

NASA Contractor Report 4029

Earth and Environmental Science  
in the 1980's  
Part I. Environmental Data Systems,  
Supercomputer Facilities, and Networks

Prepared by the Earth and Environmental Science Division  
of the NASA Office of Earth and Environmental Sciences  
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NASA Office of Earth and Environmental Sciences  
Washington, D.C. 20546

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**NASA**

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# **Earth and Environmental Science in the 1980's**

Part 1.  
**Environmental Data Systems,  
Supercomputer Facilities,  
and Networks**

*Prepared for the*  
**National Aeronautics and  
Space Administration**

October 1986

*Prepared by*  
**Science Applications  
International Corporation**  
400 Virginia Avenue, S.W., Suite 810  
Washington, D.C. 20024

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## EARTH AND ENVIRONMENTAL SCIENCE IN THE 80'S

### INTRODUCTION TO PART 1. ENVIRONMENTAL DATA SYSTEMS, SUPERCOMPUTER FACILITIES, AND NETWORKS

This report is the culmination of Part 1 of a two-part effort to describe and analyze the current status of access to on-line data sets and computational resources. It provides overviews of environmental data systems, supercomputer facilities, and associated networks relevant to the Earth and environmental research community. Part 2 will summarize and analyze the information compiled in Part 1 and will formulate recommendations designed to optimize the utility and accessibility of these resources. The motivation for this study, which was requested by the National Aeronautics and Space Administration (NASA), came from a portion of the Earth and environmental research community that uses space-derived, remotely sensed data and information. The scope of this effort has been expanded, however, to encompass other aspects of environmental research so that in situ and correlative data sets are also included.

The following definitions pertain to this document. "Environmental data systems" are those systems that allow a researcher remote access, from his or her own terminal or microcomputer, to a source of relevant environmental data and/or information. "Supercomputers" are vector, parallel, and/or multiple processors currently capable of achieving on the order of 500 million floating point operations per second. "Networks" are one mechanism through which researchers, working in their local environments, can remotely access an on-line data system or supercomputing facility.

The summaries contained in this report address content, capability, and access. The specific parameters related to these general concepts are defined for each group or subgroup, as appropriate. The information for each group is presented in parallel fashion to facilitate comparisons among participants. The level of technical detail is compatible with a broad range of scientific and related disciplines. Whenever possible, a name, address, or telephone number is listed as a source of additional and more specific information. The information in certain categories, such as cost, is intentionally general because

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the specifics in these areas change rapidly. A foldout summary table introduces each of the three main groups, and a summary sheet precedes each overview.

The information presented in this report was derived primarily from responses to a set of written questionnaires and to telephone inquiries. The response rate to the questionnaires was about 43 percent. In some instances, initial information was obtained by telephone calls or other means, but the questionnaire was never answered. Thus, some of the overviews contain information gaps. All participants who answered the questionnaire were given the opportunity to review the draft pertaining to their system or facility. The response rate for this effort was about 60 percent.

We take full responsibility for the content of this report, including any omissions, misinterpretations, or misstatements. Please forward any comments, corrections, suggestions, or names/contacts for additional systems, facilities, or networks to:

Mr. Carroll A. Hood  
Science Applications International Corporation  
400 Virginia Ave., SW  
Suite 810  
Washington, DC 20024  
(202) 479-0750

#### USE OF DOCUMENT

This document has been designed for easy access to information concerning on-line data systems, supercomputer facilities, and networks. The introduction to each section lists the overviews provided in that section, along with the foldout summary table. The following strategy is recommended for use of this publication:

1. Begin a search at the foldout summary table, which lists participants according to the order in which they appear in the text. This process can be used to narrow a search to a specific subsection or overview.
2. Go directly to the subsection or overview of interest. The overview information on content, capabilities, and access should be sufficient to enable a user to determine if further or more specific data are desired.

- 
3. Use the name, address, or telephone number listed in the subheadings to obtain additional information or to request an account. If no names or numbers are given within the body of the overview, refer to the name, address, or telephone number listed at the end of the summary.

The following examples were developed to show how this manual can be utilized. They are fictitious and are not intended as value judgements.

**Example #1:**

User desires access to graphical depictions of real-time weather information via a graphics terminal and modem.

1. Table lists five data delivery systems that offer real-time access to data: ACCU-DATA, McIDAS, NOAA Data Access System (DAS), WSI, and Zephyr.
2. Survey of overviews yields the following information: McIDAS requires specific work station; NOAA DAS is not yet operational; ACCU-DATA™, WSI, and Zephyr remain (although Zephyr requires vendor-installed receiving equipment).
3. User calls Accu-Weather, WSI Corporation, and Zephyr to obtain additional information and documentation, to arrange a demonstration, or to establish an account.

**Example #2:**

User desires interactive access to a supercomputer. The source code is written in CFT (Vectorized FORTRAN), and the user wishes to utilize DI-3000 to plot output. The user, who has access to an ARPANET node, will submit a proposal to the National Science Foundation (NSF).

1. Table yields seven facilities with operating systems that permit direct interactive access to the supercomputer: CTC, NCSA, SDSC, MSI, MHCC, NMFEC, and NAS. Of these, only CTC, NCSA, SDSC, and MSI have allocations through NSF.

- 
2. Survey of overviews yields two that support both CFT and DI-3000: NCSA and MSI (SDSC is considering support of DI-3000); of these two, MSI provides access via ARPANET.
  3. User contacts OASC or MSI for information on how to request an NSF allocation.

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## ENVIRONMENTAL DATA SYSTEMS

The environmental data systems are divided into three subgroups based on the types of information to which they provide access. The first subgroup comprises systems that give access to actual environmental data sets or portions of data sets. Users can query the system and extract data based on selected criteria. Some of the more sophisticated systems in this group permit data reduction, graphical depiction and display, and catalog and bibliography usage. The second subgroup of data systems provides access to catalog or bibliography systems only. These contain information about data sets and not the actual data sets themselves. The last subgroup consists of multidata base systems. These provide access to a large number of full text or bibliographic data bases, some of which may be relevant to the environmental science research community.

Table 1.1-1 identifies the environmental data systems discussed in this section according to the order in which they are considered. Table 1.1-2 summarizes the information collected on the data systems. The questionnaire used to collect the data is given in Appendix B.

This section has been designed to highlight key information and to facilitate cross referencing of system capabilities. For these reasons, the same format is used to discuss each data system.

## Table 1.1-1. Environmental Data Systems Surveyed

### Data Access Systems

- ACCU-DATA™
- Climate Analysis Center Communications System (CAC)
- Crustal Dynamics Project Data Information System (CDP-DIS)
- Man-Computer Interactive Data Access System (MCIDAS)
- Naval Observatory Automated Data Service (NAVOBSY ADS)
- NOAA Data Access System (NOAANET and NOAAPORT)
- NASA Ocean Data System (NODS)
- Pilot Climate Data System (PCDS)
- Pilot Land Data System (PLDS)
- WSI Real-Time Weather Information System
- Zephyr

### Catalog Bibliography Systems

- Earthnet
- Earth Science Data Directory (ESDD)
- INquiry, ORdering, and Accounting (INORAC)
- National Environmental Data Referral Service (NEDRES)
- NSSDC On-Line Data Catalog System (NODCS)
- Remote Sensing On-Line Retrieval System (RESORS)
- SAR Data Catalog System (SDCS)

### Multi-Data Base Systems

- BRS
- DIALOG
- European Space Agency Information Retrieval Service (IRS)
- Mead Data Central (MDC)
- Pergamon InfoLine
- QL Systems, Limited
- SDC Orbit

Data System	Data Sets		Systems/Subsystems			
	Data		Information	Catalog	Bibliography	Graphics
	Real Time	Retrospective				
<b>Data Access</b>						
Accu-Data™	•	•	•			•
CAC		•	•			
CDP-DIS		•	•			
McIDAS		•	•			•
NAVOBSY ADS	•	•	•			
NOAA	•	•	•	•	•	
NODS		•	•	•	•	•
PCDS		•	•	•	•	•
PLDS		•	•	•	•	•
WSI	•	•	•			•
Zephyr	•	•	•			•
<b>Catalog/Bibliography</b>						
Earthnet			•	•		
ESDD			•	•		
INORAC			•	•		
NEDRES			•	•		
NODCS			•	•		
RESORS			•		•	
SDCS			•	•		
<b>Multi-Data Base</b>						
BRS			•		•	
DIALOG			•		•	
ESA-IRS			•		•	
MDC			•		•	
Pergamon			•		•	
QL Systems			•		•	
SDC			•		•	

TBD = To Be Developed

/ FOLDOUT FRAME



Table 1.1-2. Environmental Data Systems

Other	Products			Required Equipment		User Friendliness		
	Hardcopy	Digital	Delivered to Terminal	Standard	Unique	Menu	Command	Help
• • • • • •		•	• • • • • • • •	•  •  TBD	•  •  •  •  •	• • • • • • TBD	•	• • • • •
•	•	•	• • • • • • •	• • • • • • •		• • ? • • •	•	
• • • • •	• • • • • •		• • • • • • •	• • • • • • •		•    •	• • • • • •	

Access							
Accessibility		Availability		User Service			Cost
Open	Restricted	24 Hours/Day	<24 Hours/Day	Documentation	Consultation	Training	
.		.		.	.		Fee
	.	.		.	.		No Charge
	.	.		.	.		No Charge
.		.		.	.		Fee
.		.			.		No Charge
	TBD		TBD		TBD		TBD
	.	.		.	.		No Charge
	.	.		.	.		No Charge
	.	.		.	.		No Charge
.		.		.	.		Fee
.		.			.		Fee
.	.		.		.		Fee
.	.	.		.	.		No Charge
.	.	.	.	.	.	.	Fee
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.	.	.	.	.	.	.	Fee
.	.	.	.	.	.	.	Fee
.	.	.	.	.	.	.	No Charge
.	.	.	.	.	.	.	No Charge
.	.	.	.	.	.	.	No Charge
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.		.	.	.	.	.	Fee
.		.	.	.	.	.	Fee

---

**ACCU-DATA™ FACTS**

**Data Sets**            NWS Domestic Data  
                          NWS Public Data Service  
                          NWS International Data  
                          FAA 604 Circuit  
                          Digital Satellite Data from GOES  
                          NAFAX

**Subsystems**            Advanced Map Plotting System (AMPS)

**Products**             Over 2,500 high resolution maps, climate model output,  
                          marine and seismic data, plain language forecasts, radar  
                          data, surface observations, upper air data, and more

**Required  
Equipment**            Terminal (type varies according to use)  
                          Modem (300-2400 bps)  
                          Printer (optional)  
                          Emulation/Documentation software (if applicable)

**Access**                User friendly, menu-driven system  
                          Accu-Data Account required for use  
                          Access provided by dial-up lines  
                          System available 24 hours per day, 7 days per week  
                          Documentation and consultation services available  
                          Cost information provided by Accu-Weather

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## ACCU-DATA™

Accu-Data™ is a real-time, interactive data base that includes a large amount of available weather data, forecasts, and information. The system is accessible from virtually all terminals and personal computers.

### DATA SETS

Accu-Data™ provides information from a variety of sources:

- National Weather Service (NWS) Domestic Data Service
- NWS Public Data Service
- NWS International Data Service
- FAA 604 Circuit
- Digital Satellite Data from GOES
- NAFAX.

The information comprises the following:

- North American Hourly Surface Reports
- Upper Air Reports
- Synoptic Data
- Radar Data and Plots
- Plain Language Reports and Forecasts
- Severe Weather Statements, Watches, and Warnings
- LFM Model Output
- FOUS
- Coast Guard Reports
- Coastal Waters Forecasts
- Near-shore, Offshore, and High Seas Marine Forecasts
- Trajectory Forecasts
- Prognostic and Satellite Discussions
- Air Stagnation Data
- Color or Black and White Satellite Images from GOES

- 
- Worldwide Synoptic and Upper Air Data
  - Aviation Weather Information
  - NOTAMS (Notice and Messages)
  - Ship and Buoy Reports
  - Color Graphic Radar Images and over 100 other Color Graphic Products daily.

