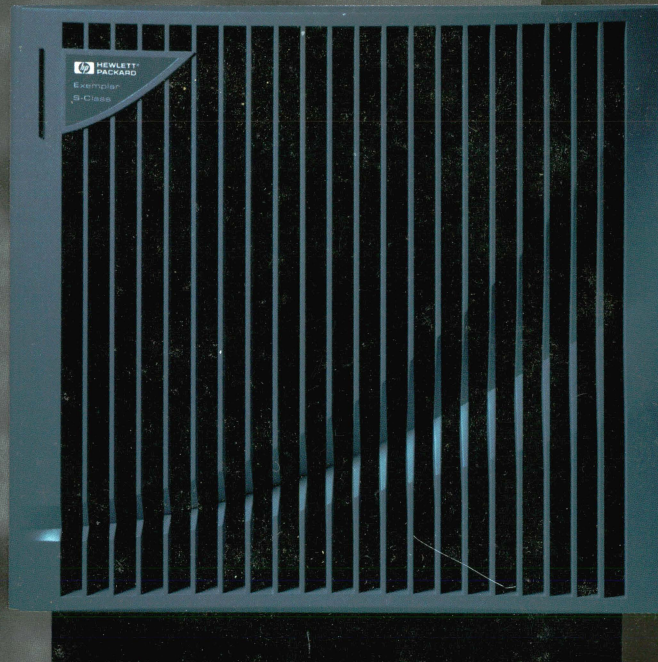




HP EXEMPLAR TECHNICAL SERVERS

S-CLASS & X-CLASS

THE COMPETITIVE
ADVANTAGE FOR THE TECHNICAL
ENTERPRISE



BUSINESSES, GOVERNMENTAL AGENCIES AND RESEARCH ORGANIZATIONS TODAY FACE INTENSIFIED GLOBAL COMPETITION THAT REQUIRES RE-ENGINEERING PEOPLE AND PROCESSES TO ACHIEVE A SIGNIFICANT COMPETITIVE ADVANTAGE. THE INNOVATIVE USE OF ADVANCED TECHNOLOGY TO MOVE FROM AN ENGINEERING VISION TO PRACTICAL, REAL SOLUTIONS IN AS LITTLE TIME AS POSSIBLE IS WHAT SETS LEADERS APART. COMPANIES MUST DRIVE TO SHORTEN PRODUCT DEVELOPMENT TIMES, LOWER MANUFACTURING COSTS AND INCREASE QUALITY. AGENCIES AND RESEARCHERS MUST FIND MORE EFFICIENT WAYS TO USE RESOURCES TO DEVELOP SERVICES AND DELIVER RESULTS.

WHETHER THE JOB IS TURNING SEISMIC DATA INTO PRODUCTIVE OIL AND GAS WELLS, MECHANICAL GEOMETRIES INTO A SPORTS UTILITY VEHICLE, INTERNET INFORMATION INTO A COMPETITIVE BUSINESS ADVANTAGE, OR A FINGERPRINT AT A CRIME SCENE INTO AN ARREST AND CONVICTION, THE NEED IS THE SAME: CONVERTING DATA INTO USABLE PRODUCTS OR INFORMATION AS QUICKLY AS POSSIBLE.

TO GIVE ENGINEERS AND RESEARCHERS EVERY ADVANTAGE, THEY NEED HIGH-PERFORMANCE, HIGH-CAPACITY SYSTEMS TO SOLVE LARGE, COMPLEX PROBLEMS IN MINIMAL TIME. THEY NEED THE APPLICATION SOFTWARE TO DO THEIR JOBS. THEY NEED EASY-TO-USE DEVELOPMENT TOOLS TO HELP SPEED THEIR WORK. THEY NEED CONNECTIVITY TO OTHER ENGINEERS AND SCIENTISTS ON THE TEAM. AND THEY NEED EXPERT SUPPORT FROM A TRUSTED PARTNER.

