

ICL Series 39

UPDATE: ICL has completely restructured the Series 39, discontinuing the Levels 20 and 30, to include seven models, one of which is the first dyadic system in the Series 39 range. ICL has also enhanced the CME* operating system to facilitate migration of ME29 users to the Series 39. In addition the vendor has released other new software to simplify the process of converting to VME.

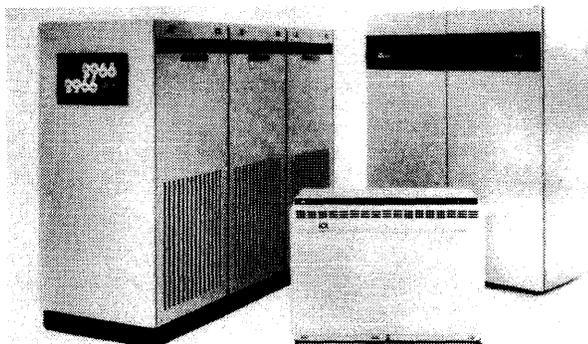
MANAGEMENT SUMMARY

After experiencing a stormy decade of faltering profits and organizational upheaval, ICL has steadied its course and is heading confidently toward new horizons. Since its takeover two years ago by STC, ICL has now achieved the enviable position of rewarding its rescuer by contributing slightly over half of the £2 billion of STC's sales. Industry observers attribute ICL's stunning renaissance to corporate restructuring, resulting in an emphasis on strong managerial training.

The new management style at ICL has paid off handsomely, allowing the company to focus on aggressive and innovative market strategies instead of assuming a reactive posture to the pervasive presence of IBM throughout Europe. ICL set out to change its image from simply being a computer manufacturer to that of a provider of a broad range of services offering solutions for the entire information technology sector.

Having realigned its strategies in the U.K. market, ICL is now setting out to boost its turnover in the international marketplace, which in 1986 increased by a rather slim four percent. To strengthen its position in the European arena, ICL has taken several positive steps. The firm has established a site in Dublin to focus on Unix-related development functions, a center in Düsseldorf, West Germany, for CIM (Computer Integrated Manufacturing) operations, and a business center specializing in networking in Paris.

ICL's efforts in France have produced gratifying results; in 1986, profits increased by 94 percent. The networking center in Paris will focus on videotex and ISDN services. ➤



ICL's Level 80 is located on the right, the Level 30 in the center, and ICL's System 2966 on the left.

Incorporating fiber optic links and Fujitsu microchip technology, the ICL Series 39 mainframes also include ICL's unique CAFS-ISP Information Search processor. The newly restructured Series 39 range now includes its first dyadic system, the Level 35D. Communications functions conform to OSI standards.

MODELS: Levels 15, 25, 35, 35D, 50, 60, 80.

CONFIGURATION: Level 50, an intermediate system, can be configured with a main memory of 16MB, one console, four FDS300 1.2GB disks, 470K bps start/stop tape, a 720 lpm printer, and 100 workstations.

COMPETITION: Levels 15, 25, 35, 35D—IBM System/38, IBM 9370, and Digital Equipment 8000 Series; Level 80—IBM 308X and IBM 3090.

PRICING: Purchase prices range from £91,000 to £1,600,000.

CHARACTERISTICS

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ICL Series 39

TABLE 1: SYSTEM CHARACTERISTICS

MODEL	MEMORY RANGE	MIPS—single node*	CYCLE TIME
Level 15	8MB to 16MB	.9	190 ns
Level 25	8MB to 16MB	1.1	190 ns
Level 35	8MB to 16MB	1.5	190 ns
Level 35D	16MB to 32MB	2.7	190 ns
Level 50	4MB to 32MB	3.1	25 ns
Level 60	4MB to 48MB	7.1	25 ns
Level 80	16MB to 64MB	11.0	400/32 bytes

*Dual nodes provide up to 4 MIPS for Level 30, 13.1 MIPS for Level 60, and 20 MIPS for Level 80.