#### SUBSYSTEMS

The Advanced Map Plotting System (AMPS) enables users to access over 2,500 high resolution maps daily. Attributes include the following:

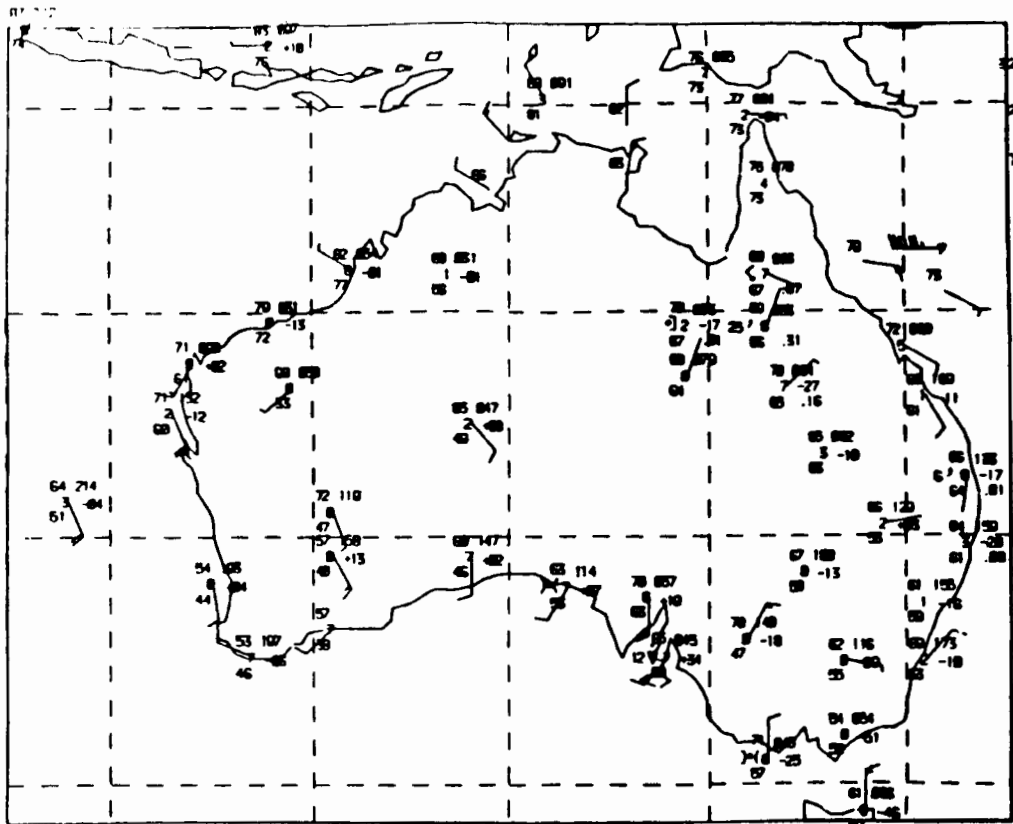
- Special high resolution maps and charts of all weather variables.
- Availability of information not available elsewhere. Such data include high resolution soundings, 24-hour temperature change charts, and 3-hour pressure tendencies on every surface map.
- Current information. Most maps are available several hours faster than on NAFAX and DIFAX. All surface parameters are available every hour.
- Tailor-made for user. User selects only those maps meeting his or her requirements. User also selects exact form and format required.

Figure 1.2-1 presents examples of the types of maps made available through AMPS.

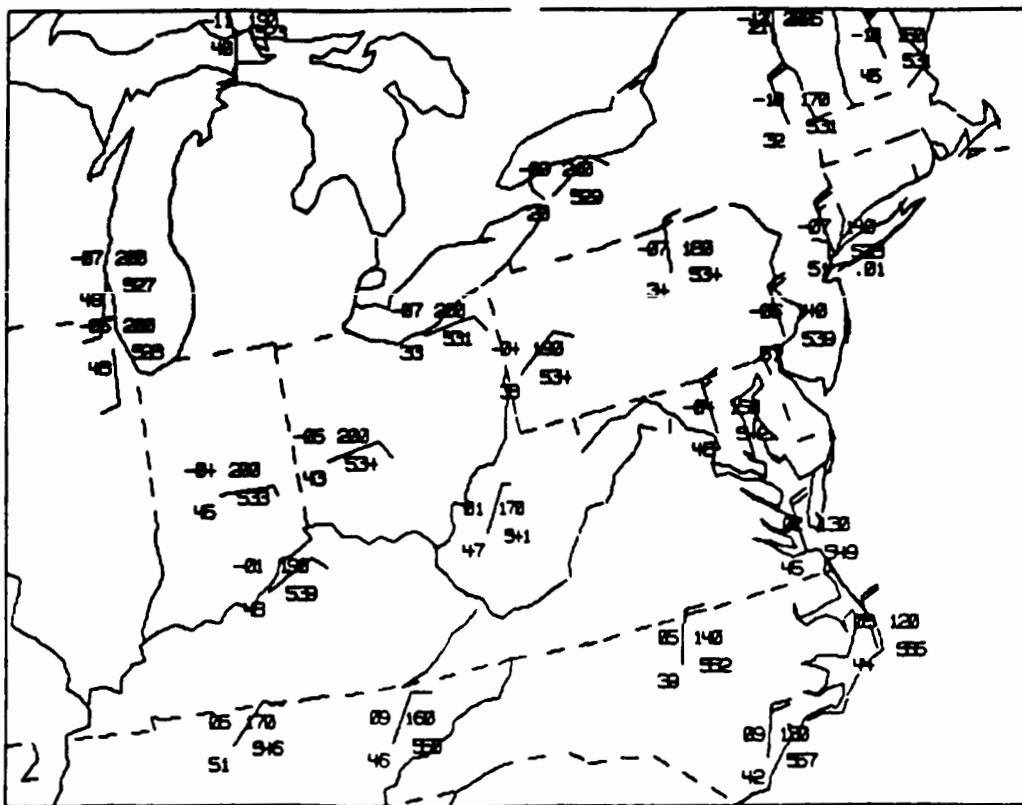
#### PRODUCTS

Accu-Data™ products include those itemized below:

- Over 2,500 high resolution maps
- Climate model output
- Marine and seismic data
- Plain language forecasts
- Radar data
- Surface observations
- Upper air data.



SYNOPTIC PLOT 12Z 13-NO-85  
 © ACCU-WEATHER, INC.



24 HOUR FOURS FORECAST 12Z 21-FEB-86  
 PRESS RETURN TO CONTINUE: © ACCU-WEATHER, INC.

Figure 1.2-1. Examples of the Types of Maps Available Through AMPS

**REQUIRED  
EQUIPMENT**

---

To access the system, the user needs the following:

- Terminal
  - Data only: any ASCII
- Graphics
  - Colorgraphics Systems
  - Chyron
  - Thomson-CSF
  - Dubner
  - Alden
  - International Technologies, Incorporated
  - Weathergraphics
  - Color Connection
  - PMT
  - IBM
  - PC-XT
- Modem (300-2400 bps)
- Printer (optional)
- Emulation/Communication software (if applicable).

**ACCESS**

Accu-Data™ is a user friendly, menu-driven system. Information on access requirements and services follow.

**Accu-Data™  
Account**

An Accu-Data™ account is required for use.

**Means of Access**

Access to the system is provided by dial-up lines.

**System  
Availability**

The system is available 24 hours per day, 7 days per week.

**Documentation**

Clear and detailed system and product manuals are available to the user, as is on-line help.

---

Consultation

Consultation is available to the user 24 hours per day, 365 days per year at (814) 237-5802.

Cost

No line charges or set-up costs are required for accessing the system. The user pays for connect time. Rates vary according to the transmission used. Contact Accu-Weather for specifics.

FUTURE PLANS

Not known

ADDRESS

Accu-Data  
Accu-Weather, Incorporated  
619 W. College Avenue  
State College, PA 16811  
(814) 237-5802



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**CAC FACTS**

**Data Sets**                   Forty-one climatological data sets available through CAC

**Systems and  
Subsystems**                   Not known

**Products**                    Tabular data  
                                  Textual information  
                                  Printer graphics  
                                  All information directed to terminal

**Required  
Equipment**                   Terminal (any ASCII)  
                                  Modem (300-1200 bps)  
                                  Printer (optional)  
                                  Emulation and/or communications software (if applicable)

**Access**                       Menu-driven system  
                                  CAC account required for use  
                                  Access provided by a dial-up line  
                                  System available 24 hours per day, 7 days per week  
                                  Documentation and consultation services available  
                                  No cost for use

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## CLIMATE ANALYSIS CENTER COMMUNICATIONS SYSTEM

The Climate Analysis Center (CAC) Communications System provides access to climate-related information primarily concerning the United States but on a more limited basis, the entire world.

### DATA SETS

Forty-one data sets, listed below, are available through CAC.

**CLIMRANK:** Monthly and seasonal climate rankings by areas.

**DDAYEXP:** Explanation of degree day products.

**FORECAST:** 5-day, 6- to 10-day, 7-day maximum and minimum, and monthly and seasonal outlooks for temperature and precipitation. Weekly heating and cooling degree day forecasts. Monthly heating or cooling degree day forecasts.

**GLOBAL:** Daily, weekly, and monthly summaries of temperature and precipitation data for more than 6,000 locations throughout the world.

**GRODGREE:** Cumulative weekly growing degree days for corn.

**MAPS:** Maps of the weekly temperature/precipitation and their departures from normal; maps of the 6- to 10-day forecast by category.

**MFOREIGN:** Monthly temperature and precipitation data for about 175 foreign cities.

**MCTYCDDY:** Monthly cooling degree days for 200 U.S. cities.

**MCTYHDDY:** Monthly heating degree days for 200 U.S. cities.

**MCTYPRCP:** Monthly precipitation data for more than 200 U.S. cities.

**MCTYTEMP:** Monthly temperature data for more than 200 U.S. cities.

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**MRECPRCP:** Comparison of current month's precipitation to record.

**MRECTEMP:** Comparison of current month's temperature to record.

**MSACDDY:** Monthly weighted State average cooling degree days.

**MSAHDDY:** Monthly weighted State average heating degree days.

**PASTDATA:** Data for the preceding 3 weeks and 3 months selectively.

**PPDANOTE:** Explanation of projected Palmer Drought Index.

**PPDCENTR:** Projected Palmer Index central United States.

**PPDEAST:** Projected Palmer Index eastern United States.

**PPDSOUTH:** Projected Palmer Index southern United States.

**PPDWEST:** Projected Palmer Index western United States.

**SCTYTEMP:** Seasonal temperature data for more than 200 U.S. cities.

**SCTYPRCP:** Seasonal precipitation data for more than 200 U.S. cities.

**SELECT:** Allows the user to access data by State. Temperature and precipitation data for several hundred supplementary stations are accessible with this option. Data subjected to less rigorous quality control than primary stations.

**WCTYDDAY:** Weekly degree days for more than 200 U.S. cities.

**WCTYPRCP:** Weekly precipitation data for more than 200 U.S. cities.

**WCTYTEMP:** Weekly temperature data for more than 200 U.S. cities.

**WFOREIGN:** Weekly temperature and precipitation data for about 175 foreign cities.

**WPDANOTE:** Explanation of weekly Palmer Drought Index.

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WPCENTR: Weekly Palmer Drought Index for the central United States.

WPDEAST: Weekly Palmer Drought Index for the eastern United States.

WPDSOUTH: Weekly Palmer Drought Index for the southern United States.

WPDWEST: Weekly Palmer Drought Index for the western United States.

WSACDDY: Weekly population-weighted State average cooling degree days.

WSAHDDY: Weekly population-weighted State average heating degree days.

WXCLSMYI: Weekly summary of internationally significant climate events.

WXCLSMYM: Monthly summary of U.S. significant climate events.

WXCLSMYS: Seasonal summary of U.S. significant climate events.

WXCLSMYU: Weekly summary of U.S. significant climate events.

WXCPSMYH: International weather and crop highlights.

WXCPSMYI: International weather and crop summary.

**SYSTEMS AND  
SUBSYSTEMS**

Not known

**PRODUCTS**

Available products include:

- Tabular data
- Textual information
- Printer graphics.

All output is directed to the terminal. See Figure 1.3.1 for an example.

**REQUIRED  
EQUIPMENT**

To access CAC, a user needs the following:

- Terminal (any ASCII)
- Modem (300-1200 bps)
- Printer (optional)
- Emulation and/or communications software (if applicable).

**ACCESS**

CAC is a menu-driven system, as shown by the main menu reproduced below:

GOODBYE	-	0		
CLIMRANK	-	1	MSAHDDY	- 16
DDAYEXP	-	2	PASTDATA	- 17
FORECAST	-	3	PPDANOTE	- 18
GLOBAL	-	4	PPDCENTR	- 19
GRODGREE	-	5	PPDEAST	- 20
HELP	-	6	PPDSOUTH	- 21
MAPS	-	7	PPDWEST	- 22
MCTYCDDY	-	8	SCTYPRCP	- 23
MCTYHDDY	-	9	SCTYTEMP	- 24
MCTYPRCP	-	10	SELECT	- 25
MCTYTEMP	-	11	WCTYCDDY	- 26
MFOREIGN	-	12	WCTYHDDY	- 27
MRECPRCP	-	13	WCTYPRCP	- 28
MRECTEMP	-	14	WCTYTEMP	- 29
MSACDDY	-	15	WFOREIGN	- 30
			WPDANOTE	- 31
			WPDCENTR	- 32
			WPDEAST	- 33
			WPDSOUTH	- 34
			WPDWEST	- 35
			WSACDDY	- 36
			WSAHDDY	- 37
			WXCLSMYI	- 38
			WXCLSMYM	- 39
			WXCLSMYS	- 40
			WXCLSMYU	- 41
			WXCPSMYH	- 42
			WXCPSMYI	- 43

ENTER MENU NUMBER & PRESS RETURN

The following items indicate requirements and services applicable to access.

