond the five meter range. Up to 24 workstations can be locally connected.

The workstation is a desk-top visual display terminal with a cable-connected keyboard and a screen with a capacity of 25 lines by 80 characters. The characters are generated in a 9-by-7 dot matrix. Ergonomically designed, the screen is attached to its base with a swivel mechanism, allowing the operator to tilt the screen for optimal comfort. The keyboard is divided into three separate blocks: alphanumeric keys, numeric keys, and function keys. There are also special function keys for controlling the DDE facilities. International character set variants are available.

PBS 360 LINE PRINTER: This band printer prints 300 lines per minute with a 64-character train. It has 132 print positions at 10 characters per inch and a standard ECMA OCR-B character font. Print bands with 48- and 96-character sets are available as options. Up to five paper copies can be made.

PBS 720 LINE PRINTER: The PBS 720 band printer has the same characteristics as the PBS 360, but can print twice as quickly (600 lines per minute) with a 64-character train.

PBS 1130 LINE PRINTER: This band printer, available with 132 print positions, is capable of operating at 1130, 900, or 660 lines per minute using standard exchangeable character bands with a 48-, 64-, or 96-character set, respectively.

All three line printers are available with a range of foreign-language character sets.

3542 MATRIX PRINTER: Available with 132 print positions and a bi-directional 130-cps printer head, the 3452 matrix printer is a needle-mosaic impact printer suitable for 1- to 5-part stationery. A 96-character set is standard, and a range of foreign-language character sets is available. With a full 132-character line, the printing speed is 75 lines per minute, and with a 20-character line, over 300 lines per minute. Pitch is 10 characters per inch, and line spacing is selectable by operator switch at 6 or 8 lines per inch. Variants include a tractor feed, dual tractor feed, and form feed.

60K-BYTE MAGNETIC TAPE SYSTEM: Magnetic tape file storage is provided by this 9-track magnetic tape system. Packing density is 1600 bpi in the standard phase encoded mode, or, optionally, 800-bpi in NRZI mode, recorded on standard ½-inch magnetic tape. Tape speed is 37.5 inches per second, and rewind speed is 150 inches per second. The data transfer rate is 60,000 characters per second in phase-encoded mode and 30,000 characters per second with the NRZI option.

The following independent peripheral devices are transferrable from 290X systems:

2430 TRAIN PRINTER: Used on the 290X systems, the 2430 train printer can be retained and connected to an ME29 via a standard interface coupler. The 2430 train printer is a high-speed, buffered, line-by-line printer that prints at 1500 lpm with a 64-character EBCDIC set, or at 1100 lpm with a 96-character ASCII set. It is available with either 132 or 160 print positions. Other features of the 2430 include an integral ▶

➤ stacker, high-speed paper throw, reduced noise emission, and improved print quality.

2510/2511 MAGNETIC TAPE SYSTEM: Transferrable from the 290X systems, the 2510/2511 is a 9-track phase-encoded magnetic tape system with full automatic loading facilities, plus an optional NRZI facility. The system consists of the 2510—the magnetic tape control with an integrated tape transport housed in the same cabinet—and up to five additional 2511 tape transports. Data is recorded at 1600 bpi in the standard phase-encoded mode, and 800 bpi in NRZI mode, and the maximum transfer rate is 80,000 characters per second.

1915/1916 PAPER TAPE READERS: These two paper tape readers are supported on the ME29. Both are very similar in appearance, mode of operation, and the facilities offered. The 1915 reads at 300 characters per second, and the 1916 at 1000 characters per second. The readers are designed to process seven data tracks plus parity, in accordance with the ICL 1900 Paper Tape Code, as well as a variety of other code formats with a range of tape widths.

1925 PAPER TAPE PUNCH: The 1925 punches at the rate of 110 characters per second.

2104 CARD READER: The 2104 card reader is a cyclic serial reader capable of reading 80-column cards at a nominal speed of 600 cards per minute.

COMMUNICATIONS CONTROL

The ME29 provides extensive communications network facilities. Distributed processing capabilities include remote job entry, remote session access, message distribution, applications distribution, and file transfers. Any ME29 function can be accessed from any local terminal provided the user has proper authorization. An ME29 system can act as a host computer for small processors and terminals, or as a satellite to a larger mainframe.

Two types of communications line couplers can be used:

The Asynchronous Multiple-Line Communications Coupler (AMLCC) provides eight local asynchronous connections, each of which can be used to support a workstation or matrix printer. Up to three AMLCC's may be configured.

The Synchronous Multiple-Line Communications Coupler (SMLCC) provides connections for eight local or remote synchronous communications lines. Terminal systems, singly or clustered, or remote computer systems can be linked. An interface allowing one SMLCC line connection to provide eight British Post Office line connections is available for support or private viewdata systems. Three SMLCC couplers may be configured.