➤ ICL claims that the Parisian center will advance its stake in the French videotex market, of which it already has an 8 percent share.

In addition to recent managerial and marketing strategies, ICL's long-term involvement with Fujitsu, which began in 1980, has significantly moved the company forward. The Series 39, originating from this alliance, combines the technological and manufacturing know-how of two giants. ICL has also assimilated Japanese production techniques, such as just-in-time inventory control systems and quality center testing, into its manufacturing operations, resulting in the reduction of product costs and an increase in productivity.

Along with the introduction of the new models to the Series 39, ICL stressed the importance of mainframes in its business objectives. The company intends to increase revenues from the mainframe market and to gain more market share. To attain this goal, ICL aims to increase the existing customer base of the Series 39 in the U.K. and to achieve greater penetration of information technology markets in continental Europe. In parallel with this strategy, ICL plans to initiate a successful migration of ICL ME29 system users to the Series 39.

In addition to realigning the Series 39, ICL is also working on developing a new generation of ultra high-powered processors under the code name Essex. The machines evolving from the Essex project will meet the needs of the largest users of mainframes. According to ICL, the demand for increased processing power is growing at approximately 40 percent per year. ICL has targeted 1990 as the time frame in which the new processors will reach the market, and plans to introduce them as extensions to the current Series 39 range.

Until the debut of the processors developed under Essex, users can obtain increased power from the three- and four-node versions of the two-node Series 39 Level 80, which has already demonstrated its power, particularly in transaction processing operations.

ICL introduced the Series 39 mainframes in April 1985, and until recently, had concentrated on filling out the middle of the range by introducing the Levels 50 and 60 and extending the top of the range with the Level 80. This ➤

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DISTRIBUTORS: ICL also has offices in the following countries: Barbados, Fiji, Ghana, Iraq, Jamaica, Kenya, Malawi, Malaysia, Mauritius, Mexico, Nigeria, Pakistan, Papua New Guinea, Saudi Arabia, Singapore, Sudan, Swaziland, Tanzania, Trinidad, Uganda, United Arab Emirates, Zambia, and Zimbabwe.

MODELS: Level 15, Level 25, Level 35, Level 35D, Level 50, Level 60, and Level 80.

DATE ANNOUNCED: Level 15—June 1987; Level 25—June 1987; Level 35—June 1987; Level 50—September 1986; Level 60—September 1986; Level 80—April 1985. Level 35D will be available at the end of 1987.

DATA FORMATS

BASIC UNIT: 8-bit byte. Each byte can represent one alphanumeric character, 2 BCD digits of 8 binary bits. The word of 32 bits is formed from four consecutive bytes.

FIXED-POINT OPERANDS: 1 to 16 bytes (1 to 31 digits plus sign) in decimal mode; one word (32 bits) or one doubleword (64 bits) in binary mode.

FLOATING-POINT OPERANDS: A word consisting of a 24-bit (6 hex digit) fractional part plus a 7-bit hexadecimal exponent in long form or, in extended form, 4 words with 112-bit fractional part (28 hex digits) plus 7-bit hexadecimal exponent.

INSTRUCTIONS: 2 or 4 bytes in length. Most instructions are available in both forms. There also are three instruction formats. Primary format instructions are either computational or miscellaneous. Secondary format instructions are store-to-store instructions. Tertiary format instructions are conditional jump instructions.

INTERNAL CODE: EBCDIC (Extended Binary Coded Decimal Interchange Code).

