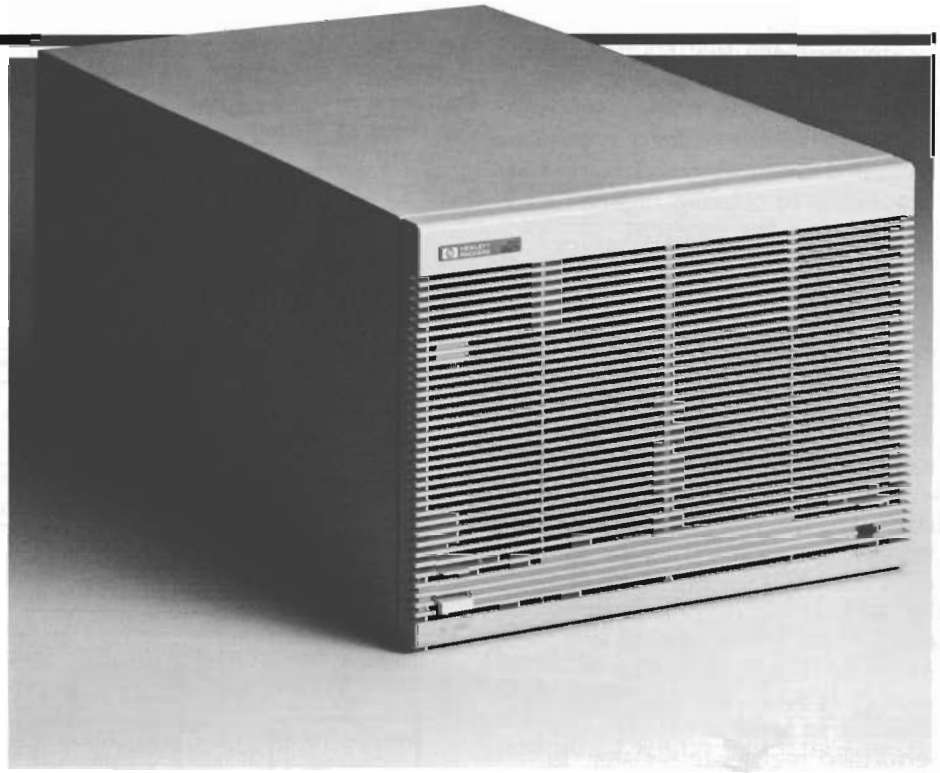
HEWLETT-PACKARD

Series 925LX System

HP 3000 Computer Systems

Data Sheet



Description

The HP 3000 Series 925LX is a midrange member of the HP 3000 family of business computers. Since it is compatible with the other HP 3000 systems, a multitude of business solutions is available for the Series 925LX—making it the ideal computing system for small- to medium-sized businesses, departments, and remote office locations.

The Series 925LX is based upon HP Precision Architecture, a reduced instruction set computer approach that provides increased power—at a lower cost than more complex designs. Utilizing sophisticated NMOS III Very Large Scale Integration (VLSI) circuit technology, the Series 925LX delivers superminicomputer performance in a surprisingly small size. The hardware performance of the Series 925LX combines with the enhanced MPE XL operating system to provide excellent throughput and industry leading price/performance—in both transaction processing and batch data processing environments. And the Series 925LX enables Hewlett-Packard customers to keep pace with their computing environments, since it can be easily upgraded to higher performance by simply replacing processor cards on site. The Series 925LX is available in a compact, attractive cabinet with the capacity to rack mount an entire entry level system. It can also be easily expanded to handle larger terminal and disc configurations. The Series 925LX is highly reliable due to its low number of parts and does not require a special computer room environment. And it is backed by the high standards of quality and support for which the HP 3000 is known.