DIRECT DATA ENTRY KEYSTATIONS: The ME29 Direct Data Entry System (DDE) is a flexible key-to-disc data capture system available via the ME29 Multipurpose Workstation. Any 12 of the ME29 workstations can be used for direct data entry at any one time; in addition, the workstations can be used for making inquiries or for running jobs.

The DDE units are connected locally to the system at distances up to 300 meters. The workstation display format consists of 7 lines of 32 characters each, plus an eighth line of 30 characters for commands, replies, or data entry, verification, and editing. These activities are supported by ICL software, which also lets any DDE be designated as a supervisory unit that can be used to initiate batches, create and store format programs, release completed batches for processing, and call up statistics for viewing. Messages are available in English, French, or German.

7502 MODULAR TERMINAL SYSTEMS: The 7502 is an intelligent software-controlled communications system. Data is transmitted bit serially at speeds up to 9600 bps. Four configurations are available with the following characteristics:

- **7502/10 Interactive Terminal System:** 12K- to 28K-byte processor, up to 8 video terminals, and up to 4 hard copy printers.

- **7502/15 Interactive/Stand-Alone Terminal System:** 16K- to 40K-byte processor, up to 6 video terminals, and 4 hard copy printers; options include 0.5-megabyte floppy disc system, 300-lpm printer, and personal identification device readers.

- **7502/20 Remote Printing Terminal System:** 16K- to 40K-byte processor, one video terminal, and a 300-lpm printer; options include a 0.5-megabyte floppy disc system, up to 4 hard copy printers, and additional video terminals.

- **7502/25 Remote Batch Terminal System:** 16K- to 28K-byte processor, one video terminal, a 300-lpm printer, a 300-cpm card reader, and a personal identification reader; options include a 0.5-megabyte floppy disc system.

Programs can be downline loaded into 7502 systems by the ME29 system.

The flexibility of 7502 system utilization over local or remote lines is greatly increased by the terminal cascade facility, which allows up to three 7502 systems to be multi-dropped from one line.

SOFTWARE

OPERATING SYSTEM: The ME29 runs under a new operating system, TME (Transaction Machine Environment), which is compatible with Exec 3S and offers new capabilities. Programs written to run under Exec 3S can be run under TME using the same job control instructions, even though TME has a new job control language. TME provides a new transaction processing system, but supports programs written for 290X Multiple Transaction systems.

Only a small part of TME is resident. The rest of the control software is divided into 1K leaves (pages) that are fetched when needed. Compilers, utilities, and user programs are not paged.

TME offers workstation users batch and distributed processing facilities, multi-access computing (time-sharing) and user-friendly features such as menus, user guides, and a HELP facility to simplify system operation. The Personal Data System, which runs under the transaction processing system, allows a user to build a personal data base and to retrieve data from it in tabular form.

TME is offered in three variants: TME 10, which runs on the Model 35-1; TME 30, which runs on the Model 35-2; and TME 40, which runs on the Model 45.

The TME 10 Operating System is based on the Module 10 disc system and does not support larger disc systems. TME 10 supports all basic CPU and I/O functions, ME29 Order Code (including Leaf Mode), two batch streams, TME TP System, TME Control Language, system filestore, output spooling to printer or screen, 256K bytes to 512K bytes of storage, one or two floppy disc drives, one PBS printer, and 16 local workstations.

The TME 30 Operating System is similar to the TME 10 Operating System but supports the larger disc systems via the MDS Controllers. Facilities additional to or different from ➤

the TME 10 system include: five batch streams, 256K bytes to 1024K bytes of user store, one MDS controller for up to 16 Module 20, 40, 120, or EDS 60 disc drives, and 24 local workstations.

The TME 40 Operating System is an extension of the TME 30 Operating System. Facilities changed or additional to those of TME 30 include: support for the power boost facility on the Model 45 processor and eight batch streams.

A number of System Options are available to extend the basic facilities of TME. Those are sub-divided into two main areas: *Peripheral Support Options* and *Service Options*.

Peripheral Support Options: The 3551 Magnetic Tape Support option provides TME support for the ICL Type 3551 Magnetic Tape Controller, which may have one to four transports connected. This option is available on all TME Operating System variants, although an additional 64K bytes of control store is required on Model 35-1 if not already present.

Another option is support for an additional eight workstations. This option, however, is offered on the TME 10 Operating System only; it is automatically incorporated on the TME 30 and TME 40 Operating Systems.