THE SOLUTION: HEWLETT-PACKARD'S EXEMPLAR S-CLASS AND X-CLASS SERVERS. AS THE HIGH-END COMPUTE SYSTEMS IN HP'S FAMILY OF EXEMPLAR TECHNICAL SERVERS, THE S-CLASS AND X-CLASS SYSTEMS GIVE DESIGNERS, ENGINEERS AND RESEARCHERS NEW LEVELS OF PERFORMANCE TO SOLVE PROBLEMS TOO LARGE OR COMPLEX FOR DESKTOP WORKSTATIONS OR DESKSIDE SERVERS. THESE SYSTEMS DELIVER SCALABLE COMPUTE POWER BASED ON THE WORLD'S FASTEST MICROPROCESSOR, HP'S PA-8000, A SUITE OF THIRD-PARTY APPLICATIONS TUNED FOR HIGH-PERFORMANCE PARALLEL PROCESSING AND ACCESS TO THOUSANDS OF APPLICATIONS USED ON HP WORKSTATIONS. THE S- AND X-CLASS ARE FOURTH-GENERATION SYSTEMS BASED ON A PROVEN ARCHITECTURE DESIGNED TO DELIVER A COMPETITIVE ADVANTAGE.

THESE SYSTEMS FURTHER REPRESENT HP'S STRONG COMMITMENT TO HIGH-PERFORMANCE COMPUTING. NO OTHER TECHNICAL COMPUTING VENDOR OFFERS CUSTOMERS THE PRICE/PERFORMANCE VALUE, THE WELL-DEFINED PRODUCT PATH, THE FULL RANGE OF SOFTWARE APPLICATIONS AND THE BALANCED SCALABILITY IN PROCESSORS, I/O AND MEMORY THAT HP DELIVERS.

EXEMPLAR SYSTEMS ARE USED TODAY BY BUSINESS, TECHNOLOGY, AND RESEARCH LEADERS WORLDWIDE. Applications for Exemplar systems span the spectrum, from analyzing automobile crash-worthiness, to modeling aluminum castings or industrial air filters, to simulating power networks, to verifying integrated circuit design, to searching the Internet, to exploring the expanding universe. These systems are put to the test daily on tasks that deliver a time-to-market advantage. Yet they are flexible enough to be used to execute multiple applications simultaneously and are scalable to the performance levels needed for the most complex design and research.

An Exemplar system from HP also includes investment protection features so that users can continue to utilize existing systems and software when they upgrade to new technology.

BALANCED SCALABILITY FOR COMPETITIVE PERFORMANCE. As compute servers, the Exemplar S- and X-Class systems are designed for data-intensive jobs requiring extremely fast throughput and time to completion. The Exemplar systems combine the advantages of a shared-memory architecture with the scalability of a distributed-memory system. As application demands increase, customers can easily expand the systems with additional memory and I/O bandwidth to complement additional CPUs. As a result, each additional CPU delivers a consistent proportional increase in performance. This balanced approach to scalable computing allows customers to match their performance to their budget requirements.

ROAD MAP FOR THE FUTURE. With its Exemplar systems road map in place through the year 2000 and beyond, HP is providing customers access to the newest PA-RISC technology while preserving investments in software, hardware, peripherals, integration and training. Only HP delivers the complete portfolio of platforms, software and services for technical computing, with a clear path to future computing technology. HP and Exemplar systems help speed quality products and services from the white board to the end user, turning engineering ideas into practical solutions.

ONLY HP DELIVERS

A TRULY COMPLETE

TECHNICAL COMPUTING

SOLUTION, WITH THE

INDUSTRY'S BROADEST

COMPATIBLE PRODUCT

LINE, AND POWERFUL

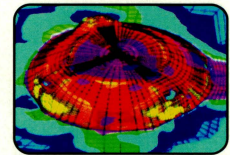
SOLUTIONS FOR



ACCESSING,
SHARING AND DISTRIB-
UTING ENTERPRISE
RESOURCES – ALL
BACKED BY AN
UNMATCHED COR-
PORATE STRENGTH
AND VISION.

