

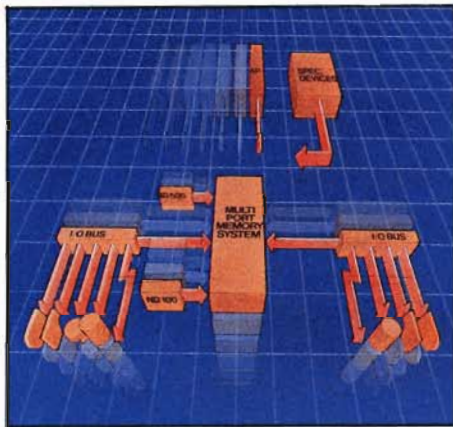
## ARCHITECTURE

The ND-500/CX system is based on a distributed processor design around Norsk Data's multiport memory system. A front end processor performs resource allocation, interrupt handling and maintenance tasks. One or more ND-500/CX processors prepare and execute the user programs.

The ND-500/CX processors can be upgraded from the ND-530/CX to the ND-570/CX directly or via the ND-550/CX and/or the ND-560/CX. More processors can be added, which means that processing power can be increased without redesign of the total system. The cache memory system can be expanded to 64 KB.

The multiport memory system is designed to handle a number of I/O buses and processors, and the total I/O bandwidth of the system which is defined by the memory bandwidth, can be expanded to 256 MB/S. DMA devices such as discs, array processors or customer-designed

controllers can be connected directly to the memory system and thereby utilize the full bandwidth. Even though the operating system is virtual, the memory system is designed to handle up to 2000 MB of real memory.



The elements of the ND-500/CX architecture allow the system to grow with user needs, both as a single system and in tight or loose networks, excluding costly investments in program redesign and peripheral equipment.

## PERFORMANCE

When high performance is an absolute requirement, the ND-500/CX system can be relied upon to deliver. Simulation... Seismic data processing... military information processing... these are some of the areas where Norsk Data's ND-500/CX series is gaining a solid reputation.

Model

MIPS Whetstone

Global optimizing  
FORTRAN Compiler

Standard  
FORTRAN Compiler

	Global optimizing FORTRAN Compiler		Standard FORTRAN Compiler	
	Single Pr.	Double Pr.	Single Pr.	Double Pr.
ND-530/CX	1.2	0.9	0.6	0.4
ND-550/CX	2.9	2.3	1.3	1.0
ND-560/CX	4.6	3.5	2.1	1.6
ND-570/CX	7.0	5.4	3.3	2.6

## ARRAY PROCESSING OPTION

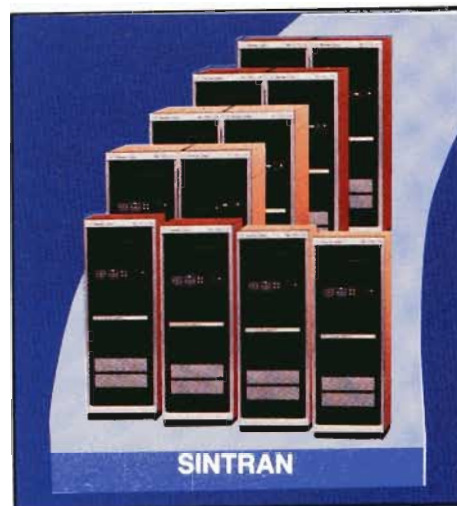
Special tasks like array handling and FFTs can be speeded up by utilizing the ND-500/CX array processing option. This is a library of microcoded instructions for fast processing of heavy routines. The option exists in both single (32 bit) and double (64 bit) precisions and will usually be a very good addition to an attached array processor. Typically, routines can be speeded up by a factor of 3 to 7 compared with FORTRAN. The array processing option can be easily integrated into standard programs.

## THE OPERATING SYSTEM

The design philosophy of SINTRAN has to a great extent been to support all kinds of user environments, resulting in a flexible and economical system. SINTRAN was developed in the mid-1970's as the first operating system on a minicomputer to implement simultaneous batch, real time and time sharing. The virtual storage system in SINTRAN has dynamic memory allocation and allows fixing of memory segments from the user programs, thereby giving the user the opportunity to keep programs and data fixed within the real memory during time-critical operations.

To insure that programs get correct support, up to 255 priority levels may be assigned to different processes. In the real time mode, programs may be scheduled by external events, program call, operator command and time of day. The file management system allows different types of mass storage devices to be handled in a uniform fashion. File sharing capabilities allow data and programs to be used by different users simultaneously.