**CAC Account**

A user must establish an account with CAC through the National Oceanic and Atmospheric Administration (NOAA), National Weather Service (NWS).

STATION IDENTIFIERS

```

CAR.
.
.
.
INL.....
ISN      GFK      INL.....      BTV      PWM
.
.
DLH..    SSM.
BIS      FAR      MQT      CON
.
.
AUX      AUV      APN.      SYR ALB BDL PVD
.
.
GRB.     HTL.     ROC      BDR
HON      MSP.     BUF      BGM      LGA
.
RST      FNT      ERI      AVP
FSD..... LSE.    MKE MKG LAN      AEE
.
VTN      MSN     GRR     DTW CLE YNG      PHL ACY
.
SUX      ALO     RFD ORD.    TOL CAK PIT
.
OFK      DSM     MLI     SBN FWA      BWI
.
LBF      ON4      CMH      DCA SBY.
.
GRI LNK      PIA     IND     DAY     PKB
.
.
    UIN SPI      CVG.     CRW ROA     RIC
GLD      CNK.....      HTS BKW     ORF
.
TOP MCI COU STL.      SDF
.
EVV.     LEX      GSO RDU     HAT
.
DDC      BWG      EWN
.
ICT      SGF     CGI     BNA     TYS     AVL CLT
.
.
    CHA     GSP.....     ILM
.
TUL      MEM      CAE
AMA      OKC     FSM      ATL     AGS.     CHS.
.
SPS      IMI     BHM
.
LBB      GWO     MCN     SAV.
.
.
    MEI.     MGM
ABI      SHV     JAN
.
DFW      JAX.
SJT      ACT     AEX     MOB.     TLH
.
AUS      BTR     AQQ     DAB
.
IAH     LCH     MSY     MCO
DRT      SAT     BPT     TPA
.
VCT GLS      PBI
.
CRP      MIA.
.
BR0      EYW
.
        PUERTO RICO MJS
    
```

Figure 1.3-1. Climate Analysis Center Communications System

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Means of Access Access is provided by a dial-up line.

System Availability CAC is available 24 hours per day, 7 days per week.

Documentation An information sheet concerning CAC is available.

Consultation Consultation on use of the system is available Monday through Friday from 8:00 a.m. to 4:30 p.m Eastern Time at (301) 763-8071.

Cost There is no cost for use except for the telephone call. The access number is local to Washington, D.C.

FUTURE PLANS Not known

ADDRESS NOAA/NWS/CAC  
W/NMC53, WWB, Room 201  
Washington, D.C. 20233  
(301) 763-8071

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**CDP-DIS FACTS**

**Data Sets**                    On-line, including catalogs, analyzed results, ancillary data, and project management information

Off-line, including pre-processed and raw data

**Systems and Subsystems**        On-line queries made with nine menu options

**Products**                    Textual information

Tabular data

Directed to terminal or sent to user

**Required Equipment**        Terminal (VT100 or compatible)

Modem (300-2400 bps)

Printer (optional)

Emulation and/or communications software (if applicable)

**Access**                      User friendly menu-driven system

CDP authorization required for use

Access provided through the Space Physics Analysis Network (SPAN), GTE Telenet, and dial-up lines

System available 24 hours per day, 7 days per week

Documentation and consultation services available

No cost for use

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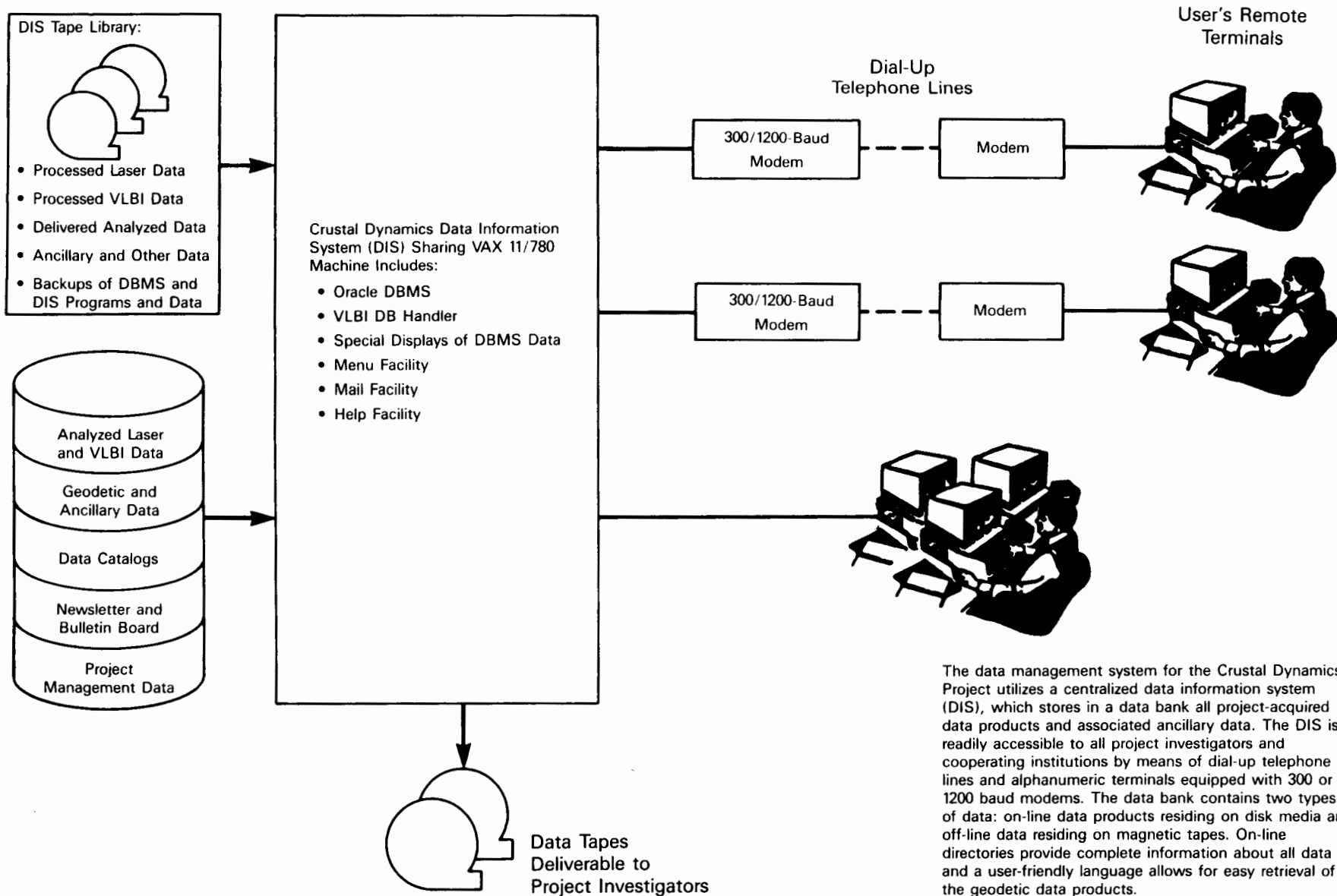
## CRUSTAL DYNAMICS PROJECT'S DATA INFORMATION SYSTEM

The NASA Crustal Dynamics Project (CDP) was established in 1980 to facilitate the study of Earth dynamics. The primary purpose of the Data Information System (DIS) is to store, display, and disseminate all geodetic data products acquired by the CDP and to maintain information on the archival of CDP-related data. Figure 1.4-1 is a diagram of the system, which is discussed below.

### DATA SETS

The DIS provides two types of data sets:

- On-line:
  - Catalogs of pre-processed Satellite Laser Ranging (SLR) data from LAGEOS, BE-C, and STARLETTE Satellites, 1976 through 1986
  - Catalogs of pre-processed Very Long Baseline Interferometry (VLBI) data, 1976 through 1985
  - Analyzed results from SLR, Lunar Laser Ranging (LLR), and VLBI studies at Goddard Space Flight Center (GSFC), Jet Propulsion Laboratory (JPL), National Geodetic Survey (NGS), Massachusetts Institute of Technology (MIT), the University of Texas, and many other institutions, 1976-1985
  - Site descriptions, occupation histories, a priori monument coordinates, star coordinates, and calibration data
  - Project management information (operational information accessible to DIS staff only).
- Off-line:
  - Pre-processed SLR data from LAGEOS, BE-C, and STARLETTE Satellites, 1976 through 1986
  - Pre-processed VLBI data, 1976 through 1985.



QUALITY OF WORK

The data management system for the Crustal Dynamics Project utilizes a centralized data information system (DIS), which stores in a data bank all project-acquired data products and associated ancillary data. The DIS is readily accessible to all project investigators and cooperating institutions by means of dial-up telephone lines and alphanumeric terminals equipped with 300 or 1200 baud modems. The data bank contains two types of data: on-line data products residing on disk media and off-line data residing on magnetic tapes. On-line directories provide complete information about all data and a user-friendly language allows for easy retrieval of the geodetic data products.

**Figure 1.4-1. Crustal Dynamics Project Data Information System**

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**SYSTEMS AND  
SUBSYSTEMS**

On-line queries are made with the following menu options:

- **HELP:** aids the user in the available menu items and presents information relative to the generation of the analyzed results stored in DIS.
- **SQL:** displays sub-menus of pre-programmed queries that allow the user to directly access the various acquired data sets through ORACLE's SQL query language.
- **DBH:** executes the VLBI Data Base Handler, developed by the VLBI Science Support Team at GSFC to provide the user with information about VLBI experiment sessions and to allow the user to browse the processed VLBI data.
- **BULLETIN:** displays current and previous CDP and DIS bulletins on an article-by-article basis.
- **NEWS:** informs users of project-related information, such as future Project meetings.
- **DATA EXCHANGE:** provides access to several analysis programs received from Project investigators.
- **REPORTS:** displays sub-menus that summarize and present selected data base tables, such as Project occupation schedules and data catalogues.
- **SCREEN FORMS:** displays a sub-menu of screen forms that allow the user to access the tables of the ORACLE data base without the use of a formal query language. Data can be retrieved and displayed in these pre-designed formats.
- **EXIT:** exits user from the DIS and terminates the connection to the NCF.

**PRODUCTS**

Available products include textual information and tabular data. On-line data can be directed to the user's terminal. Off-line data must be copied at DIS and sent to the user.

---

**REQUIRED  
EQUIPMENT**

To initiate access to the system, a user needs a terminal or a personal computer and may require additional hardware, as indicated below:

- Terminal (VT100 or compatible is suggested)
- Modem (300-2400 bps)
- Printer (optional)
- Emulation and/or communications software (if applicable).

**ACCESS**

The DIS is a user friendly, menu-driven system that provides ready access to the desired information.

**DIS Account**

Users require CDP authorization. To obtain this authorization, potential users should contact the CDP Data Manager at (301) 286-2052.

**Means of Access**

The DIS is accessible through the Space Physics Analysis Network (SPAN), GTE Telenet, and dial-up lines. Once authorized for access to DIS, the user will receive the telephone number and the VAX user names and password to the DIS account.

**System  
Availability**

The system is available 24 hours per day, 7 days per week, except during periods of system backup or maintenance.

**Documentation**

The Crustal Dynamics Data Information System User's Guide is available from the CDP Data Manager upon request. In addition, a DIS News Bulletin is published bimonthly.

**Consultation**

The DIS staff are available for consultation Monday through Friday from 8:00 a.m. to 4:30 p.m. Eastern Time. Users may call (301) 286-2052 or (301) 286-9283.

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Cost

No charges are currently associated with using DIS.

**FUTURE PLANS**

The DIS will continue to support CDP throughout its lifetime, which extends through 1990. After 1990, the DIS will become part of a data base for the National Geodetic Reference System.

**ADDRESS**

Crustal Dynamics Project  
Data Information System  
NASA Goddard Space Flight Center  
Code 634  
Greenbelt, Maryland 20771  
(301) 286-9283

Henry C. Linder

Carey E. Noll

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**McIDAS FACTS**

**Data Sets**

Real time

Non-real time

**Subsystems**

Data manipulation

**Products**

Alphanumeric

Graphics/displays

Photographic

Data directed to terminal or sent to user

**Required  
Equipment**

McIDAS work station

**Access**

Command-driven and menu-driven features

Access limited to contract

Access provided via dedicated and dial-up lines

System available 24 hours per day, 7 days per week

Documentation and consultation available

Costs for hourly use of the system and telecommunications

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## MAN-COMPUTER INTERACTIVE DATA ACCESS SYSTEM

The Man-computer Interactive Data Access System (McIDAS) was developed in 1972 to track cloud motions and compute wind fields. Currently, McIDAS is composed of a mainframe IBM 4381 Q3 computer with both local and remote work stations.