MAIN STORAGE

CHECKING: All data paths between the central processor and main storage are parity-checked by byte. When data is stored, an error-correcting code is substituted for the parity bits. (An 8-bit modified Hamming code is appended to each 8-byte doubleword of data.) When the data is retrieved, single-bit errors are detected and corrected automatically, and most multiple-bit errors are detected. ➤

ICL Series 39

TABLE 2. MASS STORAGE

MODEL	FDS160	FDS300	FDS640	FDS2500
Size (MB)	160	312	651	2500
Access Times (ms)	30	15	25	20
Transfer Rate (B/s)	1.2M	2.45M	1.2M	2.86M

➤ year, ICL has focused on the lower end of the range by introducing the Series 39 Levels 15, 25, and 35, as well as the first dyadic processor in the series, the Level 35D. With all the models in place, ICL asserts that the Series 39 offers a power spectrum of 1 to 25 on a single compatible range.

All of the new systems offer flexibility and the ease of use usually attributed to large superminis. All four of the new models incorporate ICL's unique and award-winning CAFS-ISP Information Search Processor for high-speed data retrieval. CAFS-ISP is an acronym for Content Addressable File Store Information Search Processor. ICL considers CAFS-ISP as a "search engine" that uses special-purpose hardware to perform high-speed searches of data stored on disk. It exploits the technique of content addressing in which relevant records are located by the value of their contents instead of through physical locations or the value of a key.

The Level 15, capable of supporting up to 120 users, takes over as the entry level model in the Series 39, while the Levels 25 and 35 supercede the previous Levels 20 and 30. The Levels 25 and 35 offer a 40 percent improvement in price performance over the Levels 20 and 30. ICL attributes performance improvements to the use of new CMOS 8000 gate array chips, designed by ICL and produced by Fujitsu. ICL has also made design modifications to the processors to achieve improved performance. The Level 25 can support up to 160 users, and the Level 35, up to 220 users. The Level 35D can support up to 400 users.

Representing the first dyadic system in the range, the Level 35D offers virtually twice the processing power of the Level 35. ICL has attained this processing power in the Level 35D by placing two Level 35 processors, each with its own dedicated store, in one cabinet and running them under the control of one VME operating system.

ICL has targeted the Series 39 for three distinct market areas: ME29 users of Models 37, 45, and 54 who need to upgrade to larger processors; distributed processing users who can take advantage of ICL X.25 and OSLAN communications links to connect to larger central mainframes in the Series 39 or to the equipment of other manufacturers; and users requiring dedicated application processors, such as local government, financial services, and defense.

ICL has also expended great efforts on developing software that simplifies the use of the Series 39 processors. The Systems Administrator Menu Prompter (SAMP) supplies users with selected access to VME features in menu format without curbing the facilities of the operating system. For customers new to VME, ICL has designed an entry-level version of the QuickBuild fourth-generation software tools

➤ **STORAGE PROTECTION:** Each segment of virtual storage is protected by three codes: a 1-bit Execution Permission key, an 8-bit Read access key, and an 8-bit Write access key. Only code associated with an Execution Permission bit can be executed. When a store access is made, the contents of the Access Control Register (ACR) are compared with either the read or write key of the segment. Sixteen levels of privilege are used. Values of 0 to 9 are set by the system software and values 10 to 15 by the applications programs. Access is granted when the contents of the ACR are equal to, or less than, the key assigned to the segment.

All Series 39 systems use 256KB RAM chips for main memory.

CENTRAL PROCESSORS

Series 39 computers are based on Fujitsu technology. Levels 15, 25, and 35 use CMOS 8000 chips. Levels 50, 60, and 80 use ECL (Emitter Coupled Logic) chips. Level 80 OCP uses the 2966 processor. CMOS technology generates minimal heat output and supports a high-density construction. The ECL chips, manufactured by Fujitsu, offer a 0.4 nanosecond gate delay. In addition to being extremely fast, the ECL chips run far cooler than earlier designs of comparable power, resulting in compact structures that greatly reduce cooling requirements.

The 39/15, 39/25, and 39/35 models make use of a more powerful implementation of the 8,000 gate array than did the previous models in the Series 39, the 39/20 and 39/30. The 39/35D represents the first tightly-coupled dual processor in the series. Both processors reside in a single cabinet and run under a single copy of VME.

