NAS Advanced Systems

Product Enhancement

On January 31, 1983, National Advanced Systems announced the new medium-scale AS/6600 Series, which replaces the AS/6100 Series. The AS/6600 Series comprises three models: the AS/6620 with performance approximating the IBM 4341-12, the AS/6630 with performance approximately 20 to 30 percent greater than that of the IBM 4341-12, and the AS/6650 with performance approximately 45 to 55 percent greater than that of the IBM 4341-12.

The processor cycle time is 60 nanoseconds on Models AS/6620 and AS/6630 and 50 nanoseconds on the AS/6650. The AS/6600 Series' basic configuration includes four megabytes of main memory which is expandable to 16 megabytes in four-megabyte increments. All of the models in the AS/6600 Series come standard with five integrated I/O channels. On the AS/6620 and AS/6630, the number of channels can be increased to eight. On the AS/6650, the number of channels can be increased to 10. Data transfer rates of up to three megabytes per second can be attached by all block multiplexer channels which support data streaming protocol. The maximum channel aggregate data rate is 13 megabytes per second on the AS/6620 and AS/6630 and 16 megabytes per second on the AS/6650. The aggregate data rate has been increased and main storage contention has been reduced as a result of a two-way interleaving technique implemented in main storage. The multiple-bit error detection, which is a standard feature of main storage, has also been improved.

Reductions in the amount of heat created, power usage, air-conditioning requirements and operating costs are a result of increasing the density of the semiconductor circuitry. This is done through the use of a 1500-gate and 550-gate LSI emitter coupled logic integrated circuits. Main storage is implemented with 64K-bit NMOS memory chips. High-speed switching, along with features such as instructional prefetching, large capacity buffer storage, and high-speed address translation result in the exceptional performance of the AS/6600 Series, according to NAS.

Microprograms and failsoft design make up the special features of the AS/6600 CPU. Microprograms control instruction execution. "Staticize" functions, including instruction prefetching and byte alignment, increase the effective rate of instruction execution.

The failsoft design increases system availability by performing extensive parity checking of the data being used. Extensive error checking is done through the use of firmware assist features and microdiagnostic programs to ensure the validity of arithmetic, logic, and data transfer operations. If a malfunction is detected during instruction execution, an instruction retry capability allows the CPU to retry a failing instruction.

A high-speed arithmetic unit is available on the AS/6650 which speeds the execution of arithmetic instructions. Floating-point add, subtract, and multiply instructions are processed at more than three times normal speed. Floating-point divide, fixed-point multiply and divide, and decimal multiply and divide instructions are processed up to two times faster than normal.

The AS/6600 Series contains a console service processor which includes an independent processor with a seven-color CRT display, a keyboard and operator panel, two diskette drives, and an optional printer. The operator console is used to perform operator/system communication, perform diagnostic functions, and display system status data and messages. The keyboard has alphanumeric and numeric keys, symbol keys, cursor control keys, and 12 program function keys. The operational microcode and diagnostic programs used to test the system are contained within the diskette drives. A console printer, which operates at a speed of 180 characters per second is an available option. When used in printer/keyboard mode, the console keyboard is used for input and the printer is used for output. In display mode, the printer is used as a hardcopy output device which is separately addressable from the console display unit.

The AS/6600 Series is capable of operating in both 4300 ECPS:VSE and System/370 compatible modes of operation. Each can be selected at initial microprogram load and provides the flexibility to support, without modification, any of the following virtual operating systems: DOS/VS or DOS/VSE, VM/370 or VM/SP, OS/VS1, and MVS, MVS/SE, or MVS/SP.

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The remote maintenance adapter is a standard feature on all AS/6600 Series systems delivered in the United States and Canada. This adapter connects the system console and the NAS Remote Support Center through the use of telephone communication lines. This connection for remote diagnostics provides specialists at the NAS Center with the ability to execute the majority of functions performed on-site by NAS field engineers. The optional channel-to-channel adapter allows CPUs to exchange data via multiplexer channels. This adapter is typically used as a communication link, to improve throughput in a multiple-CPU environment. Another option, direct control, enables the CPU to interface directly with another processor or peripheral. Six separate external interrupt lines provide timing signals to transfer each byte of information between the AS/6600 processor and external devices.

Microcode enhancements include the ECPS:VSE microcode, which now supports DOS/VSE when running in native mode. Other enhancements involve MVS, including ECPS:MVS, Extended Facility, and Shadow-Table-Bypass Assist. ECPS:MVS contains the Dual Address Space Feature, Page Fault Assist, and the ADD FRR (Functional Recovery Routine) instruction. Dual Address Space, which is a hardware/firmware extension for MVS/SP Version 1 Release 3, improves communication between MVS address spaces by providing a means to directly transfer data or program control. Extended Facility provides support to MVS/SE and MVS/SP by implementing privileged instructions in the microcode to assist several MVS functions. This facility is required to run MVS/SE and MVS/SP Version 1. The Shadow-Table-Bypass Assist enhances the performance of virtual machines in a VM/370 environment for which the virtual-read option is specified. This assist reduces the overhead of dynamic address translation by partially or totally eliminating duplicate segment and page tables maintained by the control program. A co-residency feature will allow concurrent residence and operation of MVS and VM microcode assists on AS/6600 processors. The following are included in this feature: ECPS:VM, Extended Facility, and Shadow-Table-Bypass Assist.

Enhancements have been made to the reliability, availability, and serviceability features which improve system performance in the AS/6600 Series. System design, including high-density, proven technology, and extensive testing at the component, subassembly, assembly, and system levels during manufacturing help to improve reliability. Error detection, error recovery, and error logout and diagnosis are functions in the design which increase system availability. In addition, channel retry and instruction retry features further enhance system availability and reduce CPU overhead. Serviceability has been improved by replacing components at the circuit board level, by employing console isolation codes for rapid problem isolation, and by providing remote support capabilities.

A four-megabyte, five-channel system will cost $370,000 for the AS/6620, $465,000 for the AS/6630, and $580,000 for the AS/6650. Availability of the AS/6600 Series is planned for the third quarter of 1983, according to NAS.□