McIDAS is used by research scientists, including biologists and entomologists, and operational forecasters. Meteorologists use the system to study the Earth's atmosphere, as well as the circulation on other planets.

### DATA SETS

The data sets available through McIDAS include those accessible real time, plus additional non-real time data sets.

- Real Time Data Sets
  - Digital satellite imagery (visible, infrared, multi-spectral, and sounding data) from the U.S. geostationary satellites received from the satellites via local antennas
  - Digital radar data from Kavouras
  - Conventional weather observations (surface hourly observations, rawinsonde observations, ship and buoy data, and FOCUS data) available from the National Meteorological Center (NMC) through Zephyr communications service
  - NMC forecast products, lightning data, and ASDAR aircraft data TIROS-N through specialized communications lines
- Non-Real Time Data Sets
  - Planetary data
  - Other geostationary satellite data (Meteosat, GMS, Indian Ocean)

- 
- Information from research radars
  - Experimental satellite radar and microwave imagery
  - Other On-line Data Bases:
    - Locations for all cities and towns in the United States
    - Rawinsonde station locations for North America
    - SVC-A station locations for North America
    - Continental and political map boundaries for entire world
    - State and county map boundaries for the United States
    - The four most recent 1 kilometer resolution visible images over the United States
    - The four most recent 4 kilometer resolution full disk visible images
    - The four most recent 4 kilometer resolution full disk infrared images
    - Surface hourly data, rawinsonde observations, ship and buoy data
    - FOUS data for the last 4 days, including up to 2 weeks of TIROS-N data in addition to VISSR Atmospheric Sounder (VAS) imagery.

#### SUBSYSTEMS

Data can be manipulated on McIDAS work stations through user commands to do the following:

- Reduce and enlarge digital data
- Edit bad data values
- Apply a filter; low pass or high pass
- Stretch digital data values
- Filter shot noise
- Look up table enhancements
- Stretch contrast



- 
- Fill missing data areas
  - Modify data arithmetically
  - Remove buffer flakes and bad lines
  - Scale data
  - Convert IR data to flux
  - Convert IR counts to Kelvin
  - Combine multiple areas.

#### PRODUCTS

Output of the original digital or point source data can be stored on magnetic tape. Alpha-numeric products from the work station can be output on a local line printer. Imagery and graphics products from the work station can be output on 3/4-inch video tape; a photographic device cabled to the video monitor, which produces 35mm color slides; polaroid pictures and prints; and a hardcopy device cabled to the video monitor, which produces instantaneous 8 x 10 black and white reproduction.

Multiple graphics frames of 480 x 640 pixels are available on each work station depending on the amount of memory. The current maximum is 256 frames. The number of graphics frames is always one-half the total number of image frames. Eight different user selected graphics colors can be displayed simultaneously from a palette of 32,000. Graphics are user generated and consist of contours, maps, plots, graphs, etc. Multiple graphics scenes can be saved in virtual memory and written onto magnetic tape. Individual graphics scenes can be rotated, reduced, enlarged, or resituated on a graphics frame.

#### REQUIRED EQUIPMENT

The hardware needed depends on the user's location and desired data access. A full McIDAS work station (CRT, keyboard, video display monitor, printer, joysticks, data tablet) is necessary for interactive manipulation of digital imagery. Local users have readily available work stations at the Space Science and Engineering Center (SSEC), the address of which is given under Access. Remote users can use one of the following methods:

- Purchase a full work station accessible via a dedicated telephone line

- 
- Purchase a CRT and modem for display of data received via a dial-up telephone line.

**ACCESS**

McIDAS supports both command-driven and menu-driven features. It has the access specifications and services itemized below.

McIDAS Account

A potential user should contact Denise J. Bittorf, the financial director, at (608) 262-2455.

Means of Access

Access is provided via dedicated or dial-up line.

System Availability

The system is available 24 hours per day, 7 days per week.

Documentation

Two manuals are available from the documentation department upon request:

- McIDAS Applications Guide, which is a procedure-oriented manual used for training; updates are based on the growth of McIDAS.
- McIDAS Reference Manual, which functions as a reference to specific commands; updated bimonthly.

The use of McIDAS requires individual training. To allow for flexibility, McIDAS does not presuppose any processes. The result is a large command pool that does not lend itself to the creation of general menus. Menus are created to suit an individual's needs.

McIDAS has an on-line help for each user command.

Consultation

SSEC personnel are available in the User Service's department from 8:00 a.m. to 5:00 p.m. Central Time, Monday through Friday. The telephone number is (608) 262-2455.

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Cost

Costs associated with using the system are as follows:

- \$360/CPU hour, or for the average user approximately \$75/clock hour
- Terminal rental (or purchase) and communications costs for remote users.

**FUTURE PLANS**

McIDAS is designed to be a continuously evolving system. The major efforts planned over the next few years include a variety of user interfaces, systems networking, pattern recognition, and other artificial intelligence techniques. These capabilities will lead to expert systems supporting meteorologists, a 4-D data assimilation model for real time forecasting, and a dynamic 3-D work station for multi-variant data display. The work station will provide McIDAS with the capability for data access and display within the IBM PC/AT class microprocessor and satellite broadcast of data and products to remote work stations.

Long range goals of McIDAS are continual evolution toward being the state-of-the-art technology in atmospheric sciences and decision making.

**ADDRESS**

McIDAS  
Space Science and Engineering Center  
University of Wisconsin - Madison  
1225 West Dayton Street  
Madison, Wisconsin 53706

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NAVOBSY ADS FACTS

**Data Sets**            Several Precise Time and Time Interval (PTTI) Data and Information Data Sets

**Products**            Textual information  
                          Tabular data  
                          Directed to terminal

**Required Equipment**    Terminal (any ASCII)  
                          Modem (300-1200 bps)  
                          Printer (optional)  
                          Emulation and/or communications software (if applicable)

**Access**                Account not necessary for use of system  
                          Access provided by dial-up lines  
                          System available 24 hours per day, 7 days per week  
                          On-line help and user service available  
                          No cost for use

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## U.S. NAVAL OBSERVATORY AUTOMATED DATA SERVICE

The U.S. Naval Observatory (NAVOBSY) Automated Data Service (ADS) provides a dial-up system containing various Precise Time and Time Interval (PTTI) data sets and information.

### DATA SETS

Figure 1.6-1 identifies the data available from the NAVOBSY PTTI system. The letters following the @ sign are the associated command.

### SYSTEMS AND SUBSYSTEMS

There are no subsystems.

### PRODUCTS

Output products include:

- Textual Information
- Tabular Data.

All output is directed to the user's terminal.

### REQUIRED EQUIPMENT

To access the system, the user needs the following:

- Terminal (any ASCII)
- Modem (300-2400 bps)
- Printer (optional)
- Emulation and/or communications software (if applicable).

### ACCESS

Access specifications and services are itemized below.

### NAVOBSY ADS Account

No account is required for use of the system.

TABLE OF MOST FREQUENTLY USED CODES

EXPLANATIONS, GENERAL	@EXP	PTTI CONFERENCE NEWS	@TTI
SPECIAL DAILY MESSAGE	@DME	TIME SERVICE DIRECTORY	@DIR
GENERAL PTTI MESSAGE	@MES	MAILBOX INFORMATION	@MBXXP
VLF STATUS	@VLF	VLF MAINTENANCE SCHED	@VLF2
VLF EXPLANATIONS	@VLFXP		
OMEGA STATUS	@ONS	OMEGA MONITOR DATA	@ONSD1
OMEGA EXPLANATIONS	@ONSXP	OMEGA OFF-TIMES SCHED	@ONSD2
GPS STATUS	@GPS	GPS TRACKING SCHEDULE	@GPSD2
GPS EXPLANATION FOR DATA	@GPSXP	GPS EXTRAPOLATION	@GPSD4
GPS LATEST TIME DATA	@GPSD1	GPS FILE DATA	@GPSSL
TRANSIT STATUS	@TRA	TRANSIT SER17	@TRAD7
TRANSIT EXPLANATIONS	@TRAXP	TRANSIT FILE DATA	@TRASL
TRANSIT TIME DATA	@TRAD1	TRANSIT SAT. VISIBILITY	@TRAVS
TRANSIT NOVA DATA	@TRAD2		
LORAN STATUS	@LOR	LORAN REAL TIME MEAS	@MLO
LORAN EXPLANATIONS	@LORXP	LORAN PROPAGATION TIME, DIRECTION, AND DISTANCE	@LDX
TOC FOR LORAN OR TV (TIME OF COINCIDENCE)	@TOC	TV EXPLANATIONS WTTG-TV CH-5, MEAS NETWORK TV MEASUREMENTS	@TVKXP @TVL @TVK
PORTABLE CLOCK DATA: MEASUREMENTS	@MPC	SCHED. OF NEXT TRIP	@MPX
SCHED. OF CURRENT TRIP	@MPN	TENT. PC TRIP PLANS	@MPT
NBS DATA:		OPERATIONS CONTROL:	
NBS EXPLANATIONS	@NBSXP	FOR DETAILS AND CODES	@OPSXP
NBS STATUS OF GOES	@NBSGO	USNO PUBLIC INFORMATION	@STAXP
REAL TIME MEASUREMENTS: EXPLANATIONS	@RTMXP	PREDICTIONS & COMPUTATIONS: SIDEREAL TIME	@STI
LORAN (4 CHAINS)	@MLO	MJD/WEEKDAY	@DAT
UTC TO +/- 50 MS	@TIM	SUNRISE, SUNSET, OR TWILIGHT	
TIME SIGNAL EXPL	@TSF	FOR ANY POINT	@SRI
		SUNRISE PROG. EXPLAN	@SRIXP
TV READINGS (AVERAGES):			
WTTG WASHINGTON, DC	@TVM	LORAN PROPAGATION TIME, DIRECTION, & DISTANCE	@LDX
NBC WASHINGTON, DC	@TVN	STANDARD TIME ANYWHERE	@STTXP

Figure 1.6-1. Data Available from NAVOBSY PTTI

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Means of Access

Access is provided by dial-up lines:

- Commercial: (202) 653-1079 for 300-1200 bps  
(202) 653-1783 for 1200-2400 bps
- Overseas: (CCITT V.21) (202) 653-1095
- FTS: 653-1079
- AUTOVON: 294-1079.

To gain access, the user should do the following:

- Type in name/organization/location at the prompt.
- Type in desired command.

Control D allows termination of service.

System  
Availability

The system is available 24 hours per day, 7 days per week.

Documentation

On-line help is available by typing "?".

Consultation

Assistance in using the system is available at the following telephone numbers:

- (202) 653-1525    FTS 653-1525    AUTOVON 294-1525
- (202) 653-1412    FTS 653-1412    AUTOVON 294-1412
- (202) 653-1520    FTS 653-1520    AUTOVON 294-1520

Cost

No cost is associated with use of the system.

FUTURE PLANS

Not known

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**ADDRESS**

U.S. Naval Observatory (NAVOBSY)  
Automated Data Service (ADS)  
Washington, D.C. 20390  
(202) 653-1525



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NOAA DATA ACCESS SYSTEM FACTS

Data Sets           NOAANET: data holdings of NOAA data centers and external data bases

                      NOAAPORT: real-time environmental satellite data, National Weather Service Family of Services

Systems and        NOAANET (operational 1991): CATALOG, NEDRES, EXTERNAL Subsystems        SYSTEMS LINK

                      NOAAPORT (operational 1987): to be developed

Products           Standard and custom product line to be developed

                      Data/Information to be directed to terminal or sent to user

Required           To be developed Equipment

Access             Prepaid account with NOAA required prior to use

                      Access by networks (NOAANET) and ground-receiving equipment (NOAAPORT)

                      User services to be developed

                      Costs to be developed

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## NOAA DATA ACCESS SYSTEM

NOAA'S Data Access System includes two data dissemination elements: NOAAANET for on-line access to retrospective data holdings and catalogs, and NOAAPORT for near-real-time broadcast of environmental data and products. The systems are both in the planning stages. NOAAPORT may be on-line in a limited manner in late 1987, NOAAANET in 1990. NOAAANET will serve the general public as well as internal NOAA users; NOAAPORT will serve the National Weather Service and the National Ocean Service and will be available to non-NOAA users as well (both Government and non-Government).

### DATA SETS

The environmental data holdings of National Environmental Satellite, Data, and Information Service (NESDIS) at the National Climatic Data Center, National Geophysical Data Center, and National Oceanographic Data Center will form the core of the data available through NOAAANET, along with external data bases that can be accessed through the "External Systems Link" function. This link will allow other data systems to include their holdings in system catalogs and permit users to access the external holdings while operating in NOAAANET. NOAAPORT will broadcast data from the NOAA environmental satellites (geostationary and polar orbiting), as well as ground- and ocean-based observations and derived products, such as model output. The precise listing of data streams and products has not yet been defined. The sources of these data are many and varied. Some originate within NOAA; others are provided by outside organizations, such as NASA and the Department of Defense. The flow is different for each data stream and each system. NOAAPORT will broadcast data continuously. NOAAANET on-line capacity is being defined and will increase over time.