Optionally available on the TME 30 and 40 Operating System is support for 1900 SI 1933 and 2430 line printers, 1900 SI 2104 card readers, and 1900 SI 2510/2511 magnetic tape units. In addition support is optionally available for the 1915, 1916, and 1925 paper tape reader and paper tape punch equipment.

Also restricted to the TME 30 and 40 Operating Systems is the optional ability to connect a second MDS controller.

Additional PBS 360, 730, and 1130 printers (up to two) can also be supported by the TME 30 and TME 40 Operating Systems, as can up to a total of 16 matrix printers.

Service Options: A fast floating-point option is available for all three of the TME Operating Systems. The floating-point instructions are performed within microcode instead of by the use of coding in the Executive, which is functionally slower.

Support of up to four local workstations operating under the Direct Data Entry Service is optionally available for all the TME Operating Systems.

Language variants for the DDE software are available in English, French, and German.

Options exist for an additional eight DDE keystations.

An option for the TME 10 Operating System supports three additional batch streams, for a total of five. Support for three additional batch streams is also available for the TME 30 Operating System, providing for a total of eight batch streams.

Optionally available for the TME 30 and TME 40 Operating Systems is support for 8 additional MAC stations, yielding a total of 16.

LANGUAGES: To enable the user to develop application programs, compilers for the following standard languages are available with ME29: COBOL, RPG-2, FORTRAN, BASIC, and ALGOL.

COBOL: Two types of COBOL compilers are offered for ICL ME29 systems: the 2903/1900 compiler and an ICL Range Standard COBOL compiler. Source conversion to Range COBOL proceeds through a conversion utility. Available COBOL options are a COBOL preprocessor, a data name

cross reference, a COBOL library routine, and a COBOL disc sort. The new Range COBOL provides for portability from DME (24-bit mode) to VME (32-bit mode) systems. It is largely compatible with the C2 compilers used for VME systems.

RPG-2: ICL's RPG-2 language, which is largely compatible with IBM's RPG II, can be used to program the remote use of VDU's and is also compatible with 1900 Series RPG. RPG-2 diagnostics are available in English, French, or German.

DATA BASE MANAGEMENT: ICL's ME29 offers a comprehensive range of data management facilities supporting the creation, processing, and administration of sophisticated data bases.

IDMS: The ME29 supports Cullinane's Integrated Database Management System (IDMS) as well as a subset of the full IDMS CODASYL data base system, IDMS-E. The subset provides a simplified user interface for customers who initially require less sophisticated facilities but who wish to retain the flexibility to grow to full IDMS. For further details on the full version of IDMS, please refer to Report 70E-272-02 in the Software section of DATAPRO 70.

DDS: The ICL Data Dictionary System (DDS) is used as an aid in the design, documentation, implementation, and maintenance of data processing systems. At the system design stage, it is used to ensure that the system design actually models the required real-world functions. At any stage in the development of a system, DDS is used to produce consistent, high-quality documentation for use both by those controlling and monitoring the system and for creating data definitions for input to COBOL and IDMS systems.

There are two versions of DDS: full DDS and DDS-E, an entry-level product. DDS-E is a subset which is restricted in the area of data ownership and version numbering. It maintains an integrated data base which holds four distinct types of information: details of real-world processes such as invoicing, order entry, payrolls, and other typical business functions; real-world data such as order and worksheet details; details of computer processes such as systems, programs, and modules; and computer data such as files, records, and IDMS sets. DDS-E offers the user facilities to record, manipulate, and call for a large variety of reports on this data.

PDS: The ICL Personal Data System (PDS) is an easy-to-use data storage and retrieval system, designed for use by non-DP professionals operating from workstations. Such a person, without any DP training, will be able to define, load, and use a personal data base. The PDS facilities include:

* Ability to define/remove/display table formats.

* Ability to add, change, and delete table data.

* Ability to list table data or specific columns of data from a table.

* Ability to join tables together.

* Ability to select data using comparison operators, including the functions MAX, MIN, TOTAL, and COUNT, which operate on table columns.

* Natural-language dialogue with friendly error messages.

* A HELP facility.

* Ability to switch on/off varying levels of diagnostic aids.

* Use of user-defined macros.

* Dump and recovery mechanisms.

* Simple prompts from PDS to the user.

ICL ME29 Series

▶ COMMUNICATIONS SOFTWARE: The ME29 Series provides extensive communications network facilities. Distributed processing capabilities include remote job entry, remote session access, message distribution, application distribution, and file transfers. In addition, any ME29 function can be accessed from any local terminal provided the use has proper authorization. ICL also offers communications between ME29 systems and IBM 360/370 host systems or IBM System/3's using the IBM 2780 RJE protocol or HASP multileaving procedures. Also available as an option is the ability to emulate an IBM 3270 interactive terminal.

