Olivetti OC 5300 Series

MANAGEMENT SUMMARY

The OC 5300 series is marketed by Olivetti Computers SpA, a subsidiary of Ing. C. Olivetti & C. SpA, Italy's largest computer manufacturer. The three systems involved are IBM plug-compatible and are made in the United States by IPL Systems Inc. with which company Olivetti has strong ties. In fact, Olivetti owns about 24% of the capital of IPL and there exists an option whereby Olivetti can buy more stock between 1981 and 1984. If fully taken up this would increase Olivetti's holding to 32%.

One of the key characteristics of the three machines in the OC 5300 series is that they can run all of the operating systems of IBM's 370, 303X and 4300 ranges without alteration, according to Olivetti claims. This is achieved by applying advanced microprogramming techniques.

The three systems—the OC 5310, OC 5320 and OC 5330—are architecturally identical and differ from each other only in terms of processing power. The processing power of the three in terms of millions of instructions per second (mips) is 0.65 for the 5310, 0.9 for the 5320, and 1.4 for the 5330. Expansion from 5310 to 5330 can be effected on site.

Main memory capacity varies from one megabyte on the 5310 to a maximum of 16 megabytes on the 5330. A special feature, called "the over 4-megabyte feature," is required for configurations over four megabytes. Since both the OC 5320 and OC 5330 start at a capacity of 2 megabytes, this feature will be needed for most configurations of these two models. There is also a sort of cache memory available for the 5320 and 5330, although Olivetti refers to it as a "high speed buffer" memory. Cache memory functions by means of algorithms designed to optimize data accesses and, in some cases, also instruction accesses. There is apparently no algorithmic approach as far as the Olivetti high speed buffer memory is concerned. However, since it has a cycle time of 100 nanoseconds and a capacity of 8K bytes on the 5320 and 16K (8K for instructions and 8K for data) on the 5330, the buffer memory can speed processing up considerably, almost regardless of the presence or absence of optimizing algorithms, since main memory cycle time is 400 nanoseconds. In addition, this high speed buffer memory is more consistent with the 5300 processor cycle time of 50 nanoseconds.

This fast cycle time of the processor is achieved in part by the use of Emitter Coupled Logic (EPL), which while processing less data in each cycle than other mid-range computers, carries out this processing at a much faster rate. Olivetti makes the claim that this sort of approach lowers manufacturing costs and complexity because there is less logic circuitry required than with other mid-range computers.

The OC 5300 series is a range of three IBM plug-compatible computers made by IPL systems in the USA. The performance is comparable to the IBM 4341/1 and represents an interesting alternative to that and comparable systems, for example, the IBM base of fast diminishing 370/148 and 158 users. All operating systems of IBM's 370, 303X and 4300 series can be used without modification.

MODELS OC 5310, OC 5320, and OC 5330.

CONFIGURATION: 2M to 16M bytes of main memory; one byte multiplexer and up to five block multiplexer channels.

COMPETITION: IBM 4300 and 303X Series.

CHARACTERISTICS

SUPPLIER: Olivetti Computers SpA, Via del Giorgioni 63, 00147 Rome, Italy. Telephone (06) 541 0841.

MANUFACTURER: IPL Systems Inc., 12 Crosby Drive, Bedford, Massachusetts 01730, U.S.A. Telephone (617) 275-1475.

MODELS OC 5310, OC 5320, OC 5330

DATA FORMATS

BASIC UNIT: 8-bit byte. Each byte can represent 1 alphanumeric character, 2 BCD digits, or 8 binary bits. Two consecutive bytes form a halfword of 16 bits, while 4 consecutive bytes form a 32-bit word.

FIXED POINT OPERANDS: Can range from 1 to 16 bytes (1 to 31 digits plus sign) in decimal mode; 1 halfword (16 bits) or 1 word (32 bits) in binary mode.

FLOATING-POINT OPERANDS: 1 word, consisting of 24-bit fraction and 7-bit hexadecimal exponent, in "short" format; 2 words, consisting of 56-bit fraction and 7-bit hexadecimal exponent, in "long" format; or 4 words in "extended precision" format.

INSTRUCTIONS: 2, 4 or 6 bytes in length, specifying 0.1 or 2 memory addresses, respectively.