Features

- HP Precision Architecture
- 3.2 mips CPU performance
- 48-bit virtual addressing
- 16-Kbyte high-speed CPU cache
- Advanced-instruction pipelining techniques
- 24-Mbyte ECC memory standard, expandable to 48 Mbytes
- High-performance floating point coprocessor
- 2048-entry translation lookaside buffer for virtual-to-physical address translations
- Battery backup, auto restart
- I/O bus
- Low power and cooling requirements
- Support for up to 32 users
- Terminal connection via IEEE 802.3 local area network
- MPE XL operating system
- Network and relational database management systems standard

HP Precision Architecture

The Series 925LX uses HP Precision Architecture (HPPA) to achieve high performance and reliability at a low cost. HPPA is based on the concept of reduced instruction set computing (RISC), a design approach that leads to greatly simplified computers that are optimized to provide the highest performance for a given integrated circuit (IC) technology. In addition to offering higher performance, the inherent simplicity of HPPA means lower cost and higher reliability because machines can be implemented with fewer components.

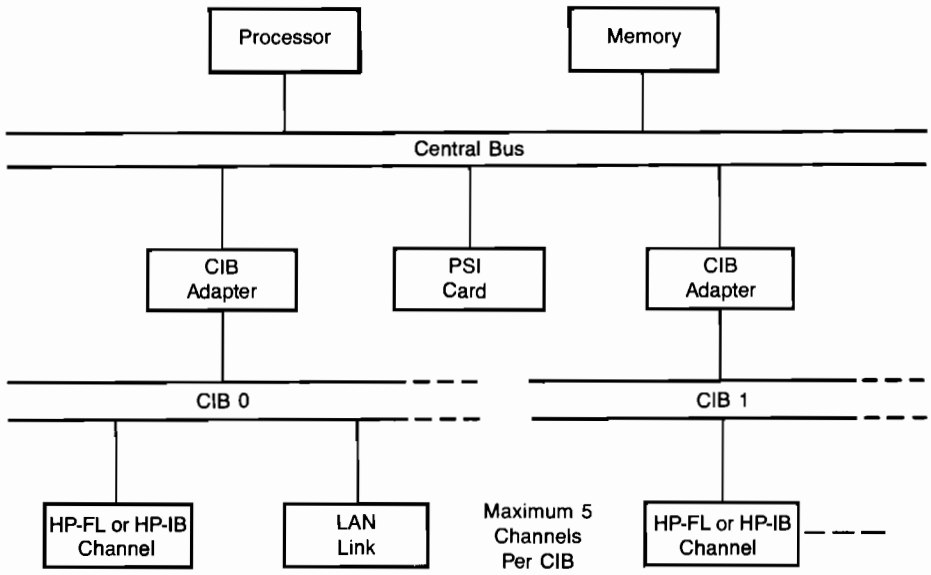
At the core of HPPA is an instruction set containing 140 carefully selected, fixed-format instructions. Because the instruction set is simple, instructions can be hardwired directly into the central processing unit (CPU). This eliminates the need for microcode and the necessity to decode complex instructions. HPPA utilizes a load/store design to reduce the number of relatively slow memory accesses, as most operations are performed register-to-register. To further enhance performance, optimizing compilers are used to schedule instructions and manage the instruction pipeline. With hardwired control, a load/store design, and optimizing compilers, one instruction is executed with virtually every clock cycle. Single-cycle execution provides much of the performance benefit of HPPA over traditional architectures.

HPPA also incorporates many other features unrelated to RISC which greatly enhance its functionality. For example:

- Support for coprocessors (i.e., floating point)
- Extended addressing
- Memory-mapped I/O subsystem