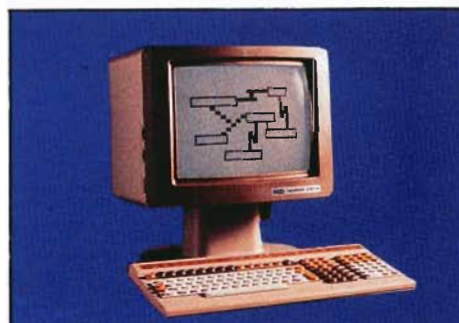
**SINTRAN runs on the entire line of computers from Norsk Data, eliminating the problems associated with different operating systems from the same vendor.**



## NETWORK

ND-500/CX computers function together with other ND systems and mainframes in networks of varying complexity. Different media, e.g. X.25, X.21, Ethernet and point-to-point links, may be used to interconnect the various resources in the network. The PAD service is also available at Norsk Data's site. A modular approach is used to communication called COSMOS, this results in easier addition of new applications.

**For ease of network operations, all ND computer systems run the same communication hardware and software.** Services such as accessing files on remote system, transferring files between computers, terminal access to remote systems and spooling facilities in the network are all easily available to the end-user. This also makes available different libraries, for example programmer's tools.



**CORPORATE HEADQUARTERS**

■ Norsk Data A.S  
 Olav Helsets vei 5  
 P.O.Box 25 - Bogerud  
 0694 Oslo 6, Norway  
 Tel: (+47-2) 29 54 00  
 Tlx: 18284 nd n

**SALES OFFICES:****Norway**

Oslo (02) 30 90 30  
 Tromsø (083) 71 766  
 Sandnes (04) 66 75 80  
 Bergen (05) 13 04 90  
 Trondheim (07) 92 12 22

**Sweden**

Stockholm (0760) 92 000  
 Gothenburg (031) 49 67 60  
 Malmö (040) 70 510

**Denmark**

Copenhagen (02) 42 50 55  
 Århus (06) 21 00 55

**Germany****ND-DIETZ**

Mülheim (0208) 48 441  
 Berlin (030) 803 1053  
 Hamburg (040) 850 2098  
 Hannover (0511) 62 7011/12  
 Wiesbaden (06121) 76 050  
 Stuttgart (07121) 31 00 71  
 München (089) 95 02 65  
 Münster (0251) 32 90 90

**United Kingdom**

Newbury (0635) 35544  
 London (01) 588 9905

**France**

Paris (1) 602 3366  
 Ferney-Voltaire (50) 40 85 76  
 Lyon (74) 94 44 08

**U S A**

Boston (617) 237 7945  
 Los Angeles (714) 752 5081

**Netherland**

Utrecht (3408) 86 734

**Switzerland**

Lausanne (21) 25 01 22

**Hong Kong**

Hong Kong (5) 42 10 40

**REPRESENTED BY AGENT IN:****Australia**

Melbourne (03) 544 7448

**Finland**

Helsinki (0) 84 82 66

**ND COMTEC****HEAD OFFICE**

ND Comtec  
 Division of Norsk Data  
 Jerikoveien 20  
 P.O.Box 4 - Lindeberg gård  
 1007 Oslo 10, Norway  
 Tel: (+47-2) 30 90 30  
 Tlx: 18661 nd n

**OTHER SALES OFFICES****Sweden**

Stockholm (0760) 84 100

**Denmark**

Odense (09) 15 74 40  
 Copenhagen (02) 42 50 55

**Germany**

Düsseldorf (0211) 66 63 88

**United Kingdom**

Newbury (0635) 35544

**REPRESENTED BY AGENT IN:****Austria**

Vienna (2266) 8484

**Finland**

Helsinki (0) 84 82 66

**ND - SILVIDATA****Sweden**

Sundsvall (060) 15 41 50  
 Daneryd (08) 753 00 70  
 Växjö (0470) 46 020



**Norsk Data**

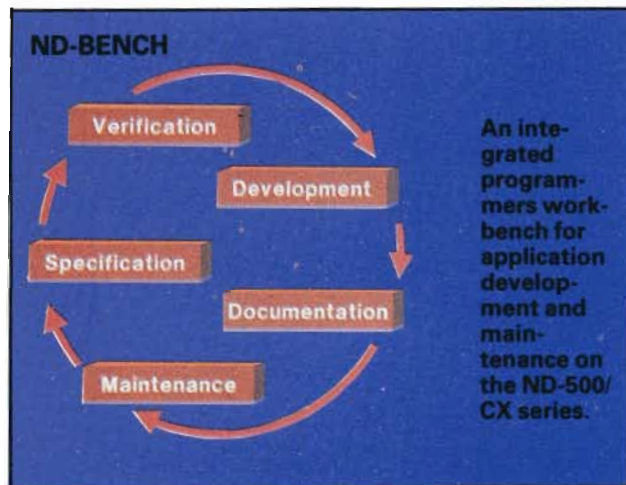
Systems that put people first

## TOOLS

The ND Programmer's Workbench, ND-BENCH, is a task-oriented tool for system designers, programmers and other project members cooperating on the task of designing their own organizations' technical/scientific data processing systems. It is more than a toolbox. It is an integrated approach, where tools are combined to attain the essential features of modern data processing, e.g. user-friendliness, availability and performance/economy.