The Series 39 follows a design concept of processor nodes with each processor node consisting of an Order Code Processor (OCP), a store module, one or two I/O controllers, and a Node Support Computer (NSC). The NSC functions as an integral but independent microprocessor which accommodates transaction logging and performance monitoring for remote diagnostics. The I/O controllers connect the node to local area networks. The OCP operates 2900 Order Code in native mode and consists of a seven-stage pipeline for code, data, and current page accessing. An optional scientific unit furnishes hardware capabilities for floating point instructions.

Each system also contains ICL's CAFS (Contents Addressable File Store) Information Search Processor which supports fast serial, ordered, and direct serial file searches for approximately 7,000 records in a database within a one-second time frame.

CONFIGURATION RULES

ICL offers the following configuration examples:

- Level 15, an entry-level system, can be configured with a main memory of 8MB, one console, two FDS300 600MB disks, a 360 lpm printer, 310K bps start/stop tape, and 20 workstations.
- Level 80, a large system, can be configured with 32MB of main memory, one console, three FDS2500 and two FDS300 8GB disks, four 780K bps start/stop tapes, and 500 workstations.

➤ to assist these users in developing applications running under VME.

COMPETITIVE POSITION

The Relative Performance Index of the four new systems in the Series 39 range is 40 (Level 15), 52 (Level 25), 70 (Level 35) and 128 (Level 35D). These figures position the new systems against the IBM System/38 and IBM 9370, as well as against the Digital Equipment Corporation 8000 Series. Rated at 20 MIPS, the dual-node Level 80 system competes against the IBM 3090 Model 200.

To limit the competitive position of ICL to a machine versus machine strategy, however, is to misunderstand ICL's new direction. No longer simply a "product-led" organization, ICL has made peace with a world dominated by IBM. Facing up to the fact that in 1985, the company had penetrated only 2.2 percent of Europe's computer market, ICL adopted a new policy of regarding itself as not solely a computer vendor, but a sophisticated organization capable of solving complex information technology problems for customers by supplying total solutions.

This new image has changed the perception of ICL in the marketplace. No longer regarded as a David aiming its slingshot at the IBM Goliath, ICL has diverted its efforts into areas where IBM has not staked such a large claim. The new arena chosen by ICL is the vertical marketplace in which the firm has strengthened its presence through an innovative and effective concept known as business centres. Through the business-centre approach, ICL has reached the customer by listening to specific needs, adjusting systems to meet those needs, and preparing to address needs as they arise.

This somewhat holistic approach to marketing appears to be working. Instead of facing competitors in areas where they excel, ICL has chosen to take them on in areas where they are weak. By concentrating on getting close to the customer, instead of acting as the expert forcing equipment on the hapless buyer, ICL can hardly fail to emerge as a winner.

ADVANTAGES AND RESTRICTIONS

Perhaps the greatest advantage of acquiring a Series 39 mainframe will result from dealing with a company that combines the best of the new with the best of the old. No newcomer to the computer scene, ICL has always excelled in technology, but has not always performed well in marketing its products. Having corrected that imbalance, ICL has geared up for the battle of attracting mainframe business throughout Europe. Its principal weapon for this offensive will be tailoring systems for the specific needs of users.

Listening to the user has not always ranked high with computer manufacturers. In Datapro surveys, the lowest ratings assigned by users to entries in the questionnaires have traditionally fallen on vendor support in the areas of troubleshooting, documentation, and education. In addi-

➤ INPUT/OUTPUT CONTROL

The Series 39 systems function as distributed systems with the CPU acting as the central node or one of a pair of nodes. Instead of channels, the OCP, as ICL refers to its CPU, connects to MACROLAN or OSLAN to support the attachment of peripherals. Level 30 supports the connection of two OSLANs and four MACROLANs; Level 80 supports the connection of three OSLANs and six MACROLANs.