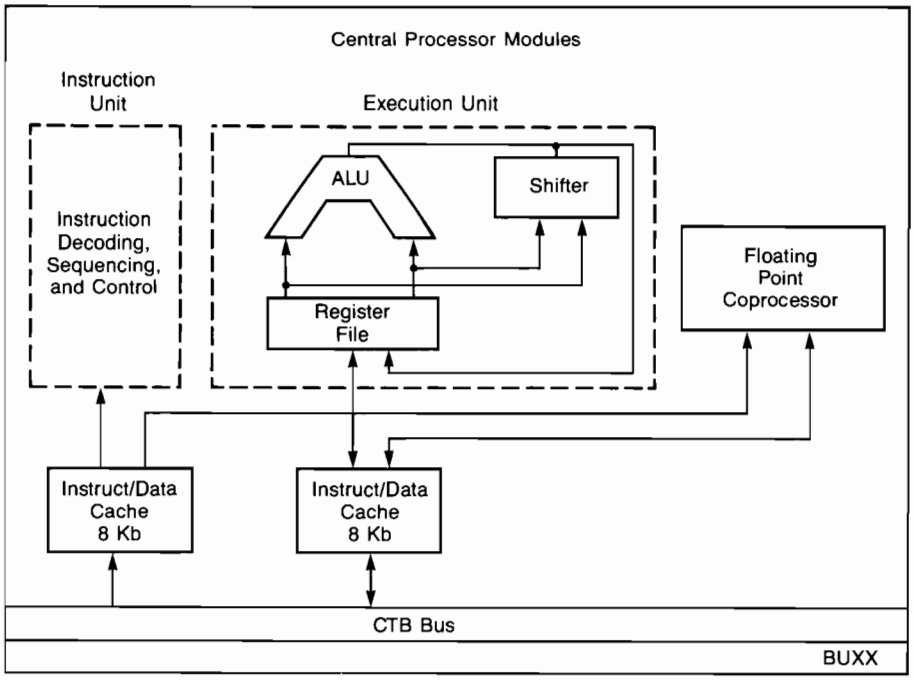
System Organization

The processor communicates with memory and I/O via the central bus (CTB). The central bus provides a 32-bit data path and can support data transfer rates of up to 20 Mbytes/second. The CTB supports up to two PSI cards, allowing HP 3000 900 Series systems to be linked to other computers in a distributed data processing environment. The CTB is interfaced to a separate 16-bit-wide channel I/O bus (CIB) via a CIB adapter. The CIB supports I/O interfaces to peripheral devices and datacommunications links.



HP Computer Museum
www.hpmuseum.net

For research and education purposes only.



The Series 925LX Processor

The Series 925LX processor is a two-board set implemented with NMOS VLSI logic. With hardwired control, the Series 925LX is capable of executing one instruction every 80-nanosecond clock cycle. Separate instruction and execution units facilitate pipelining and allow for efficient, parallel use of processor resources.

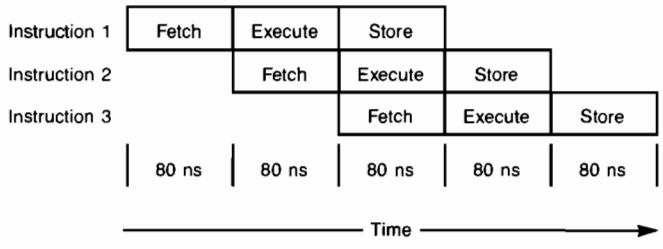
Caches

The cache is a high-speed buffer for the CPU that minimizes the number of relatively slow transactions with main memory. The Series 925LX uses a 16-Kbyte, high-speed, integrated CPU cache for data and instructions. The cache uses a write-to management scheme, is two-way associative (direct mapped), and is organized in sets of 256 cache lines, with 32 bytes per cache line. Data modified in the cache is written to main memory only when the processor requires other data to be in that cache location, or when a direct memory access (DMA) operation is performed within that data area, or upon a power fail.

Instruction Pipelining

The Series 925LX is pipelined at the instruction level, such that three instructions can be operated on simultaneously. The instruction pipeline consists of three 80-nanosecond stages. During the first stage the instruction is fetched from the I-Cache and is decoded. The specified function or calculation is performed during the second stage, and in the third stage the result of the calculation is saved to a CPU general purpose register. Excepting penalties for cache misses, etc., the net effect is that one instruction is completed with every 80-nanosecond CPU cycle.