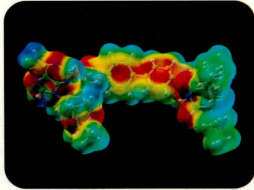
ADVANTAGE: EXEMPLAR S- AND X-CLASS SERVERS The Exemplar S- and X-Class servers feature the following: • Powerful performance driven by the PA-8000; • Production-oriented, feature-rich operating environment for optimized application performance and flexible allocation of resources; • Industry standard connectivity, operating system and compilers that allow the Exemplar systems to fit smoothly into existing operating environments. Consistent user interfaces eliminate needs for complex programming language extensions; • Consistency and compatibility with HP workstations and • Extensive applications availability.

The Exemplar S-Class system, with 4 to 16 CPUs, is a feature-rich, crossbar-based SMP (symmetric multi-processor) technical server that eclipses the performance and capability of the entire range of SMP systems available in the industry today. The S-Class, which delivers up to 11 GFLOPS (billions of floating point operations per second) performance and 15 GB/s (billions of bytes per second) internal system bandwidth, is ideal for technical users who need high-performance, high-capacity systems, with the price point and ease-of-management benefits of the SMP midrange.



The X-Class system, with 16 to 64 CPUs, extends the S-Class system performance by a factor of four. The X-Class delivers up to 46 GFLOPS performance and an overall system bandwidth of 61 GB/s. For complex technical problems and leading-edge scientific challenges, this CC-NUMA (cache coherent non-uniform memory access) system delivers scalable performance that is unmatched in the industry.

FULL SYSTEM SCALABILITY DELIVERS LINEAR PERFORMANCE GAINS S- and X-Class systems utilize an innovative memory crossbar technology to deliver scalable performance that is not achievable with bus interconnects or clustering schemes used in other scalable systems. The crossbar provides high bandwidth, low latency, non-blocking access from CPUs and I/O channels to local memory.



The X-Class systems may be expanded with additional processing nodes that are linked by a coherent low-latency interconnect. This interconnect is uniquely matched to the overall system architecture so that customers see performance that scales in linear proportion to the size of the system.

Scalable performance is a necessity for professionals who are addressing the issues of organizing, classifying and automating access to vast amounts of information in databases and intranet servers. For example, NCSA (National Center for Supercomputing at the University of Illinois Champaign-Urbana) is using Exemplar systems for research in the Digital Library Initiative. Exemplar X-Class servers will provide the compute performance to index millions of journal abstracts across thousands of subject areas. This activity is part of a project designed to develop the tools that will enable business and researchers to find critical information stored on intranet servers quickly and easily.

OPERATING ENVIRONMENT UNLEASHES THE POWER OF EXEMPLAR SERVERS With its feature-rich operating environment, Exemplar systems combine a general-purpose computing resource with high-performance, high-capacity power. S- and X-Class systems support a broad range of applications, including the familiar HP user interfaces and tools, as well as the thousands of applications that run on HP's broad family of workstations and servers.

HEWLETT-PACKARD
COMPANY HAS BEEN CHOSEN
AS THE PREFERRED SUPPLIER
OF TECHNICAL WORKSTA-
TIONS AND SERVERS FOR
LOCKHEED MARTIN INFOR-
MATION SYSTEMS' SIX-YEAR
CONTRACT WITH THE FBI TO
DEVELOP AN AUTOMATED
FINGERPRINT IDENTIFICATION
SYSTEM (AFIS). LOCKHEED



RIGHT THUMB

MARTIN CHOSE HP BECAUSE
THE COMPUTE-INTENSIVE
PARALLEL PROCESSING POWER
OF THE HP EXEMPLAR
SERVER MEETS THE MISSION-
CRITICAL NEEDS OF THE
PROJECT, WHILE THE HP
EXEMPLAR SERVER'S PROVEN
SCALABILITY OFFERS A
RELIABLE GROWTH PATH FOR
FUTURE SYSTEM EXPANSION.