### SYSTEMS AND SUBSYSTEMS

Figure 1.7-1 presents an overview of system functions for NOAAANET, which comprises the following:

- **CATALOG:** NOAAANET will provide a three-tiered catalog system. The top level will give specifics on environmental data sets and the second level on information

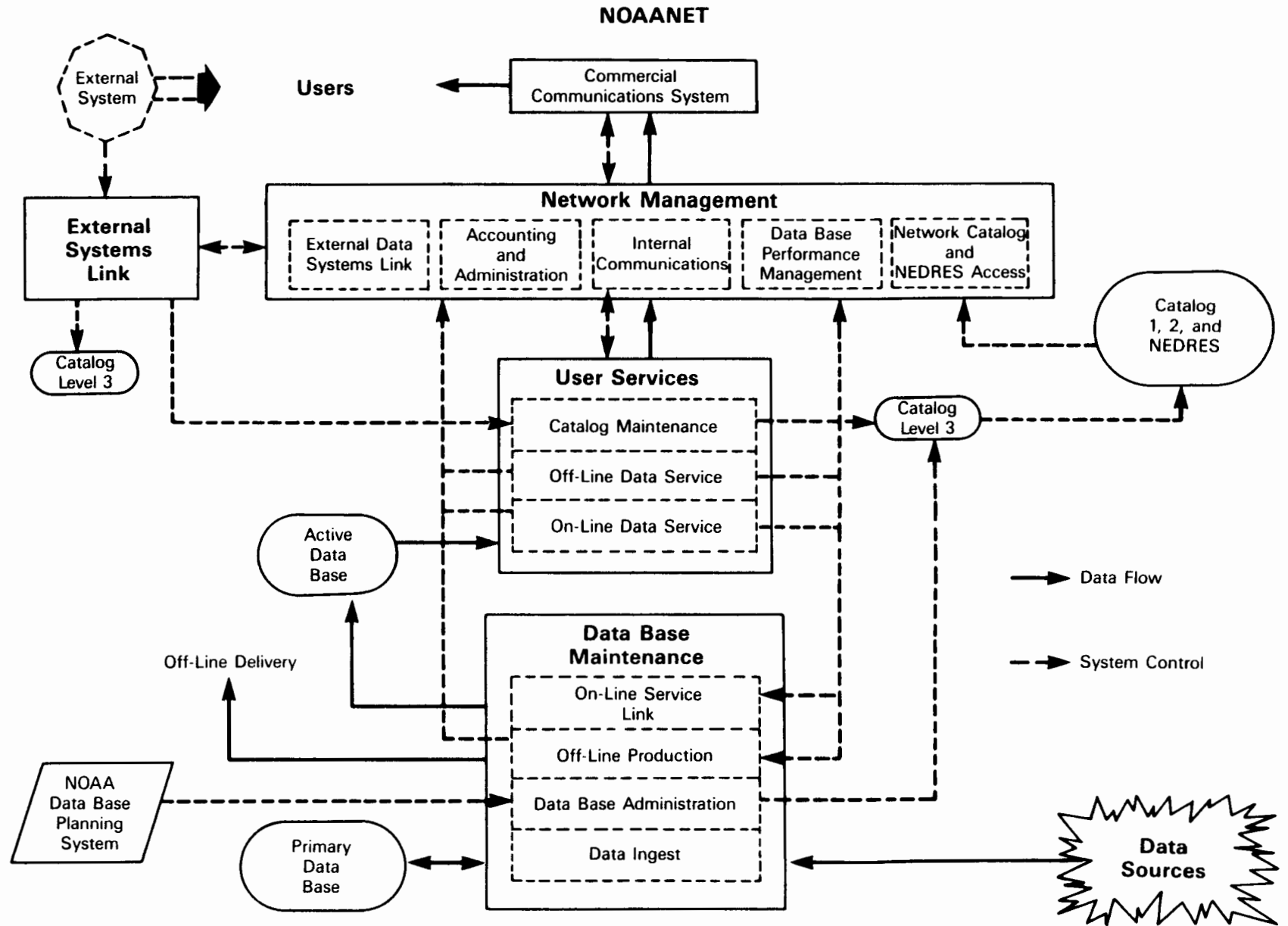


Figure 1.7-1. Overview of System Functions

---

known to NOAAANET. The third level will detail data sets archived by NOAAANET.

- NEDRES: will provide a referral service for NOAAANET.
- EXTERNAL SYSTEM LINK: will provide a transparent method of accessing other data systems for catalogs through NOAAANET.

The system and subsystems for NOAAPORT are to be developed.

**PRODUCTS**

The full product lines of NOAAANET and NOAAPORT are still being developed. However, NOAAANET will enable users to download data to their terminals or have the information sent by mail. NOAAPORT will include real-time transmission of environmental data and information.

**REQUIRED  
EQUIPMENT**

The equipment required for use of the system will be determined after the final design specifications for NOAAPORT and NOAAANET have been developed.

**ACCESS**

Access requirements and services are identified below.

**NOAA Account**

A user will be required to have a prepaid account with NOAA.

**Means of Access**

Access will be provided by networks (NOAAANET) and satellite-receiving equipment (NOAAPORT).

**System  
Availability**

NOAAPORT will be available 24 hours per day. Availability for NOAAANET is still to be determined.

**Cost**

Cost will be determined upon development of NOAAANET and NOAAPORT.

---

**FUTURE PLANS**

Plans for future development may be found under other headings in this section.

**ADDRESS**

NOAA/NESDIS  
Data Access Project Office  
FOB-4, Room 0135  
Washington, D.C. 20233  
(301) 763-4640



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## THE NASA OCEAN DATA SYSTEM

The NASA Ocean Data System (NODS) of the Jet Propulsion Laboratory (JPL), Pasadena, California, is designed to give the oceanographic research community access to a variety of remotely sensed and in situ oceanographic data sets and to provide efficient tools to preview such data. The last major system release became operational in February 1986.

NODS is funded by the NASA/OSSA/ESAD Oceanic Processes Branch and the NASA/OSSA Information Systems Office. The system receives formal guidance from the Satellite Ocean Data Systems Science Working Group, a committee sponsored by Joint Oceanographic Institutions, Incorporated.

### DATA SETS

NODS provides three types of data sets, which are listed below with examples:

- On-line remotely sensed data sets, including:
  - SEASAT Altimeter, level 2.5 (Streamlined Geophysical)
  - SEASAT SASS, level 2.5
  - SEASAT SMMR, level 2.5
  - GEOS-3 Altimeter, level 2.5
- On-line in situ data sets, including:
  - JASIN Surface Observations, level 2.5
  - NDBO Observations, level 2.5
- Off-line remotely sensed data sets, including:
  - SEASAT Altimeter SDR, level 1.0
  - SEASAT Altimeter GDR, level 2.0
  - SEASAT SASS GDR, level 2.0
  - SEASAT SMMR GDR, level 2.0.

---

## SUBSYSTEMS

The basic components of NODS are four subsystems accessed through a common menu interface, illustrated in Figure 1.8-1. The information below identifies these subsystems.

### Global On-Line Data Catalog

The GOLD catalog contains information on oceanographic data archived at several repositories:

- Top level permits query on platform/project, sensor/parameter, location (latitude/longitude), and time
- Lower level includes both general and comprehensive information, browsable examples (to be developed), bibliographic subsystem interface (to be developed), and interface to data extraction subsystem (to be developed).

### Bibliography

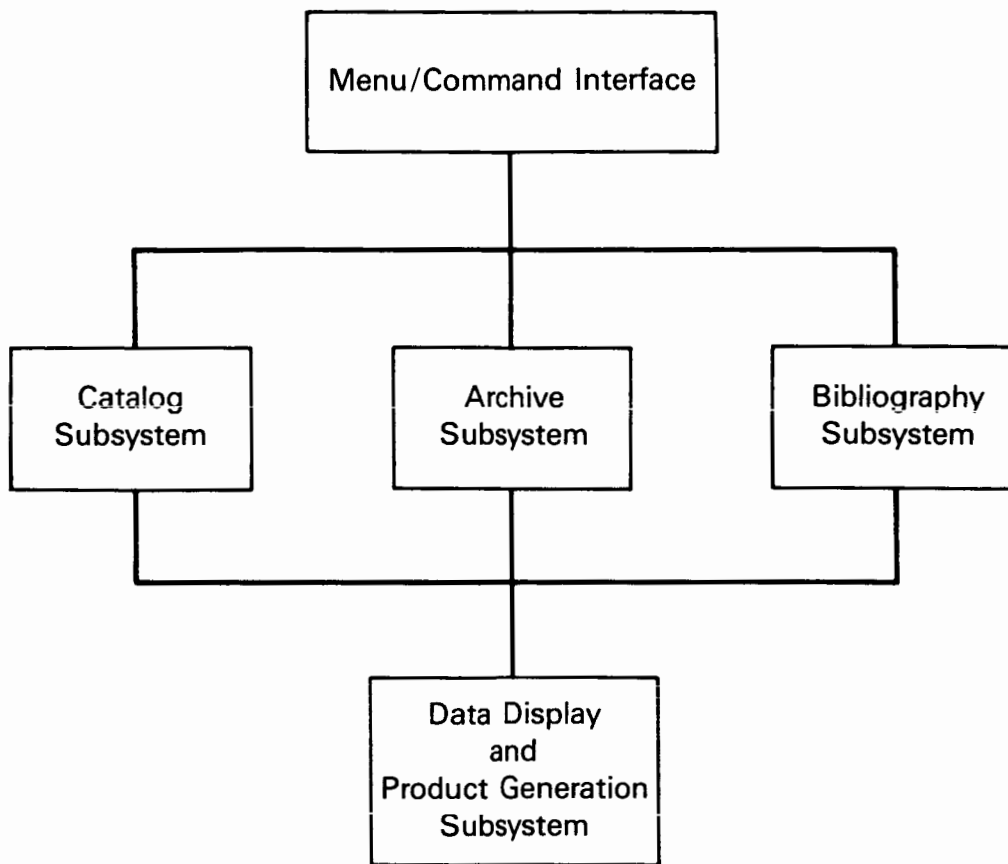
- This subsystem provides information on over 1,600 abstracts of papers, journal articles, and internal documents related to oceanography or oceanographic remote sensing.
- Searches can be made according to the following criteria:
  - Author's last name
  - Project
  - Sensor
  - Report type
  - Year completed
  - Oceanic Remote Sensing Library (ORSL) number
  - Subject, main category
  - Subject, subcategory
  - Internal report number.

### Data Archive

The archive system is responsible for loading data sets onto an indexed archive and then providing access to loaded data sets by allowing the user to extract all or part of a data set to produce a variety of output products.

- The subsystem is menu driven or command driven.





**Figure 1.8-1. NASA Ocean Data System**

- 
- User must specify time, region(s), parameter, project/platform, sensor, degree of processing, and output format.
  - In situ data sets can also be accessed through interaction with the Relational Information Management (RIM) Data Base Management System.
  - On-line data sets can be sent directly to the terminal, to a disk for temporary storage, or be dumped to a tape or remote printer for subsequent delivery. Off-line data sets may only be dumped to a tape or remote printer and subsequently sent to the user.

Data Display  
and Product  
Generation

- Graphics are produced by three methods:
  - Menu mode (many parameters selected by default)
  - NODS command language
  - PODSGRAF command language (most sophisticated).
- The subsystem supports nine types of plots:
  - Parameter(s) vs time
  - Parameter(s) vs latitude
  - Parameter(s) vs longitude
  - Histogram
  - Data location vs latitude/longitude
  - Data value vs latitude/longitude
  - Vectors vs latitude/longitude
  - Contours vs latitude/longitude
  - Scatter plots (parameter vs parameter--PODSGRAF only).
- The subsystem has three methods of producing pseudo-color displays of applicable data sets or data set extractions:
  - Menu mode (many parameters selected by default)
  - NODS command language
  - NOIDS command language (most sophisticated).