Instruction Pipelining



Floating Point Coprocessor

Single-precision and double-precision floating point calculations are performed by a floating point coprocessor on the system board. The coprocessor significantly decreases the time required to perform floating point calculations. The floating point coprocessor and the CPU can operate in parallel, thus allowing for increased performance in applications that utilize floating point.

Virtual Memory Management

Virtual addresses on the Series 925LX are 48-bits in length, ensuring sufficient expandability to meet evolving software needs. Virtual memory is divided into a set of 65,536 spaces, with each space being 4 Gbytes in length. Spaces are further divided into fixed-length 2-Kbyte pages, with a given page holding either data, code, or both. A single data structure can be up to 1 Gbyte, and code can span multiple spaces.

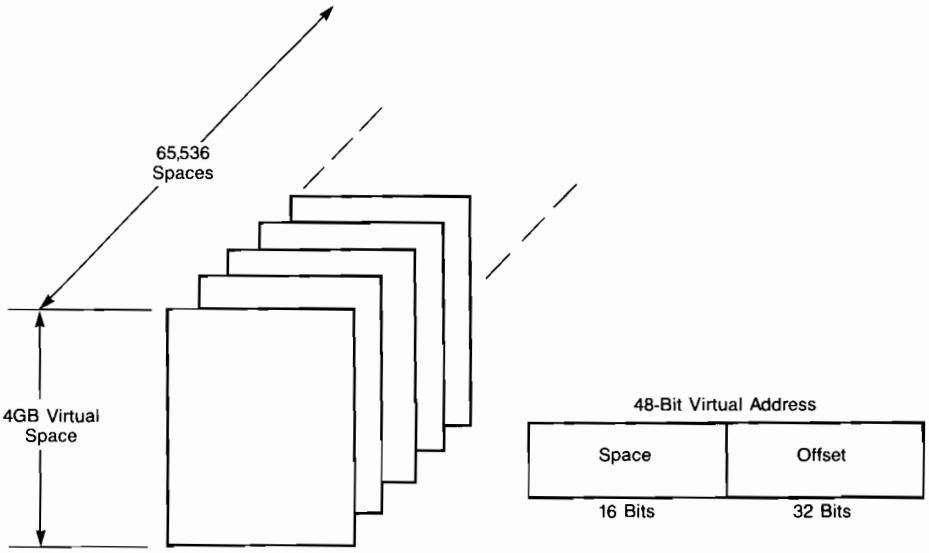
Virtual Address Translation

Virtual-to-physical address translation is done by translation lookaside buffers (TLBs), which cache recently accessed virtual page translations and convert the 48-bit virtual address into a 29-bit real address. The Series 925LX TLB holds translations for 2,048 virtual pages and is split into a 1,024-entry instruction TLB and a 1,024-entry data TLB. Page-level access protection is provided on the Series 925LX, and the TLB hardware supports protection mechanisms to ensure that the currently executing process has sufficient authorization to perform the requested data, code, or I/O access.

Memory Subsystem

The Series 925LX supports 24 Mbytes of main memory standard and is expandable to 48 Mbytes in 8-Mbyte increments. The memory subsystems use 1 Mbit nibble-mode dynamic RAMs. Main memory has battery backup to ensure that information is maintained for a minimum of 15 minutes in the event of an interruption in AC power. This allows the operating system to be automatically restarted and processing to continue without data loss upon resumption of power.

The internal memory word size is 72 bits, with 64 data bits plus 8 bits for error detection and correction. There are also 8 correction bits per cache line. Single-bit memory errors are automatically corrected, with automatic detection of all double-bit errors.



I/O Subsystem

I/O Buses

The channel I/O bus (CIB) supports up to seven cards for interfacing peripheral devices and providing datacommunications functions. Each CIB adapter provides DMA functions and supports up to a 5 Mbytes/second data throughput capability. The CIB adapter directly interfaces with the central bus (CTB). The CTB runs synchronously with an 8-MHz clock and can support data transfer rates of up to 20 Mbytes/second.