High-speed devices such as nodes and disk drives connect to MACROLAN, and lower-speed devices connect to OSLAN. Port Switch Units (MPSUs) control devices in MACROLAN totaling up to 15 MPSUs per MACROLAN. Each MPSU has 6 ports, one for the Input/Output Controller (IOC) and the remaining five for other devices. A single Level 30 node can support a maximum of two OSLANs, and a single Level 80 node can support a maximum of three OSLANs.

Workstations link to the system via OSLAN, attaining a maximum of 1,024 workstations per OSLAN. Users can connect OSLANs via local bridges to support many more terminals per system. Low-speed and letter-quality printers connect to the systems via workstations. Tape drives also connect via MACROLAN and require the use of a controller.

MASS STORAGE

Disks connect to the Series 39 via MACROLAN. They are connected to Retained Disk Controllers (RDCs), separately housed. The RDCs connect to MACROLAN via a High-Speed Disk Controller (HSDC). Each RDC supports a string of up to eight disk drives. For FDS640 drives, the addition of a second coupler doubles the string size to 16 drives. Levels 15, 25, and 35 use 50M bps fiber optic links to connect disk drives incorporating CAFS/ISP to the main CPU. Disks attach to all models. Series 39 systems can also use 2900 Series peripherals.

For detailed information on mass storage, please refer to Table 2.

INPUT/OUTPUT UNITS

WORKSTATIONS: The local workstations 3106/02 and 3116/02 offer line speeds of 9600 bps, 2,000 character displays, and upper and lower case functionality.

For additional information on other I/O units, see Tables 3 and 4.

COMMUNICATIONS CONTROL

MACROLAN: Internal communications between System 39 peripherals and main processors is achieved through the high-speed MACROLAN network. MACROLAN uses fiber optic cables to transmit data between nodes and high-speed peripherals as far as 1,500 meters apart at a maximum speed of 50M bps. Two Series 39 computers can be connected via two optical fibers in ICL's MACROLAN network to form a 1,500-meter data highway for high speed devices like disks and magnetic tapes.

ICL designed MACROLAN as a token-passing local area network. Nodes or peripheral controllers attach to MACROLAN as stations on a Port Switch Unit (PSU) that supplies up to six MACROLAN transmitter/receiver ports. Two MPSUs can be cascaded, and up to 15 stations can be connected to a single MACROLAN circuit, with the largest system supporting six MACROLAN units. ICL claims that MACROLAN provides faster throughput than conventional star configurations.

ICL Series 39

TABLE 3: MAGNETIC TAPE UNITS

Magnetic Tape Units	Number of Tracks	Recording Density, Bits/Inch	Encoding	Tape Speed, Inches/Sec.	Transfer Rate, Bytes/Sec.
MTS61	5-inch PE	37.5	9	1600	Start/stop
MTS310	5-inch GCR/PE/ NRZI	125	9	GCR:6250 PE:1600 NRZI:800	Start/stop
MTS470	5-inch GCR/PE/ NRZI	125	9	GCR:6250 PE:1600 NRZI:800	Start/stop
MTS780	5-inch GCR/PE/ NRZI	125	9	GCR:6250 PE:1600 NRZI:800	Start/stop

tion, users have consistently chosen to have their application software designed in-house rather than acquiring it from the vendor.

With ICL's emphasis on business centres that develop industry-specific systems, users can turn to the vendor for the tailoring they need. ICL has already focused on retail systems, zeroing in on supermarket technology. At the present time, ICL has achieved U.K. leadership in point of sale systems, surpassing NCR and IBM. The company has also started work on developing systems for distribution, purchasing, and warehousing. ICL has also penetrated the vertical market with systems for local government and defense.