The tools within the ND-BENCH concept are divided into three categories:

- Basic development tools: The ND-500 monitor, the FORTRAN compiler, Linkage Loader, PED (Programming Editor) and Symbolic Debugger.
- Advanced development tools: User Environment (a technical/scientific application menu system), Measuring and Optimization tools and, software configuration management tools.
- Special conversion tools: Source compare and File Compare. Foreign Media and FORTRAN Converter, particularly efficient for VAX® programmes.



(VAX® is a registered trademark of Digital Equipment Corp.)

Norsk Data believes that a basic resource is skilled people and a basic constraint is software. The DP manager, the project manager, programmer or scientist/technician - all will find the tools in ND-BENCH greatly reduce the development time of new applications.

Often, we find that customers needing primarily a system to run technical or scientific systems choose Norsk Data and get a lot more than they counted on. For example, our NOTIS text and information processing system is in use by over 80 percent of our customers. Everyone, regardless of their level of DP familiarity, will find NOTIS useful in getting, sorting and storing letters and documents. **With NOTIS, you can forget about dedicated word processing systems and use the power of your ND-500/CX system for all your office functions as well.**

SIBAS is Norsk Data's CODYSYL approved DBMS, and is the most widely used such system in Scandinavia. Although SIBAS is designed to handle large amounts of data, security is a key design criteria, existing at many levels. Data stored in SIBAS is maintained without the user having to be concerned about its structure or location. Loss of data is virtually unknown with SIBAS.

## EXPERIENCE

Since Norsk Data was started in 1967 it has had a strong involvement in the technical and scientific market. This commitment, together with systems that were often ahead of their times, has led to a solid reputation for the company. Today, about 40 percent of all systems delivered are destined for technical or scientific application - and this means over 500 systems per year with current production. Why consider Norsk Data? In a word, experience. Europe's top six atomic research institutes use Norsk Data systems for processing data about the world's smallest particles. Universities in Scandinavia, West-Germany, France and the U.K. use our systems both for basic re-

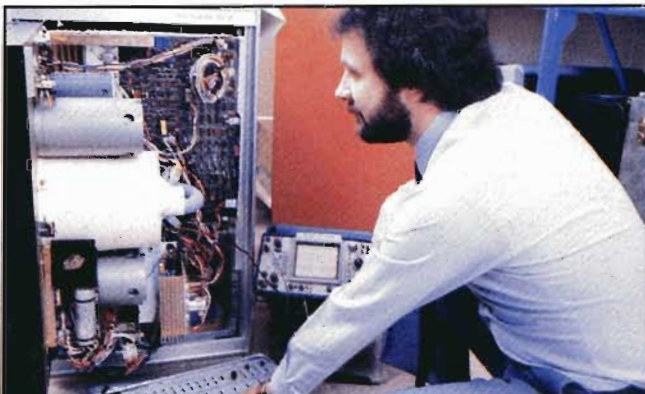
search and for teaching data processing. Defence agencies use our systems for flight simulation and command control information systems. Geophysical exploration puts heavy demands on a system, both for data acquisition and for data processing. ND-500/CX systems have proven themselves up to this task in the North Sea, in the Gulf of Mexico and off the coast of China.



## NORSK DATA - A SOLID PARTNER

Norsk Data develops, produces and markets a wide range of high performance minicomputers for customers around the world. Sales and customer support are carried out by wholly-owned subsidiaries and joint venture companies in ten countries, operating out of 50 offices. Other markets are served through agents.

Resources are concentrated on the key system elements adding the greatest value to the system. Thus, system architecture, basic system software and communication equipment are viewed as key proprietary technologies.



Norsk Data is a privately owned company with its shares traded on the Oslo, Stockholm and London stock exchanges and on the over-the-counter market in the U.S.A. For the period 1973 to 1983, Norsk Data has had an average compounded annual growth of 42 percent in sales and 83 percent in pre-tax profit.