EXEMPLAR SYSTEMS

SUPPORT MCAE APPLI-

CATIONS THAT INCLUDE

STRESS ANALYSIS,

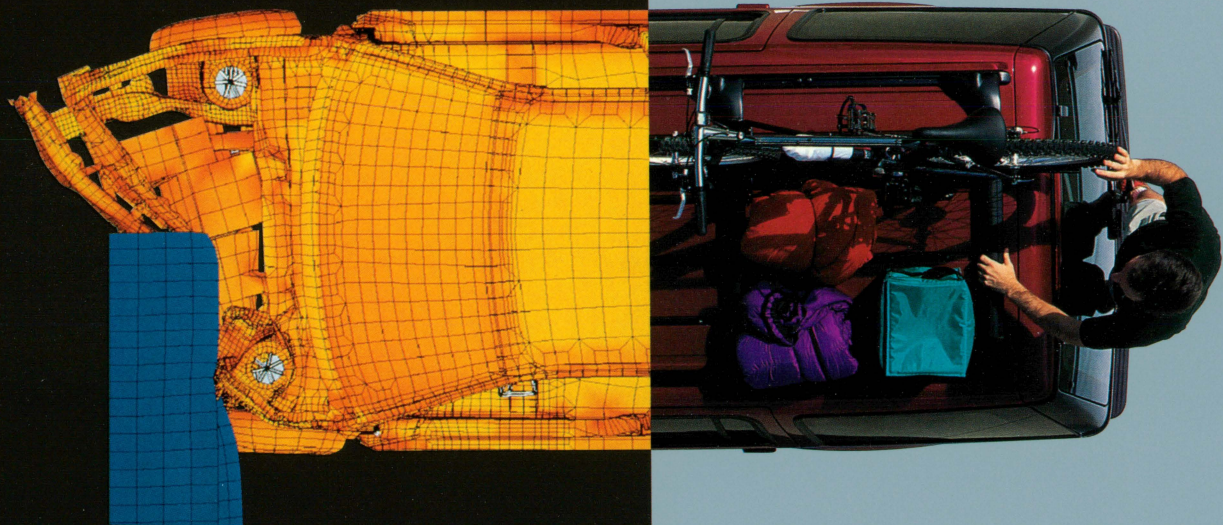
CRASHWORTHINESS,

NOISE/VIBRATION/

HARSHNESS ANALYSIS

AND COMPUTATIONAL

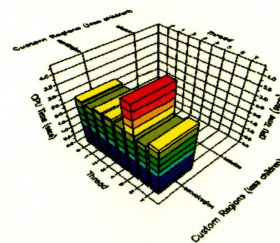
FLUID DYNAMICS. THE



AUTOMOTIVE INDUSTRY
USES EXEMPLAR SYSTEMS
TO LOWER POLLUTION
EMISSIONS, IMPROVE FUEL
EFFICIENCY, BOOST ENGINE
PERFORMANCE, INCREASE
INTEGRITY AND ENHANCE
PASSENGER COMFORT
AND SAFETY.

The Exemplar Operating Environment (EOE) unleashes the true power of the S- and X-Class systems and puts that power to work to solve customer problems. The EOE provides tools to parallelize and optimize applications and an environment that allows users to deploy the computing power where and when it is needed throughout the enterprise.

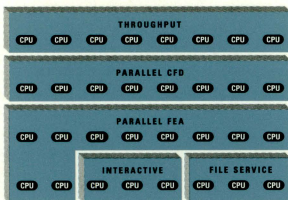
The Exemplar system's robust programming environment includes automatic optimizing, parallelizing compilers that make porting as easy as recompiling; programming tools such as debuggers, profilers and event analyzers and enhanced performance features based on the UNIX operating system. All these capabilities help technical professionals and researchers to increase productivity by focusing on solving the problem.