The customer will also benefit from ICL's streamlined manufacturing process. In 1985, the creation of the Series 39 demanded new methods of manufacturing, resulting in the origin of Mercury, an assembly and testing technique that can construct up to 15,000 Series 39 machines in a year at ICL's Ashton plant. A control center at the end of the Mercury line equipped with a color-display mimic screen, instantaneously checks work in progress. As a result of the vastly improved manufacturing cycle, ICL has set a goal of meeting delivery deadlines 100 percent of the time.

The technology incorporated into the Series 39 offers many benefits to users. Two types of advanced chips, CMOS 8000 and ECL logic manufactured by Fujitsu to ICL's design, ease operational conditions. CMOS technology generates minimal heat and supports high-density construction. Emitter Coupled Logic (ECL) activates extremely fast processing while running coolly, resulting in a compact space-saving design and lowered cooling requirements.

ICL also used an innovative technique in selecting fiber optics for the cabling of MACROLAN, the high-speed data network in the Series 39. The MACROLAN data network links high-speed disks and magnetic tapes to a Series 39 node over a distance of 1,500 meters, allowing nodes and peripherals linked to MACROLAN to be located well away from each other, thus allowing users a great deal of flexibility in installing their systems. The system views a high-speed peripheral on MACROLAN as not being attached to any particular node, rather it considers it as a resource

OSLAN (Open Systems Local Area Network): OSLAN provides coaxial cable connection of up to 500 meters for terminals, workstations, personal computers, and printers. The trunk cable of OSLAN supports the connections between up to three user devices such as ICL workstations, ICL server devices, ICL nonmagnetic peripherals, non-ICL workstations, and non-ICL peripherals. Having been adopted by many manufacturers as a standard, OSLAN operates at 10M bps with up to 1,024 peripheral devices linked to it. OSLAN reflects ICL's commitment to international standards for Open Systems Interconnection (OSI). Protocols supported include asynchronous ICL CO3, X.25, IBM 2780/3780, and Viewdata.

PERILAN: The PERILAN peripheral interface to OSLAN allows 2900 Series peripherals to be attached to the Series 39. ICL offers one 2900 peripheral interface as standard and a second interface as an option. When two interfaces are fitted, the types of retained 2900 peripherals connected to them need not be the same. PERILAN resides in a small, freestanding box and links to the peripheral via the peripheral's cable and to OSLAN via an OSLAN drop cable and transceiver.

SOFTWARE

OPERATING SYSTEM: The Series 39 runs under VME Version SV213 and supports a memory range of 4MB to 16MB (Level 30 and 4MB to 32MB (Level 80). It also supports Multiple Access Computing (MAC), Transaction Processing Management (TPM), and local, batch, and RJE functions.

MAC enables users to have immediate interactive access to the system via local or remote terminals. It includes HELP, screen editing, and program development facilities.

The VME Transaction Processing Management System (TPMS) provides direct connection between the terminal user and applications software. TPMS supports multiple applications within one service while VME will support multiple TP services if required. TPMS also provides data and message security and recovery features. TPMS furnishes facilities to interface to ICL's IDMS database system, via high-level languages.

An operator's local or remote workstation controls batch facilities. Remote job entry provides a method of submitting batch work from a remote location and receiving output back if required.

The latest version of VME has been developed for nodal systems in order that all resource needs for a virtual machine are met from a single node. All resources, including peripherals, are equally available to each node, and use does

ICL Series 39

➤ available to all network users. If any nodes are removed or added from a configuration, the system's operation is not disrupted.

The medium-speed network OSLAN, also a member of ICL's Network Product Line, operates over a coaxial cable that transmits at 10M bits per second. Users can easily plug in terminals, workstations, and printers after OSLAN has been routed through a building. Users can set these peripherals anywhere in their buildings and can move them whenever necessary without causing problems to existing operations.

To accommodate the critical problem of immediate access to vast and complex databases, ICL has equipped the Series 39 with the CAFS Information Search Processor. Via this unit, search speeds accelerate as much as 60 times. Inexperienced personnel, as well as data processing professionals, can use the system through a simple method of asking by asking questions and referring to only one segment of the information, such as an appropriate number, date, word, or part of a word. Since the CAFS-ISP has its own processing power, the search exerts only a minimum impact on system throughput.

