Olivetti OC 5300 Series

MANAGEMENT SUMMARY

The OC 5300 series is marketed by Ing. C. Olivetti & C. SpA, Italy's largest computer manufacturer. The systems are IBM plug-compatible and are made in the United States by IPL Systems Inc. Olivetti owns about 24% of IPL and 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. This is achieved by applying advanced microprogramming techniques.

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 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 cache memory available for the 5320 and 5330, which Olivetti refers to as a "high speed buffer" memory. Cache memory functions by means of an algorithm designed to optimize data accesses and, in some cases, also instruction accesses. The high speed buffer memory 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 up processing considerably 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 processor cycle time is achieved in part by the use of Emitter Coupled Logic (ECL), 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 most important architectural feature of the OC 5300 series is the bus, which is the main data highway and connects all the components 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. ➢

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. 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: Ing. C. Olivetti and C. S.p.A., Direzione Olivetti Computers, Via Neravigli, 12, 20123 Milan, Italy. Telephone (02) 88361.

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

MODELS: OC 5310, OC 5320, OC 5330.

NUMBER INSTALLED TO DATE: By June 1983 a total of 54 OC 5300 machines had been installed: 13 Model 5310s, 27 Model 5320s and 14 Model 5330s.

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

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 16MB in the OC 5330. ➢

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The function of some of the 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.

On the 5300 series, a black and white screen is standard, but one option is a color unit and a second option is a 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.

Olivetti claims that maintenance is minimized by the flexibility and modularity of bus architecture, by the facility of isolating faulty components by means of microdiagnostics (that is, diagnostic software in microcoded form) loaded from the floppy disk drive. Also optionally remote maintenance can be effected by Olivetti engineers using a line connected to a video console on the OC 5300 series site.

Software for the OC 5300 series includes the standard IBM operating systems—DOS/VS, DOS/VSE, VM/370, OS/VSI, MVS/SE and MVS/SP. In addition there are various microcoded subprograms which can be utilized. These are usually specifically designed to speed up some frequently used parts of the operating or other systems offered.

COMPETITION

The main competition to the OC 5300 is from IBM with the 4341 and 3031 and from Sperry 1100/60, as well as products from several European manufacturers and other PCMs such as National Advanced Systems AS/5-3.

ADVANTAGES AND RESTRICTIONS

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 delivery time and price/performance ratio are better.□

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

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 instruction 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 Commerical 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

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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.

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 controllers 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 is available.■