SUPPORT THROUGH THE ADVANCED TECHNOLOGY CENTER To further improve productivity for customers and ISVs (independent software vendors), HP's Advanced Technology Center for high-performance applications provides technical assistance in optimizing codes, accessing new software solutions and addressing issues associated with advanced application development. The Center's charter is to ensure that customer and ISV high-performance computing investment pays off at the bottom line, through increased productivity and decreased time-to-market.

For example, HP worked with ISVs to tune the applications on an Exemplar system installed at a major automotive corporation division. The division is tasked with identifying new computer-aided engineering (CAE) technologies and processes and introducing them to the product divisions in the company. Their objective is to decrease time to solution for very large problems and to introduce the new CAE capabilities of multiphysics and adaptivity. As a result of cooperation among Advanced Technology Center staff members, the ISVs, and the automotive division staff, a problem that required three days to run on the company's previous system now runs overnight on the Exemplar. With this kind of dramatic performance increase, automotive companies can design, test and deliver vehicles to market faster than ever before.

HIGH-PERFORMANCE COMPUTE SERVICE AND A GENERAL-PURPOSE RESOURCE The EOE also makes it possible for the customer to deploy flexible computing resources across the enterprise by using the Subcomplex Manager, an innovative tool offered only by HP. With a few mouse clicks, customers can reallocate any individual processor or user-defined group of processors. This feature enables a systems administrator to respond instantly to a team's changing workflow needs. In addition, these changes are made by using a single copy of the operating system, saving system administration time.



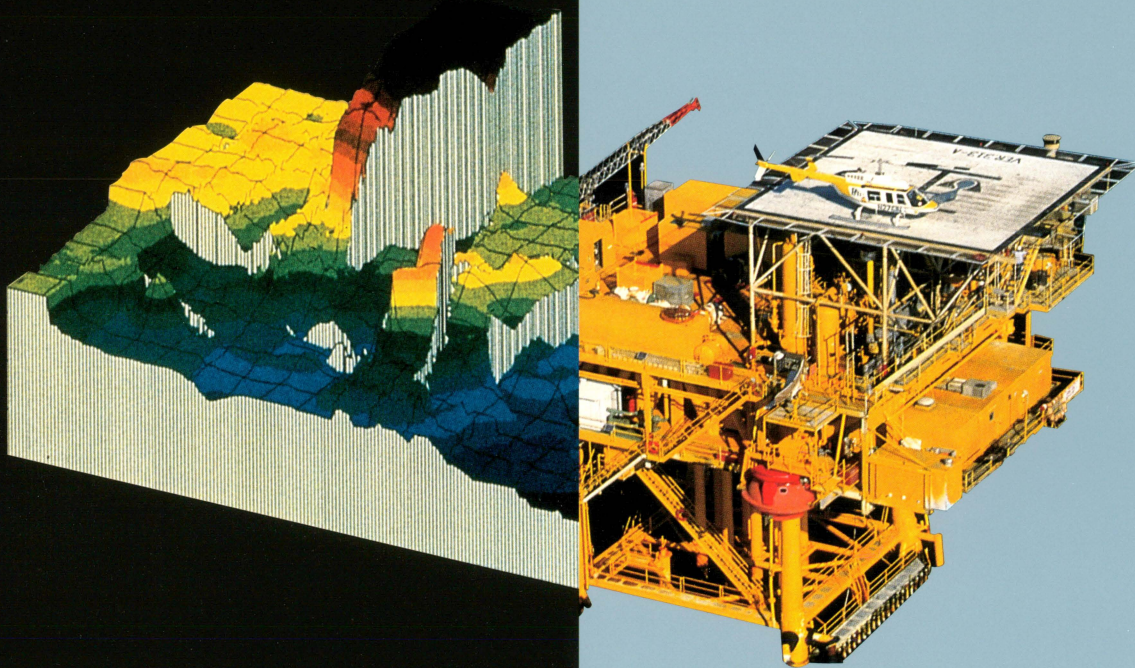
For example, a system can be configured to run a compute-intensive electronic design application simultaneously with file management tasks and in addition run a complex mixture of batch and interactive jobs. All of the power of the system can be applied to a single problem to solve it as quickly as possible, or that power can be distributed throughout the enterprise.