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

MAIN STORAGE

STORAGE TYPE: Metal oxide semiconductor (MOS).

CAPACITY: From 4,048,576 bytes to 8,388,608 bytes in increments of 1,048,576 bytes. Up to 46MB in the OC 5330.

CYCLE TIME: 400 nanoseconds for both read and write operations.

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The most important architectural feature of the OC 5300 series is the bus, which is the main data highway and connects all the component parts of the system. Each of these parts can be compared roughly with a printed circuit board. The components are: main memory, the storage control unit, the high speed buffer, reloadable control storage, the execution unit, the instruction unit, the storage to storage unit, the console, and the Input/Output channels. The bus has a maximum total data rate of 80 megabytes per second.

Main memory and the high speed buffer have already been described. The function of some of the other units may not be altogether clear from their titles. Perhaps the most significant of these elements is the Reloadable Control Storage. It consists of 64 kilobytes of memory and contains the microcode and the microcoded diagnostic programs. What is significant about this reloadable control storage is that loading is done each time at machine start-up from a floppy disk drive. This means that Olivetti can alter the microcode to suit any changes which may be implemented by IBM in hardware or software.

Regarding other units—the storage control unit's job is monitoring access requirements from other units to the bus, the execution unit executes instructions, the instruction unit fetches instructions from main memory (5310 and 5320) or from high speed buffer (5330); and the storage to storage unit is a dedicated processor which executes storage to storage instructions. All these units optimize speed and throughput and are more technical than management oriented. But the console is certainly important to management and others. On the 5300 series, a black and white screen is standard, but one option is a color unit and a second option is a purely printer console with a 180 character-per-second printer. The console is integrated with the central processor of the machine. As an effective part of the console, but actually placed beneath it, is the floppy disk drive already mentioned in connection with the reloadable control storage.

Maintenance is another important responsibility of suppliers of machines. As far as the Olivetti series is concerned, the vendor claims that maintenance is minimized by the flexibility and modularity of bus architecture, by the facility of isolating faulty components by means of the use of microdiagnostics (that is, diagnostic software in microcoded form) loadable from the floppy disk drive, and also by the option of having remote maintenance effected by Olivetti engineers using a line connected to a video console on the OC 5300 series site. In addition to these features, actual errors are dealt with in the following manner: single-bit errors are corrected, all double-bit errors are detected.

Software for the OC 5300 series includes the standard IBM operating systems—DOS/VS, DOS/VSE, VM/-370, OS/VS1, MVS/SE and MVS/SP. In addition there are various microcoded subprograms which can be

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 and signaled so that appropriate program action can be taken.

STORAGE PROTECTION: The Store and Fetch Protection features, which guard against inadvertent overwriting and/or unauthorized reading of data in specified 2048-byte blocks of storage, are standard.

CENTRAL PROCESSORS

The OC 5300 series maintains full compatibility with IBM 4300, 303X and system/370 CPUs except for those programs that contain time-dependent coding.

The OC 5320 and OC 5330 processors include a high-speed buffer memory and instructions pre-fetch hardware.

REGISTERS: The OC 5300 processors contain sixteen 32-bit general-purpose registers that can be used for indexing, base addressing, and as accumulators; four 64-bit floating-point registers; and sixteen 32-bit control registers.

INSTRUCTION REPERTOIRE: The OC 5300 processors feature the IBM System/370 Commercial Instruction Set with two exceptions: the Store Channel ID instruction cannot set condition codes 1 and 2; and the two instructions associated with direct control, READ DIRECT and WRITE DIRECT, are not provided.

OPERATIONAL MODES: Like the System/370, the OC 5300 processors can operate in either the Basic Control (BC) mode or the Extended Control (EC) mode. In the Extended Control mode, certain bits of the Program Status Word are interpreted differently than they are in the Basic Control mode. In addition, the reserved portion of lower main memory is altered. Both these changes are implemented in order to facilitate dynamic address translation and thereby support the virtual memory operating systems.