USER REACTION

In the 1987 *British User Ratings of Mainframes*, eleven respondents rated the ICL Series 39. The average life of those systems rated amounted to 7.56 months. The majority of users, 45.45 percent, had rented their systems from ICL, and 36.36 percent had purchased their systems. The principal applications run on the systems were Accounting/Billing (72.73 percent), followed by Payroll/Personnel (54.55 percent).

A total of 100 percent of the respondents used application programs developed by in-house personnel. In the section of the survey devoted to future acquisitions, however, 63.64 percent of the respondents indicated that within the year, they intended to acquire software from the manufacturer. A very high percentage, 72.73 percent, noted that they intended to expand their present hardware systems within the year, as well. An even higher percentage of users, 81.82 percent, expressed their intentions of expanding data communications facilities.

In the section of the survey that asks readers to specify whether their systems performed as they had expected, 72.73 percent indicated yes, 9.09 percent indicated no, and 18.18 percent noted that they were undecided. In that same section, 72.73 percent of the users indicated that they would recommend their systems to another user.

Respondents rated the following categories on a scale of 4.0 for Excellent, 3.0 for Good, 2.0 for Fair, and 1.0 for Poor. ➤

➤ not affect other nodes. Fault conditions affecting one node seldom affect any others.

Series 39 systems also run under DME (Direct Machine Environment), which emulates earlier ICL products such as the 1900 and System 4 machines. DME can run concurrently with VME under CME (Concurrent Machine Environment).

ICL has developed software that simplifies the use of the Series 39 processors and assists in the conversion of ME29-based programs to run under VME. A notable example of this type software, the Systems Administrator Menu Prompter (SAMP) gives the user selected access to VME features in menu format without restricting the operating system's full range of facilities.

ICL has also enhanced the power of the CME* operating system which enables programs written for ICL's ME29 under its native TME operating system to run unaltered on Series 39 processors, while a significant part of the machine can be used simultaneously for development and running of new applications under VME.

LANGUAGES: The Series 39 supports Algol 68, APL, Basic, Cobol, Fortran, Pascal, and RPG II compilers.

Basic: The Basic interpreter follows the informal standards set by Dartmouth Basic and by the National Computing Centre and incorporates a number of capabilities not included in earlier ICL versions of the language.

Cobol: This compiler follows the guidelines used in developing American National Standard (ANS) Cobol-74.

Fortran: This compiler is based on American National Standard (ANS) Fortran, and includes, among its enhancements, facilities for handling direct-access files. ICL also offers an Optimizing Fortran Compiler (OFC) that produces more efficient code but requires longer compilation times.

Pascal: The Pascal compiler is fully compatible with ISO standards, and conforms to the Jensen and Wirth compiler.

DATABASE MANAGEMENT: ICL offers an integrated set of products constructed around the Data Dictionary System (DDS), which is a complete system for the documentation of all aspects of applications development.

IDMS (Integrated Database Management System): IDMS is a Codasyl implementation of a network/hierarchical nature that offers a relational interface. It can be accessed via CAFS. For recovery, IDMS relies on the checkpoint/restart technique. For queries, it offers QueryMaster, as well as ReportMaster for hard copy reports.

PRODUCTIVITY/OPERATIONAL AIDS: ICL offers aids such as Text Editor, an interactive editor included with the operating system, as well as a conversion facility for changes from non-VME to VME programs or data formats. An entry level version of the QuickBuild fourth-generation software tool, known as QuickBuild S, assists customers new to VME in developing applications.

IDH: IDH (Interactive Data Handler) formats video screens and validates data input. It can also create and store screen formats, data validation parameters, and database parameters. IDH can capture, buffer, and output large volumes of source data to user files, as well as displaying extracts from user files.