INDUSTRY-STANDARD CONNECTIVITY S- and X-Class systems incorporate industry-standard PCI peripherals, delivering support for a broad range of high-performance disk arrays and subsystems, tape drives and automated tape libraries. In addition, networking options are designed to meet the connectivity needs of a broad range of users. Users requiring connections to widely used interfaces such as Ethernet, FDDI, ATM and HIPPI can seamlessly integrate the Exemplar servers into their existing network environments.

APPLICATIONS AVAILABILITY HP-UX compatibility provides Exemplar S- and X-Class system users with access to thousands of widely used applications, including the same scientific and technical solutions that run on HP workstations and servers. For the highest performance, applications may utilize shared-memory or explicit-message-passing (EMP) parallelization, or a combination.

HP'S EXEMPLAR TECHNICAL SERVERS HP's Exemplar Technical Server product portfolio provides the engineering enterprise with high-speed, reliable, and scalable servers for compute, file, product data management, storage and intranet applications. This server portfolio presents solutions to the five major information management challenges faced by engineering and technical users. Each server category includes the hardware platform, services and application software needed to create complete server solutions for specific computing environments.

TRULY SUCCESSFUL
EXPLORATION AND PRODUCTION COMPANIES IN
TODAY'S GLOBAL MARKETPLACE HAVE LEARNED
HOW TO REDUCE – REDUCE COSTS TO IMPROVE PROFITABILITY, REDUCE PROJECT
CYCLE TIMES TO RETURN INVESTMENTS SOONER,
REDUCE RISKS IN THE E & P
DECISION PROCESS.



EVEN WITH THIS FOCUS ON
OPTIMIZING THE BUSINESS,
THE ORIGINAL CHALLENGE
REMAINS: REDUCE OCEANS OF
DATA INTO WELL INFORMED
DRILLING DECISIONS. HP
EXEMPLAR SYSTEMS DELIVER
THE POWER AND CAPACITY TO
SOLVE COMPLEX 3D SEISMIC
PROCESSING AND IMAGING
PROBLEMS, AS WELL AS
THE SCALABILITY TO MEET
THE REQUIREMENTS OF ANY
PROJECT OR BUDGET.

THE ADVANCED TECHNOLOGY
CENTER FOR HIGH-PERFORMANCE
APPLICATIONS PROVIDES A
WORLDWIDE CONSULTING TEAM
WHERE HP TECHNICAL SERVER
CUSTOMERS AND INDEPENDENT
SOFTWARE VENDORS (ISVS)
CAN WORK WITH MEMBERS OF
THE HP TECHNICAL STAFF TO
OPTIMIZE CODES, ACCESS NEW
SOFTWARE SOLUTIONS AND
UNCOVER TECHNOLOGY SOLU-
TIONS TO SOLVE CUSTOMER



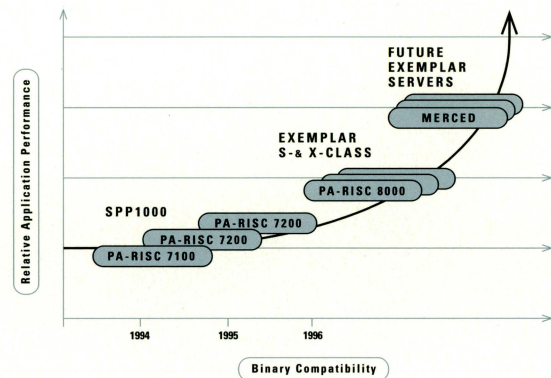
PROBLEMS SUCH AS FULL-CAR
MODELING TECHNIQUES TO
MORE EFFICIENTLY DESIGN CARS
AND DRASTICALLY REDUCE THE
TOTAL DESIGN TIME. THE CEN-
TER'S STAFF – WHICH INCLUDES
EXPERT MATHEMATICIANS AND
SCIENTISTS IN A RANGE OF
DISCIPLINES – WORKS WITH CUS-
TOMERS AND ISVS TO HELP
INCREASE THEIR COMPUTING PRO-
DUCTIVITY SO THEY CAN DE-
CREASE THEIR TIME TO MARKET.