Memory-Mapped

Input/output operations are initiated and controlled via a memory-mapped I/O scheme, such that the processor only needs to access reserved virtual or physical memory locations to control I/O operations. Memory-mapped I/O allows for streamlined I/O operations and thus increases system performance in I/O intensive applications.

Peripheral Connections

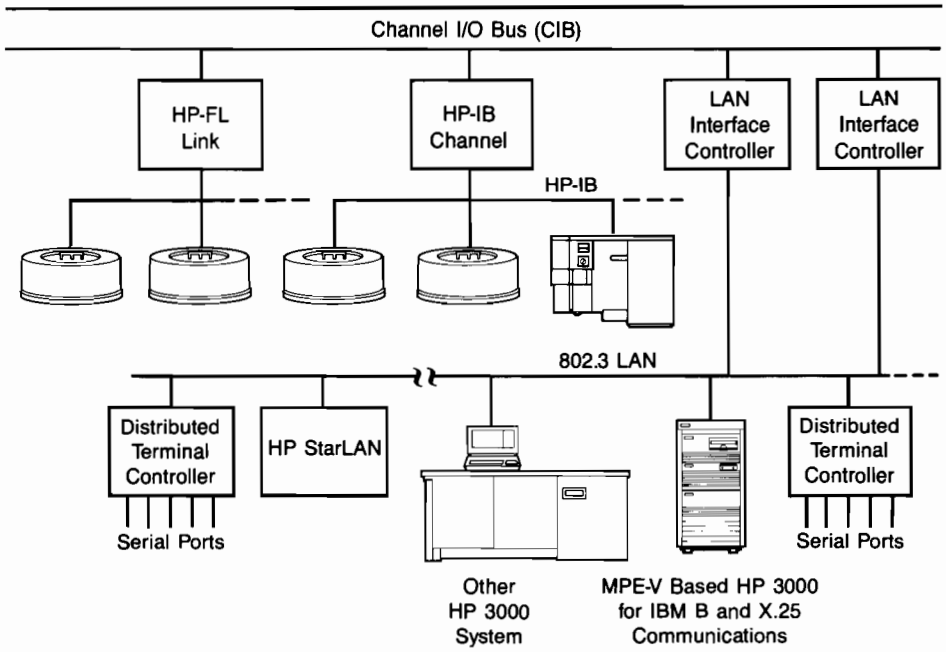
Discs, tapes, and printers are connected via an HP-IB channel that supports the 8-bit-wide, IEEE-4888 standard Hewlett-Packard Interface Bus (HP-IB). Each HP-IB card supports up to six peripheral devices. Discs are also connected via HP Fiber-optic Link Channels (HP-FL), each supporting up to 8 discs.

Workstation and Serial Printer Connection

Connections for workstations, serial printers, and other serial devices are provided via one or more distributed terminal controllers (DTCs), which are distributed over an IEEE 802.3 standard local area network (LAN). This flexible connection scheme allows DTCs to be situated in the department that they service, saving the cost and effort of running cables from each workstation back to the processor. Each DTC can support up to 48 direct connect ports, or 36 modem ports, or a combination of the two. Both RS-232C and RS-422C interfaces are supported. PCs can also be connected to the 802.3 LAN via HP StarLAN which is a local networking scheme using unshielded twisted pair (or phonewire).

System Packaging

The Series 925LX is available in two compact, attractive cabinets; a .53-meter and a 1.6-meter cabinet. The .53-meter cabinet is capable of holding the SPU. The 1.6-meter cabinet has been uniquely designed to hold an entire modular system in a very small amount of space, maximizing the efficiency of office or computer room space. It is capable of holding the SPU, one DTC, a magnetic tape drive, and two disc drives.



Environmental Specifications

Regulatory Compliance	Safety compliant with UL 478, CSA 220, and IEC 380/435.
Electromagnetic Interference	Complies with FCC Rules and Regulations, Part 15, Subpart J, as a Class A computing device. Manufacturer's declaration verifies VDE level B.