REMOTE SESSION ACCESS (RSA): RSA permits the operator of any interactive terminal connected to one mainframe to access, on a per-session basis, a service provided in another remote mainframe (host) via a full Extended Basic Mode (XBM) communications link. The local ME29 system becomes transparent during the session.

DISTRIBUTED MESSAGE ROUTER (DMR): DMR handles message distribution. When the DMR detects that a user request cannot be processed locally, it automatically sends the message to the correct remote system and then relays the response back to the user.

DISTRIBUTED APPLICATION FACILITY (DAF): DAF allows an application program running in the local system to get data or processing help from a remote system.

FILE TRANSFER FACILITY (FTF): FTF, in conjunction with the DAF, can transfer entire files from one system to another.

VIEWDATA: Private viewdata systems are being developed for use on the ME29 range. A special viewdata coupler links up to 8 telephone lines to one SMLCC port, thus allowing a maximum of 192 television sets to be linked to each computer at one time.

UTILITIES: Available utilities include disc file re-organization, sort/merge, copiers, formatters, initializers, labelers, dumps, utilization reporters, loaders, file creators, and library maintenance routines. All utilities are grouped together and are priced separately from other software products.

APPLICATIONS SOFTWARE: ICL offers users a number of packages, dealing with such specific application areas as finance, statistical analysis and project control, manufacturing and stock control, and electronic mail.

Financial Packages: LUCRE—A ledger update and control system which creates and maintains sales, purchase, and general ledgers.

PROSPER-E and PROSPER+—Both of these systems are used for financial modeling, in applications such as cash flow forecasting, project selection, breakeven analysis, costing analysis, etc.

COMPAY+ (UK only)—Processes a user's payroll, calculating gross wages, net wages, national insurance payments, taxes, and pensions, and updating employee records.

BACSTER (UK only)—Provides an interface for input into the BACS system. BACSTER picks up a user's own financial data, such as Bank Giro credits and debits, and puts it onto magnetic tape in a form ready for input to the Bankers Automated Clearing Services (BACS).

Technical and Statistical Packages: PERT—Aids in the planning and control of projects, taking time and resource constraints into account.

PACKAGE X—A system for the management and analysis of data, providing summary statistics (maximum and minimum values, means, standard deviation, number of missing values), tabulation, regression analysis, and significance tests. Output can be printed, and can include scatter diagrams and plots.

Manufacturing Packages: OMAC—An on-line manufacturing control system that aids in the planning and controlling of production levels in manufacturing industries. OMAC is modular in form, comprising the following seven subsystems:

1) The Bill of Materials Processor (BOMP) provides a list of all parts, subassemblies, and raw materials used to make up a given product and the operations involved in making the product.

2) The ICL Stock Control System enables the minimum amount of stock to be held while still satisfying all orders. It also provides stock reports and inquiry facilities.

3) The Work-in-Progress subsystem ensures that stock levels are kept at a sufficient level to meet production requirements.

4) The Requirements Planning subsystem provides production and purchasing schedules for finished product requirements.

5) Forward Load Analysis enables loadings to be placed in advance of production via requirements planning.

6) The Completion Time Estimator enables completion dates of production to be predicted. It also provides charts on trends in factory performance.

7) Cost Establishment gives standard costs for all items manufactured.

ORDERMASTER—Provides the customer with a comprehensive on-line sales order entry and purchase order processing system.

Information Processing Packages: 1900 WORKSKIL MANAGER—A product designed as a mainframe support package for the 7500 terminal executive known as WORDSKIL. WORDSKIL MANAGER is the mainframe utility that can be used to link several word processor units to a mainframe computer. A document from a word processor can be sent to the mainframe by a single command. When the document has been stored in the mainframe by a word processor unit, it can be made available for retrieval by any or all of the other word processor units. In this way, an "electronic mail" facility is provided.

PRICING

POLICY: ICL offers the ME29 for purchase or lease. Maintenance is priced separately for both purchased and leased equipment. Lease terms can vary from one to five years. All software is separately priced. The U.K. supplies other countries with master files of available software. Some of it, however, is only applicable to the U.K., and other countries develop their own products where necessary. Prices, terms, and available configurations may vary in other countries to suit location conditions.

An entry-level ME29/35 with 256K, one workstation, a matrix printer, one million characters of floppy disc storage, and 35 million characters of disc storage is purchase priced at approximately £35,000. Rental is provided on a monthly basis at £777, and monthly maintenance at a cost of £204.

A large ME29/45 with one million characters of memory, 24 workstations, three 360-lpm printers, two million characters of floppy disc storage, 2000 million characters of disc storage, and communications couplers would cost about £250,000.

Monthly rental is priced at £5,100 and monthly maintenance costs £1,400.■