Four PA-8000-based hardware platforms comprise the portfolio – HP's D-, K-, S- and X-Class servers. Customers can custom-configure their solutions by selecting the systems with capabilities best suited to their application requirements. K-, S- and X-Class platforms are utilized for compute server solutions; scalable storage management is available with K-Class servers; and product data management, file and intranet servers are based on D- and K-Class systems.

TECHNOLOGY ROAD MAP TO THE FUTURE Choosing HP is the risk-free way to invest in high-performance, high capacity systems. HP is committed to long-term investment protection, including board- and chip-level upgrades that simplify transitions to new technologies. Maintaining a consistent binary-compatible architecture beyond the year 2000 enables customers to get productivity gains today, with a clear growth path to the future.

With the HP Exemplar systems road map, customers and ISVs will have access to the newest PA-RISC technology while preserving investments in software, hardware, peripherals, integration and training. Further, under HP's technology-investment-protection program, Exemplar systems ship with a provision for adding new PA-RISC processors and other capabilities as they become available.

No other vendor can combine the price/performance value, built-in quality, range of product offerings and technical experience that HP brings to the table. HP has more experience with scalable shared-memory architectures than any other vendor. That experience, and the Exemplar S- and X-Class systems, deliver a competitive advantage for the technical enterprise.





For more information, contact any of our worldwide sales offices or HP Channel Partners (In the U. S., call 1-800-637-7740; in Canada, call 1-800-387-3867). Look for HP on the World Wide Web (<http://www.hp.com/go/techservers>).