AC Power Input Voltage/Frequency:

Range	Tolerance	Maximum Current
100V	90-108 VAC, 48-66 Hz	9.5A
120V	108-132 VAC, 48-66 Hz	8.0A
240V	180-264 VAC, 48-66 Hz	5.3A

Physical Dimensions

Height: 234 mm (9.21 in.)
Width: 325 mm (12.8 in.)
Depth: 500 mm (19.7 in.)

Weight: 23 kg (51 lbs)

Operating Temperature: 0 to 55 degrees C (32 to 131 degrees F)

Nonoperating Temperature: −40 to 75 degrees C (−40 to 167 degrees F)

Relative Humidity: 5% to 95% at 0–40 degrees C, noncondensing

Altitude (operating): To 4.6 km (15,000 ft.)
(non-operating): To 15.3 km (50,000 ft.)

Battery Backup Time, Minimum: 15 minutes

Acoustics: 5.0 bels (A) sound power

System-to-System Datacommunications

NS3000/XL and LAN Link/XL provide virtual terminal, network file transfer, remote file and database access, network interprocess communication, and remote process management between HP 3000s on an IEEE 802.3 LAN. These same capabilities for remote communications are currently provided via an MPE V HP 3000 system. SNA IMF, SNA NRJE, and SNA Link provide HP 3000 to IBM system communications.

System Software

Listed below are software products currently available for the HP 3000 Series 925LX as of MPE XL Release 1.1. This list will be expanded over time as development and testing of additional software products continues. Check with your local sales representative for more information.

Operating System

MPE XL

Datacommunications

NS3000/XL
LAN Link/XL
SNA IMF
SNA NRJE
SNA Link

Utilities	Office Automation
EDIT/V	TDP/V
FCOPY/XL	HP/Spell/V
SORT-MERGE/XL	HP Deskmanager
	HP Curator
	HP AdvancePrint

Languages

COBOL II/V	
COBOL II/XL	HP Business BASIC/V
HP Pascal/V	HP BASIC/V
HP Pascal/XL	SPL/V
HP FORTRAN 66/V	RPG/V
HP FORTRAN 77/V	HP C/XL
HP FORTRAN 77/XL	

Information Management

ALLBASE	Query/V
TurboIMAGE/XL	Transact/V
Visor/XL	Transact/XL
TurboIMAGE DBchange/V	VPLUS/V
HP System Dictionary/XL	KSAM/V
Inform/V	Dictionary/V
Report/V	BRW/V
HP Toolset/XL	BRW/XL
Information Access/XL	

Application Software

A wide range of solutions is available for the HP 3000 systems in application areas that include manufacturing, financial management, and information management. Your sales representative can provide more information that is specific to your needs.

Supported Peripherals

Listed below are peripheral devices currently available for the HP 3000 Series 925LX as of MPE XL Release 1.1. This list will be expanded over time as development and testing of additional peripherals continues. Check with your sales representative for more information.

Terminals				
2392			HP Vectra PC	
2393			Portable Plus	
2397			HP Vectra CS	
2394			HP Vectra ES, ES12	
700/92			Touchscreen II PC	
700/94				
Disc Drives				
7937H/XP			7935H/XP	
7933H/XP			7936H/XP	
			7937FL	
Tape Drives				
79798A/B			7979A	
7974A			7980A	
Printers				
2680	2566A/B	2686	2563A/B	2567B
2688	2565A	2934	2564B	LaserJet 2000

Support Services

A wide range of hardware and software support services is available worldwide for all HP 3000 products. Contact your HP sales representative for details on available support services.

Ordering Information

The HP 3000 Series 925LX SPU includes 24-Mbyte main memory, one CIB, one LAN interface, a console connection, and two HP-IB channels. Return credits are available when upgrading other HP 3000 systems to the Series 925LX. For more information contact your local HP sales office.

Technical information in this document is subject to change without notice.

Copyright © 1988 Hewlett-Packard Company

Printed in U.S.A. M0288
5951-0691IC

HEWLETT PACKARD