SYSTEM UTILITIES: Some system accounting features come with VME; more appear under Automatic Diagnosis and Error Management System (ADEMS) which maintains logs of system errors. ➤

ICL Series 39

TABLE 4. PRINTERS

MODEL	Linewriter 400	Linewriter 800	LP2000
TYPE	Band	Band	Band
SPEED	360/300/225 lpm	720/600/440 lpm	2000 lpm
CHARACTER SET	48/64/96	48/64/96	48/64/96
PRINT POSITIONS	132	132	132/160

	<u>Weighted Average</u>	
Ease of Operation	2.82	<ul style="list-style-type: none"> • BUDGET 29: Budgeting program that gives management and variance accounts, and includes individual company and account structures • PROSPER STAR: A table-based financial modeling package • HMIS: Housing management system for local government housing, which includes management of rentals and repairs • OMAC 29: A group of packages for online manufacturing which includes database, materials requirement, and multiple site/stock planning systems • LIFEMANAGER: Quotation system for life insurance companies
Reliability of Mainframe	3.09	
Reliability of Peripherals	2.55	
Maintenance Service		
Responsiveness	2.55	
Effectiveness	2.55	
Technical Support		
Troubleshooting	2.27	
Education	2.09	
Documentation	2.64	
Manufacturer's Software		<p>PRICING AND SUPPORT</p> <p>EXCHANGE HIRE SCHEME: Under this program, ICL offers term rental contracts of 3, 4, and 5 years duration with nominated breakpoints in which processors and peripheral equipment can be changed to allow users to take advantage of the latest technology. Under this scheme, the quarterly hire charge for a Series 39 Level 15 processor with 8MB of main storage, 600MB of disk storage, magnetic tape unit, and printer starts at £4,600. The equivalent outright sale price is approximately £91,000. The cost to an existing ME29 user who retains magnetic tape units and printers to run on the Series 39 Level 15 is much lower—from £2,850 per quarter or an outright sale price of approximately £70,000.</p> <p>PRICING: Hardware pricing for the Series 39 follows.</p>
Operating System	2.91	
Compilers & Assemblers	2.91	
Applications Programs	2.27	
Ease of Programming	2.64	
Ease of Conversion	2.45	
Overall Satisfaction	2.64 □	

► **OFFICE AUTOMATION:** ICLMAIL uses English commands and extensive online help screens to provide electronic mail capabilities such as read, write, post, forward, or delete files containing text and/or VME.

APPLICATIONS SOFTWARE: The Series 39 can run a wide variety of software under VME for applications such as accounting, business, central and local government, information processing, manufacturing, and management science. Some of the programs include:

- **BACSTER** (Bankers Automated Clearing Services Transfer Exchange Routines)

PRICING FOR PACKAGED SYSTEMS

MODEL	U.K. Pricing (UKP)	French Pricing (FFR)	U.S. Pricing (USD)
Level 15	91,000	1,400,000	145,600
Level 25	—	2,000,000	—
Level 35	—	3,000,000	211,200
Level 35D	—	4,000,000	—
Level 50	450,000	—	—
Level 60	1,000,000	—	—
Level 80 (16MB)	1,000,000	—	—
Level 80 (32MB)	1,600,000	—	—

PERIPHERAL PRICES

DISKS

FDS300/300MB fixed
FDS2500/2.5GB fixed

Purchase Price—Germany (DM)

47,334
170,016

CONTROLLERS

003631/02 disk controller
003631/03 disk controller
006591/01 disk controller for FDS2500

57,627
57,624
82,320

ICL Series 39

Purchase Price—Germany
(DM)

PRINTERS

Linewriter 400
Linewriter 800
LP2000

30,870
41,160
163,408

MAGNETIC TAPE

310K bps PE/GCR
470K bps PE/GCR
780K bps PE/GCR

115,318
121,604
127,512 ■