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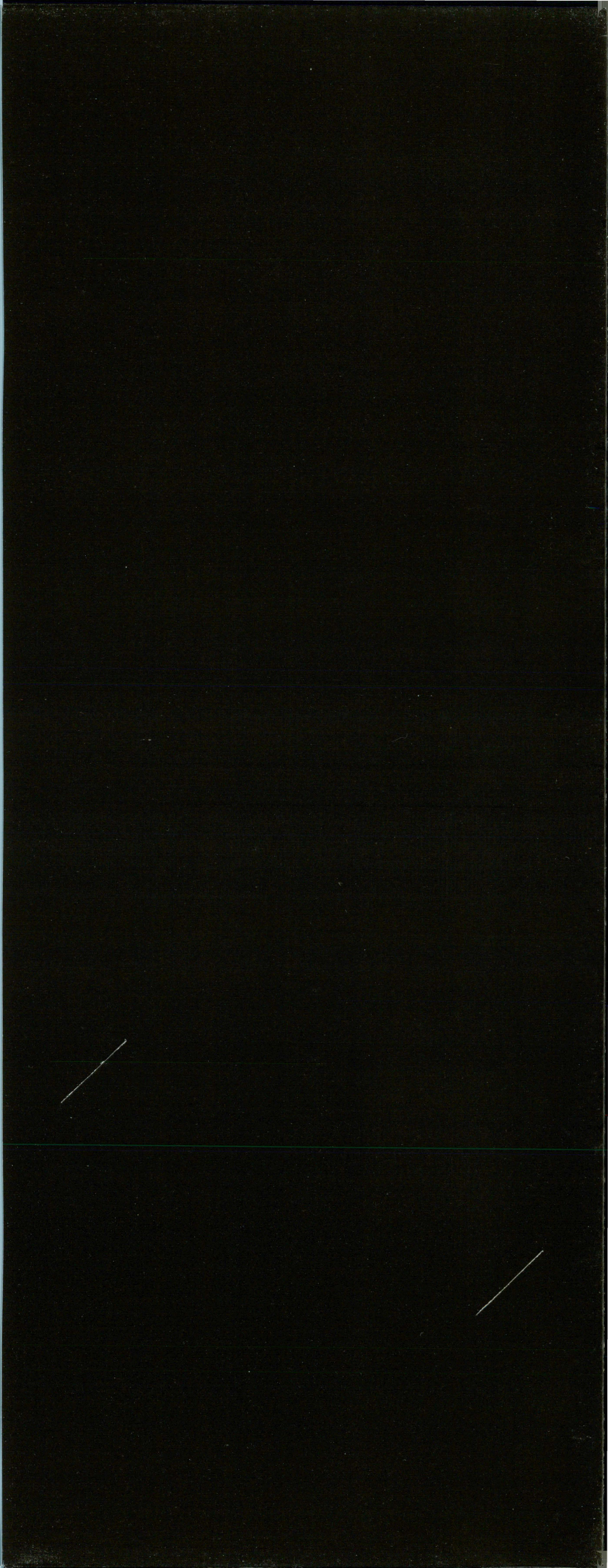
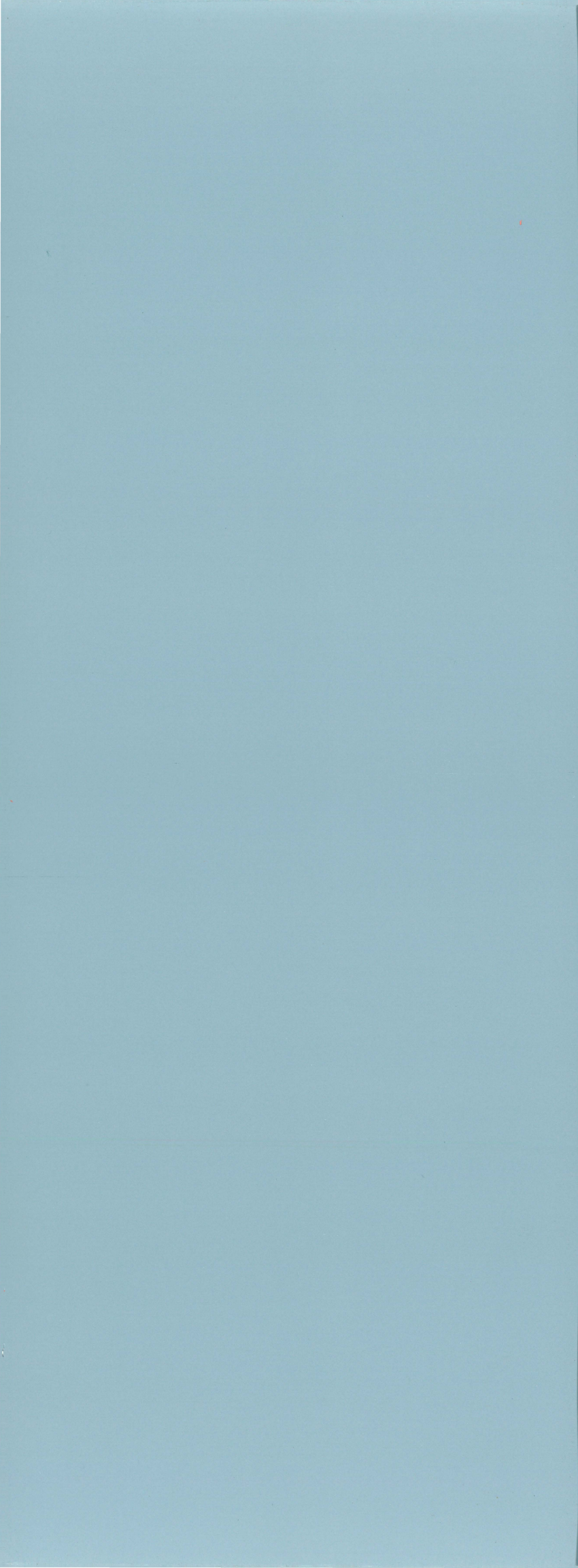
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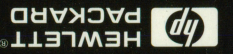
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