---

## PRODUCTS

The products from NODS, which are identified below, can be directed to a user's terminal/printer or be printed at JPL and sent by mail:

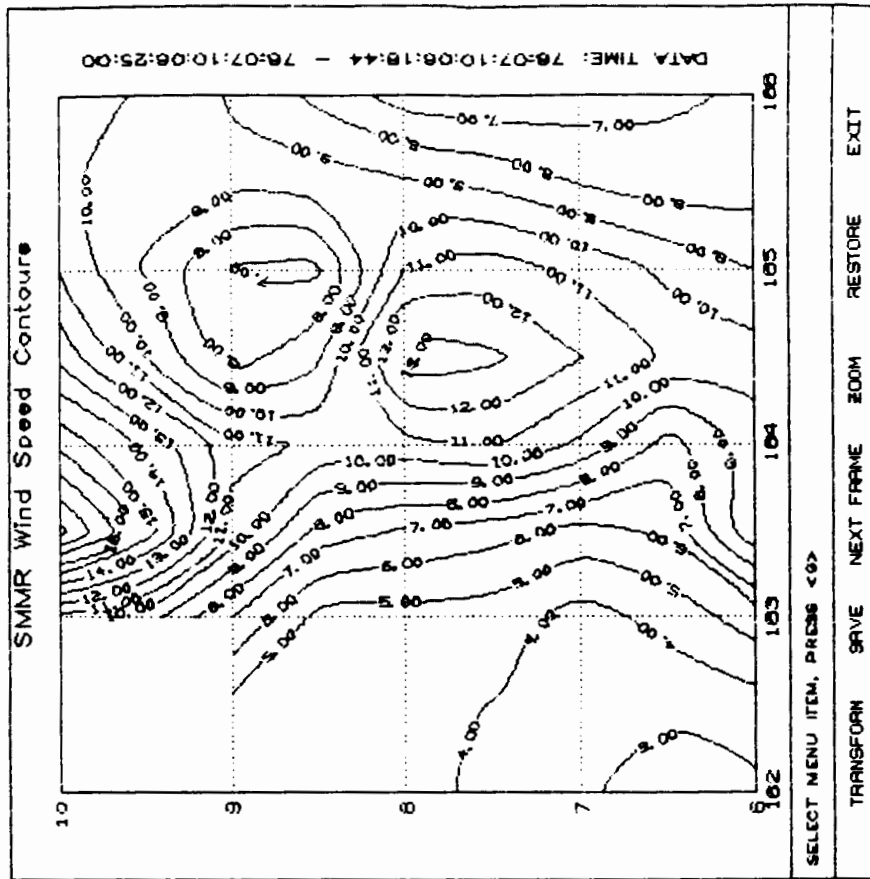
- Directed to terminal (on-line data only)
  - Tabular data
  - Abstracts, catalog information
  - Graphics (with appropriate terminal)
  - Displays (with appropriate terminal)
- Generated at JPL and sent to user (on-line and off-line data)
  - Tabular lists (data, abstracts, catalog information)
  - CCTS
  - Graphics
  - Displays.

High quality graphics require a plotter, or they must be produced by NODS plotters and sent by mail. Figure 1.8-2 presents samples of graphics.

## REQUIRED EQUIPMENT

Any ASCII terminal can be used to communicate with NODS. A special graphics terminal is needed, however, to utilize the system's graphic functions. The following list identifies the required equipment:

- Terminal
    - For catalog, bibliography, and data extraction without graphics or display: any ASCII terminal
    - For graphics: VT100 with VT640 retrographics, Hewlett Packard 2647a and compatible, Tektronix 4014 and compatible, Ramtek 6211, Tektronix 4107, and VT125
    - For color display: Tektronix 4107.
  - Modem (300-4800 bps)
  - Printer (optional)
-



SMMR WIND BINNED AT 2.0 - MERCATOR PROJECTION  
FILL=YES, FILTER=3X3, CONTOUR INTERVALS = 4

DATA TIME: 78:09:11:01:27:37 - 78:09:11:17:05:17

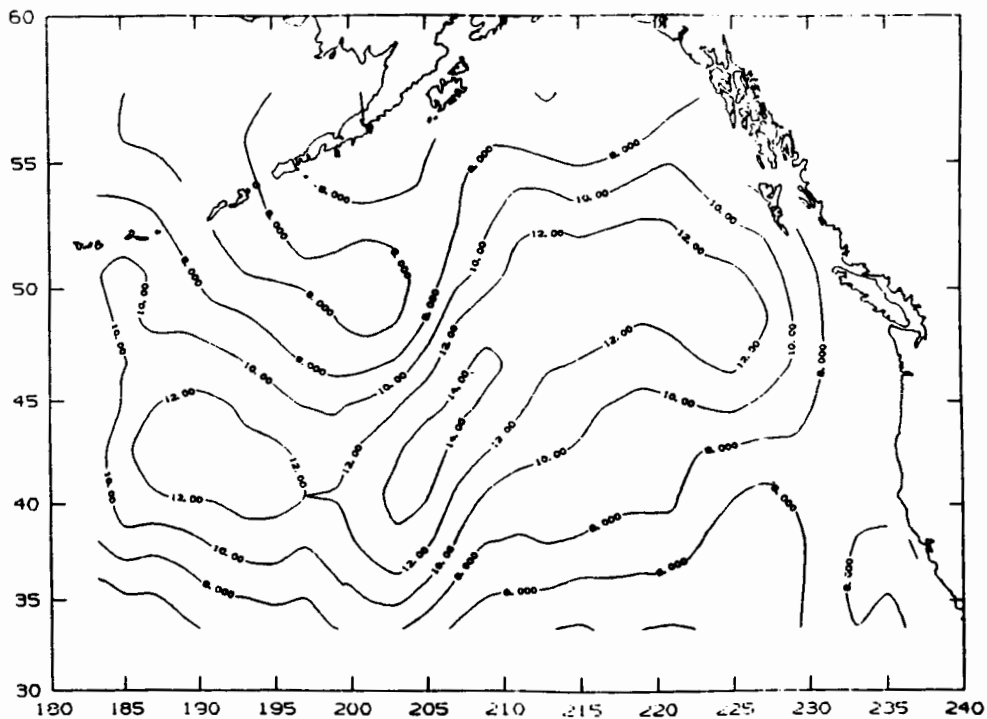


Figure 1.8-2. Examples of Graphics Generated on NODS

- 
- Plotter (optional): Varian/Benson, Zeta 3610
  - Emulation and/or communications software (if applicable).

## ACCESS

NODS is a user friendly system with menu-driven and command driven modes. The menu mode will direct novice users through a training session. Experienced users may wish to work with one of the various command languages. Help is available in either mode by typing 'Help' or '?' followed by the command name. The following paragraphs explore access further by discussing topics ranging from establishing a NODS account to identifying costs for use of the system.

### NODS Account

To establish a NODS account, a researcher must complete an application and send the form to NODS. After the form has been received at NODS, about 1 week is required to set up the account and mail information to the researcher.

Oceanographic researchers involved in noncommercial research are encouraged to apply for an account.

### Means of Access

Local or WATS telephone numbers are used for packet-switched access through GTE Telenet. Circuit-switched access is available to selected Government institutions and to universities through the Space Physics Analysis Network (SPAN).

### System Availability

NODS is available 24 hours per day, 7 days per week, except during periods of scheduled maintenance. The computer room is staffed 16 hours per day, 5 days per week (Monday through Friday, 7:30 a.m. to 11:30 p.m. Pacific Time).

### Documentation

A two-volume User's Guide is supplied to all account holders. In addition, a newsletter is published quarterly.

### Consultation

NODS staff are available for consultation 8 hours per day (8:30 a.m. to 4:30 p.m. Pacific Time) Monday through Friday.

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Specific contacts are as follows:

System Status	System Operator	818-354-8032 FTS 792-8032
		Emergency only- weekends, holidays: 818-354-5036 beep #L735
Project Manager		818-354-5036 FTS 792-5036
Data Sets/Software		818-354-4787 FTS 792-4787
Telecommunications		818-354-7452 FTS 792-7452
Telenet HOTLINE		800-336-0437
Science Issues		818-354-4658 FTS 792-4658

Cost

NODS currently does not charge for use of the system or for the acquisition of data, although a rate schedule has been established. Should this schedule be put into effect, users can check the estimated cost of a request interactively before the request is executed.

**FUTURE PLANS**

To serve the evolving needs of the oceanographic research community, NODS plans to do the following.

- Add to its on-line archive the data sets listed below:
  - DMSP SSM/I (Winter 1987)
  - Geosat (late 1987)
  - West Coast AVHRR and CZCS from 1978 (1988)
  - NSCAT (1990)
  - TOPEX (1991)

- 
- Continue to upgrade hardware through the procurement of optical disk and VAX clustering equipment
  - Remain informed concerning changing international data communications standards, such as those proposed in the ISO OSI.

**ADDRESS**

The NASA Ocean Data System  
Jet Propulsion Laboratory  
MS 202-101  
4800 Oak Grove Drive  
Pasadena, California 91009

---

**PCDS FACTS**

**Data Sets**

Twenty-four data sets providing direct support to climate researchers sponsored by NASA at Goddard Space Flight Center (GSFC) and other institutions (for example, universities, other NASA centers, other Government agencies)

**Subsystems**

CATALOG

DATA MANIPULATION

INVENTORY

GRAPHICS

DATA ACCESS

**Products**

Textual information

Tabular data

Graphics

Directed to terminal

Generated at GSFC and sent to user

**Required  
Equipment**

Terminal (type determines quality of graphics output) or personal computer with emulation and/or communications software

Modem (300-1200 bps)

Printer (optional)

**Access**

User friendly menu-driven and/or command-driven system

An account with PCDS required prior to use

Access provided by dial-up lines, via Telenet, and the Space Physics Analysis Network (SPAN)

System available 24 hours per day, 7 days per week, except during system backup and maintenance, and special stand alone periods (no operator is currently available on weekends)

Documentation and consultation services available

No direct charges for use of system

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## PILOT CLIMATE DATA SYSTEM

The Pilot Climate Data System (PCDS) is an interactive data and software system that enables environmental researchers to locate climatological and related data. PCDS also provides the capability to obtain, manipulate, and display user specified subsets of many climate-related data sets.

PCDS was developed to manage a large collection of useful Earth, oceanic, and atmospheric sciences data for NASA's research community. It has evolved into a system with extensive capabilities for supporting selected NASA and non-NASA data sets from both spaceborne and surface-based measurements.

### DATA SETS

The current holdings of the PCDS data library, which consists mainly of tapes, are listed below with the abbreviated name used by PCDS to reference each data set shown in brackets:

- Global Temperature Deviations [ANGELL]
- First Global Atmospheric Research Program (GARP) Global Experiment (FGGE) Level II-b Restructured Data [FGGE2B] and Level III-b Analyses from the European Center for Medium Range Forecasts [FGGE3B]
- National Meteorological Center Northern Hemisphere Octagonal Grids [NMCGRD]
- Nimbus-4 Backscatter Ultraviolet (BUV) Detailed Profiles [DPFL] and Daily Zonal Means Profile and Total Ozone in geodetic or geomagnetic coordinates [DZP and DZPM]
- Nimbus-5 Electrically Scanning Microwave Radiometer (ESMR) Three-day Averages of Calibrated Brightness Temperature [ESMR3DAY]
- Nimbus-7 Earth Radiation Budget (ERB) Matrix Tapes [ERB-MATRIX], Zonal Means Tapes [ERB-ZMT], Solar and Earth Flux Data Tapes [SEFDT], and Level II-c data formatted for the FGGE [ERBM/FGGE and ERBZ/FGGE]

- 
- Nimbus-7 Limb Infrared Monitor of the Stratosphere (LIMS) Master Archive Tapes [LIMS-LAMAT] and Stratospheric Temperature Profiles formatted for the FGGE [LIMS/FGGE]
  - Nimbus-7 Scanning Multichannel Microwave Radiometer (SMMR) data formatted for the FGGE, including sea surface temperature, total atmospheric water vapor, and sea ice concentration [SMMR/FGGE]
  - Nimbus-7 Solar Backscatter Ultraviolet (SBUV) Ozone [OZONE-S] and Level II-c ozone readings formatted for the FGGE [SBUV/FGGE]
  - Nimbus-7 Stratospheric Aerosol Measurement (SAM II) Beta and Aerosol Number Density Archival Tape [BANAT]
  - Nimbus-7 Temperature-Humidity Infrared Radiometer (THIR) Clouds Earth Radiation Budget Tapes [CLE] and Calibrated-Located Data Tapes [CLDT]
  - Nimbus-7 Total Ozone Mapping Spectrometer (TOMS) Ozone [OZONE-T]
  - National Oceanic and Atmospheric Administration (NOAA) Heat Budget Data [NOAA-HB]
  - Stratospheric Aerosol and Gas Experiment (SAGE) Profiles [SAGE-PROF]
  - World Monthly Surface Station Climatology [SSCLIMATE].

#### SUBSYSTEMS

PCDS consists of five subsystems, each of which is listed below with its corresponding user function. Figure 1.9-1 also illustrates the PCDS. On-line help is available throughout the system. Utilities such as NEWS and DEMO are also available.

- **CATALOG:** provides an on-line central source of information about many climate-related data sets and associated sensor measurements. The data sets contained in the PCDS library, as well as other climate data archives, are described in this subsystem. Descriptions are standardized to allow a user to easily compare two data sets and include information on data type, source, processing status, availability, quality, and references for further information. Currently, this subsystem describes about 150 climate-related data sets, with details on both existing and planned data sets and products.