PROCESSOR FEATURES: The OC 5300 processors incorporate the following standard features: the System/370 Commercial Instruction Set; floating-point facilities including extended-precision; storage protection for both store and fetch operations; conditional swapping (a standard IBM 370/138 feature); a console printer and keyboard; a console file for initial microprogram loading; control registers; dynamic address translations, (in System/370 mode only); extended control program support (ECPS; VSE) mode; single-bit error correction; machine check handling; program-event recording; the standard System/370 timing facilities including the interval timer, clock comparator, and CPU timer, and time-of-day clock; channel retry facilities and channel indirect data addressing; microprogrammed instruction retry; and standard microcode enhancements, including extended control mode. OS/DOS compatibility, and advanced control program support and virtual machine assist are standard, as on the IBM 370/148.

A unique double-word buffer that provides greater levels of throughput is included with each block multiplexer channel.

MULTIPROCESSOR CONFIGURATIONS: The OC 5300 processors are intended for use only in uniprocessor configurations. No hardware support for multiple-processor systems has been provided; however, users with IBM systems possessing the Channel-to-Channel Adapter can implement these systems.

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utilized. These are usually specifically designed to speed up some frequently used parts of the operating or other systems offered—although Olivetti does not state specifically what the objectives of these microcoded subprograms are.

Advantages cited by the vendor of the 5300 series vis-a-vis the IBM 4300 series are that the 5300 series is faster (0.65 to 1.4 mips against IBM's 0.7 to 1.3 mips—hardly significant), the 5300 bus structure is better, the 5300 physical characteristics (space, heat output, power requirements) are lower and that delivery time and price/performance ratio are better.

Competition for the OC 5300 range occurs from IBM's 4341 and 3031, from the Univac 1100/60 and from the products of several European manufacturers as well as other PCMs, such as National Advanced Systems' AS/5-3.

However, the Olivetti market for these OC 5300 machines seems to be well established with 35 systems installed by December 1981—10 Model 5310s and 25 Model 5320s.

BACKGROUND

A wholly owned subsidiary, Olivetti Computers SpA was set up in September 1979 by Olivetti, with the main object of marketing its DP products and especially those at the top end of the market. The share capital of the then new company was 4 billion Italian lire. The board comprises seven members, all of whom are senior managers of Ing. C. Olivetti & C., SpA, the parent Ivrea-based company.

Apart from recruitment and assignment of personnel for the company, the end of 1979 and initial part of 1980 were occupied by the negotiation of two agreements—the first with IPL for the supply of medium power systems (OC 5300) and the second with the Japanese company, Hitachi, for the supply of large processors (OH 5520, OH 5530, OH 5545). A further agreement with Hitachi was signed in July 1980 for the provision of its new very large systems (Olivetti 5560).

INPUT/OUTPUT CONTROL

The OC 5310 processor supports one byte MPX channel and up to four block MPX channels. The OC 5320 and OC 5330 processors support one byte multiplexer channel and up to five block multiplexer channels.

Each byte multiplexer channel has 256 unshared subchannels and can address up to 256 devices. Similarly, each block multiplexer channel can have up to 256 subchannels. Unit control words (UCWs) can be dynamically assigned from a pool of 432 unshared and 16 shared UCWs.

The maximum byte multiplexer channel data rate is 50,000 bytes per second in normal operating mode and 180,000 bytes per second in burst mode. Any block multiplexer activity reduces the byte multiplexer data rate.

Each block multiplexer channel has a maximum data rate of 3.0 million bytes per second. The aggregate data rate for all block multiplexer channels in a system with 6 channels is 42 million bytes per second.

PERIPHERAL EQUIPMENT

The OC 5300 series can utilize all IBM System/370, 43XX, 303X input/output and mass storage devices, except those devices that required the Direct Control feature or integrated controlles and adapters, as well as the plug-compatible counterparts from other vendors. Detailed coverage of many of these peripherals can be found in Volume 2 of DATAPRO 70.

SOFTWARE

The OC 5300 series fully supports the following IBM operating systems: DOS/VSE in S/370 mode and in ECPS; VSE mode, OS/VS1, MVS/SP and VM/SP.

PRICING

There is very heavy competition between rival vendors of IBM plug-compatible equipment and none is prepared to give much information on prices. In Olivetti's case no data are available.■

Olivetti Computers SpA has branches in several Italian cities and has established subsidiaries in Spain and Great Britain.□