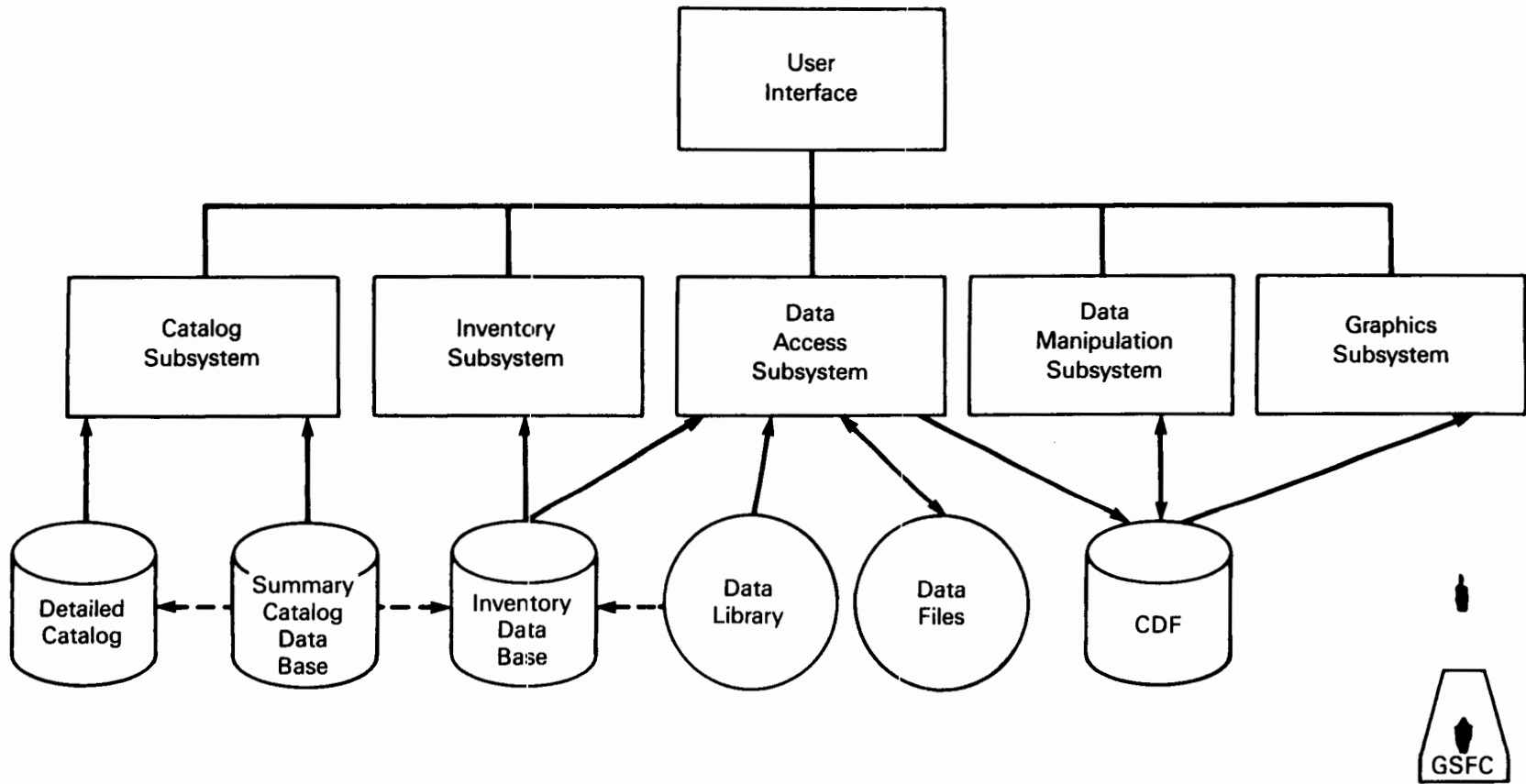


Figure 1.9-1. Data Structure of the PCDS

- 
- **INVENTORY:** allows users to obtain detailed information about temporal coverage and data volume for data sets currently residing in the PCDS library. This information is useful for refining data selection, so that a user can acquire a particular subset of data via the Data Access Subsystem.
  - **DATA ACCESS:** enables users to select data subsets by time, geographic area, and type of data. These data sets are generally maintained in the PCDS library in the original tape format, and this subsystem permits the user to copy the data to a subset tape in the original format or transfer portions of a data set to disk in a special PCDS format called the Climate Data File (CDF) (being expanded to the Common Data Format).
  - **DATA MANIPULATION:** provides several functions for manipulating files in the CDF format. These functions permit a user to customize a data set before transferring it to another computer for further work or using it with the Graphics Subsystem. This utility package supports parallel analyses on heterogeneous data, since the functions are data independent.
  - **GRAPHICS:** Enables user to create various graphical representations of the data stored in the data set independent files. For example, data can be displayed in two- and three-dimensional formats, and text charts can be generated. See Figure 1.9-2 for examples.

## PRODUCTS

Most data products are directed to the user's terminal, and many users take advantage of the capabilities of their personal computer to capture these data. Users can also take advantage of network capabilities for moving files. Tape copies and special graphics products (charts, transparencies, film) requested by users will be sent to them.

## REQUIRED EQUIPMENT

To access the system, a user needs the following:

- Terminal (type determines graphics quality) or personal computer with emulation and/or communications software
- Modem (300-1200 bps)
- Printer (optional).

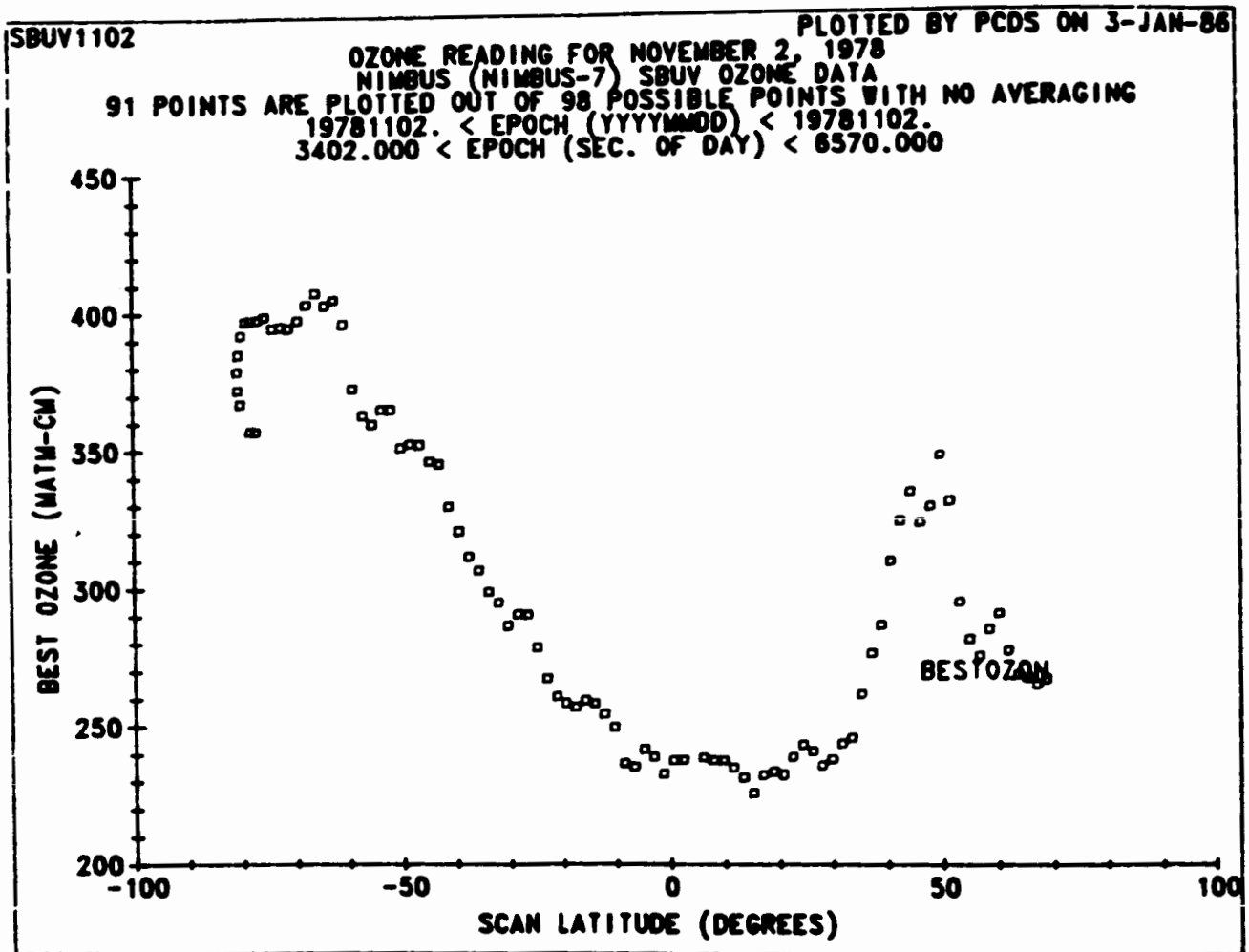


Figure 1.9-2. Example of Graphics Generated on the Pilot Climate Data System

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**ACCESS**

PCDS is a user friendly, menu-driven and command-driven system with the access specifications given below.

PCDS Account

To establish a PCDS account, a user should contact the PCDS Manager at GSFC.

Means of Access

Access is provided through dial-up lines, Telenet, and the Space Physics Analysis Network (SPAN).

System Availability

PCDS is available 24 hours per day, 7-days per week, except during periods of scheduled maintenance and backups. Currently, there are no operators available on weekends.

Documentation

A user's guide, catalog, and on-line help are available to users.

Consultation

Consultation is available Monday through Friday from 9:00 a.m. to 5:30 p.m. Eastern Time at (301) 286-5037 or (301) 286-4103.

Cost

No direct charges are made for use of the system at present.

**FUTURE PLANS**

A redesign of the system, which will allow it to move from the prototype to the operational stage, is now being implemented. This transition will be completed in FY87. Data set support will be continuously expanded.

**ADDRESS**

Pilot Climate Data System  
NASA Goddard Space Flight Center  
National Space Science Data Center  
Data Management Systems Facility  
Code 634  
Greenbelt, Maryland 20771  
Contacts: PCDS Manager: Mary G. Reph (301) 286-5037  
PCDS Support Office: Lola M. Olsen (301) 286-4103  
Head DMSF: Paul H. Smith (301) 286-5876



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## PILOT LAND DATA SYSTEM

The Pilot Land Data System (PLDS) was created to provide a limited scale, demonstration, information system that would offer scientists the ability to archive, locate, transfer, integrate, and manipulate data in a distributed fashion. PLDS is under development, therefore there are currently no users. Two science scenarios were chosen to represent a sample of the overall land science community and initially only those chosen will have access to PLDS.

A quasi-operational system will be in place by July 1987.

### DATA SETS

Data sets needed by the two selected science scenarios will be supported by PLDS. These are mostly remotely sensed image data. Outside data bases that can be accessed by PLDS users include the EROS data center, USGS/ESDD in Reston, Virginia, NOAA/NEDRIS, and USGS/WATSTOR.

### SYSTEMS AND SUBSYSTEMS

The extant design of PLDS has not yet been precisely defined, but concepts of the types of subsystems that may be incorporated are listed below.

- **Directory:** The system will have one central directly listing information about data that is physically maintained by PLDS as well as information about other data bases listed above. At two different locations, a catalog and inventory subsystem will be maintained, each containing some redundant information as well as specific information that supports each of the above described science projects.
- **Data Reduction:** Data sets may be searched by data type, spatial characteristics, temporal characteristics, instrument description, quality assessment, data processing sequence, and others yet to be determined. The system will provide for Radiometric/Geometric as well as subsetting capabilities using a variety of techniques. Data processing algorithms will be developed as required, however, the processing will occur at the user node.
- **Catalog:** A catalog will support the data and information that is archived at each major node within the system.



- 
- Graphics: An interactive graphics capability will be available by FY 87.

**PRODUCTS**

Output products will be in the near-term in the form of CCTs or analog reproduction of text either sent through the mail or over a communication line. In the midterm (FY 87) data may be sent via compact disk technology; this has yet to be tested.

**REQUIRED  
EQUIPMENT**

The system design is driving towards standardization of operating systems and communications protocols rather than specific hardware requirements (e.g., TCP/IP and UNIX). However, it is felt that eventually, the typical science user would access the system via a scientific work station.

**ACCESS**

PLDS will be a user-friendly menu/command driven system with the access specifications given below.

PLDS Account

To be developed

Means of Access

By July 1987, it is envisioned that the system will have communication links with all the principal investigators as well as major data sources. This will be using TCP/IP via 56kb links using packet-switching technology as well as 9.6 baud dial-up lines. (PSCN)

System  
Availability

To be developed

Documentation

A users guide will be developed on procedures for access, etc. This will be available through the "User Support Office."

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Consultation

Consultation for users of the PLDS is available by contacting any of the following individuals at NASA Goddard Space Flight Center in Greenbelt, Maryland.

Dr. Paul Smith  
Project Manager  
Code 634  
(301) 286-5876

Mr. William J. Campbell  
Deputy Project Manager/System Engineer  
Code 634  
(301) 286-9541

Dr. Robert Price  
Project Scientist  
Code 620  
(301) 286-5411

Ms. Maryel Schein  
User Support Office  
Code 634

Cost

Currently, there are no costs associated with the PLDS, but guidelines are in the development stage.

FUTURE PLANS

Changes anticipated include more online storage, compact disk media for data transfer, image quick-look capability, additional data extraction/manipulation algorithms, and faster communication capabilities.

ADDRESS

PLDS  
Code 634  
NASA Goddard Space Flight Center  
Greenbelt, Maryland 20771  
(301) 286-5876



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**WSI® REAL-TIME WEATHER INFORMATION SYSTEM**

The WSI® concept is to make rapidly changing, perishable data available, in real-time, through conventional communication channels to the widest possible variety of clients. A decentralized computer archival and data base management system continuously and in real-time ingests transmissions from a multitude of data circuits throughout the world. The data are checked and made available to users on a dial-up, request/reply, or broadcast basis. Users access the system only when and if information is needed, avoiding the receipt of massive amounts of unwanted data.

**DATA SETS**

WSI® provides real-time access to the following sources of data and information:

- North American Hourly Weather Data Base
  - Hourly weather data are processed and stored for each Federal Aviation Administration (FAA), military, and civilian weather observing installation reported through the National Weather Service (NWS)/FAA data network from the United States and Canada.
  - Data are available in raw, tabular, and map format.
- Upper Air Data Base
  - Twice daily, upper air data received from North America and around the world are processed and stored in real-time.
  - Data can be retrieved in tabular or simple graphic form.
- Synoptic Data Base
  - Synoptic data received four times daily from North America and around the world are processed and stored in real-time.
  - Data can be retrieved in raw, tabular, or map form.

- 
- Foreign Data Base
    - The WSI® System ingests sets of geophysical data through the World Meteorological Organization of the United Nations Global Telecommunications System. Surface data, synoptic data, upper air data, and ship reports form most of the information received.
    - All of these data are available in raw form, and most may be displayed in the same manner as North American data: in tabular or simple graphic format.
  - Plain Language Data Base
    - All plain language discussions, analyses, forecasts, special, and severe weather statements are received, exactly as written, in real-time, from the NWS and other data sources.
    - They may be retrieved in part or entirely, screened by both product type and location.
  - Raw Data Base
    - All data are available in raw form, exactly as received from the data collection circuits.
  - Special Displays
    - WSI® produces special displays of weather data, including the FOUSMAP and RADMAP displays.
  - Representative Reports, which are available through the WSI® Real-Time Weather Information System and which represent only a fraction of the total number of accessible files
    - North American Surface Weather - Synoptic
    - North American Surface Weather - Hourly
    - Foreign - Synoptic
    - World Upper Air Reports
    - U.S. Digital Radar Data
    - Ocean/Great Lakes Ship Reports
    - Coast Guard Station Reports
    - Offshore Buoy Reports
    - Daily Severe Storm Outlook
-

- 
- Tornado/Surtstan Watches
  - Tornado/Severe Thunderstorm Warnings
  - Earthquake Bulletins
  - Tropical Weather Advisory
  - Hurricane Summary
  - Hurricane Warnings
  - High Tide Advisories
  - Fire Weather Outlooks
  - Tsunami Alerts
  - River Stage Reports
  - Drought/Soil Moisture by Region
  - Excessive Precipitation Outlook
  - Flash Flood Watches
  - Flash Flood Warnings
  - 6-hour Precipitation
  - 24-hour Precipitation
  - Snow Cover
  - Percent of Normal Rainfall
  - Pressure Change
  - Wind Gusts
  - Pasquill-Gifford Stability Class
  - MOS Temperature
  - 24-hour Temperature Change
  - Relative Humidity
  - Synoptic Trajectories
  - Winds Aloft Forecasts
  - Aviation Terminal Weather - United States
  - Aviation Terminal Weather - Foreign
  - Marine Forecasts
  - Daily Maximum Temperature
  - Daily Minimum Temperature.

ORIGINAL PAGE IS  
OF POOR QUALITY

- 
- National Meteorological Center (NMC) Product Services
    - WSI Corporation ingests into its computer system all of the output from the NMC Product Services data circuit.
    - Data include all output from the Nested Grid Model (NGM) and Global Spectral model.

SYSTEMS AND  
SUBSYSTEMS

WSI® includes the following subsystems, grouped according to categories and with relevant examples:

- Graphics and Imagery Products
  - SuperSat™: WSI® ingests digital satellite images directly from the NOAA GOES-East and GOES-West meteorological satellite received via a dedicated antenna system, the data are processed and stored on the WSI System (see example below in Figure 1.11-1).

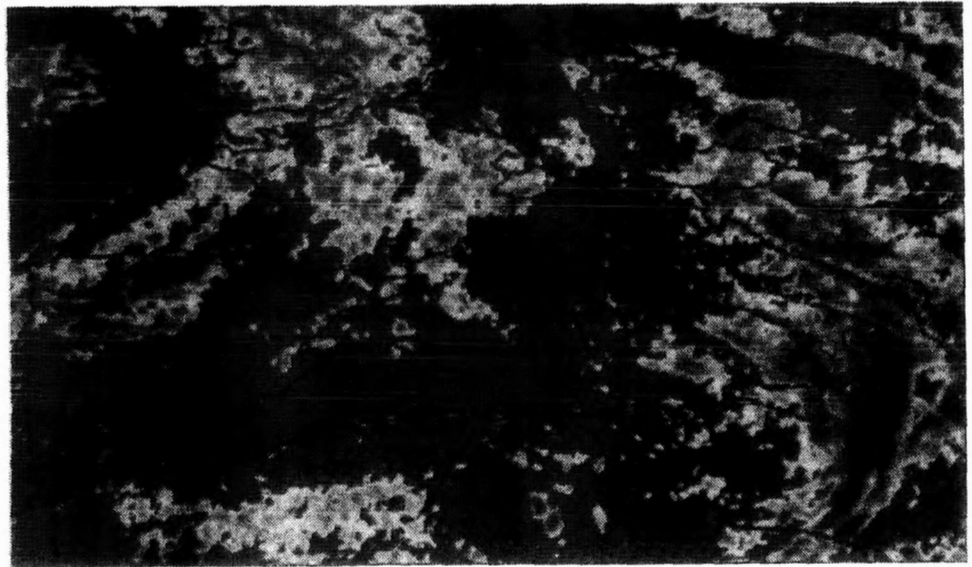


Figure 1.11-1. WSI Real-Time Weather Information System —  
SUPEREURS Image

- 
- SuperWorld™: The full disk SuperSat (entire hemisphere) image is available many times a day.
  - SuperRadar™: SuperRadar is the composite of all NWS radar sites' reports.
  - SuperTemp™: A national temperature map is produced each hour, displaying 10 degree (F) temperature bands.
  - SuperSeas™: Similar to SuperTemp, sea surface temperatures are displayed in 1.5 degree (C) intervals.
  - SuperFront™: SuperFront displays frontal and major surface features (highs and lows) based on NWS analysis.
  - DIFAX: WSI provides access to NWS's Digital Facsimile (DIFAX) graphics products. All DIFAX charts are ingested into WSI's computers, and are immediately available for access.
- Aviation Products and Services
    - PILOTbrief™: This system provides pilots with all necessary weather information for flights in the United States, Canada, Mexico, and the Caribbean, as well as some limited international weather information.
    - FLITEbrief™: This system determines the optimum routing and fuel loading for jet aircraft operators.
- Sports
    - SuperSports™: WSI transmits the latest scores from professional sports and collegiate action.
- Audiotex Services
    - PLANEtalk™: PLANEtalk is WSI's real-time, computerized-voice-response weather briefing service. Accessible anywhere in the country with a touch-tone telephone, PLANEtalk provides hourly reports, terminal forecasts, NOTAMS, SIGMETS, AIRMETS, area, and local public forecasts.
    - SKItalk™: This system is WSI's computerized-voice-response ski reporting service.
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**PRODUCTS**

Data are available in the following formats:

- Raw code
- Tabular data
- Plain language
- Simple alphanumeric maps
- Color graphics.

**REQUIRED  
EQUIPMENT**

To access WSI, a user needs the following:

- Terminal or personal computer
  - Text: any ASCII
  - Graphics: several types available
- Modem (300-2400 bps)
- Printer (optional)
- Emulation and/or communications software (if applicable).

**ACCESS**

The WSI® Real-Time Weather Information System is a user friendly, common-driven system. Specifications concerning access are given below.

WSI Account

A user must establish an account with WSI.

Means of Access

Access is provided by GTE Telenet, Tymnet, or by WSI's own WSInet, a private set of dial-up ports available locally at a number of cities.

System  
Availability

The system is available 24 hours per day, 7 days per week.

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Documentation

A system user's manual and on-line documentation are available.

Consultation

Consultation is available to the user 24 hours per day, 7 days per week at the following telephone number: (617) 275-5300. Services include:

- Interpreting meteorological data for non-meteorologists
- Preparing user-specific access routines
- Assisting users in identifying access procedures
- Primary system troubleshooting
- Activating back-up systems
- Assisting new users with system procedures.

Cost

Contact WSI for cost information.

FUTURE PLANS

Not known

ADDRESS

WSI Corporation  
41 North Road  
Bedford, MA 01730  
(617) 275-5300

NOTE:

WSI® is a registered trademark of WSI Corporation. SuperSat, SuperWorld, SuperRadar, SuperTemp, SuperSeas, SuperFront, PILOTbrief, FLITEbrief, SuperSports, PLANEtalk, and SKItalk are trademarks of WSI Corporation.

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**ZEPHYR FACTS**

<b>Data Sets</b>	NWS DIFAX	NWS INTERNATIONAL DATA
	NWS NAFAX	NWS NMC PRODUCT
	FAA 604	NWS GOES IMAGERY
	NWS DOMESTIC DATA	SPACE ENVIRONMENT DATA
	NWS PUBLIC PRODUCT	
<b>Subsystems</b>	WEATHERPLUS	
	METPLAN	
<b>Products</b>	Text	
	Tabular data	
	Graphics	
	Imagery	
<b>Required Equipment</b>	Terminal	
	Modem or satellite receiver antenna and decoder	
	Printer (optional)	
<b>Access</b>	Menu-driven system	
	Zephyr authorization required for use	
	Downlink equipment provided by Zephyr with subscription	
	System available 24 hours per day, 7 days per week	
	Consultation services available	
	Costs vary according to level of products selected	

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## ZEPHYR

Zephyr provides and distributes a complete package of weather information products, including National Weather Service (NWS) facsimile and text services, as well as digital color weather satellite imagery, conventional weather graphics, and specialized weather information products. The system is an end-to-end service, which includes reception of the data and transmission to the user through local telephone circuits and customer-provided antennas. Although Zephyr transmits a complete package of weather information products, the user can select only those services needed for specific requirements and individual applications.

### DATA SETS

The following Zephyr services are available to users:

- NWS DIFAX SERVICE (GD63717): 4800-baud digital facsimile service containing weather charts transmitted by the National Meteorological Center
- NWS NAFAX SERVICE (GD60144): analog facsimile service containing weather maps and charts transmitted by the National Meteorological Center
- FAA 604 SERVICE (GD90488-604): 1200-baud text service that contains weather reports, forecasts, advisories, and other information of interest to the aviation industry
- NWS DOMESTIC DATA SERVICE (GD56141): 1800-baud text service that contains weather information for the United States, Canada, Mexico, Puerto Rico, the Caribbean, and Central America
- NWS PUBLIC PRODUCT SERVICE (GD68861): 1200-baud text service that contains severe weather advisories, watches, and warnings; public statements, travelers' forecasts; and State, zone, and local forecasts for the entire United States

- 
- NWS INTERNATIONAL DATA SERVICE (GD68862): 1800-baud text service containing worldwide surface weather observations, upper air bulletins, ship reports, sigmets, aerodrome forecasts, and marine forecasts and warnings
  - NWS NMC PRODUCT SERVICE (GD68863): 4800-baud data service containing analyses and forecasts derived from Limited Fine Mesh (LFM) and Global Spectral Models
  - NWS GOES IMAGERY SERVICE (GOESTAP): analog facsimile-type service, which contains high-resolution satellite imagery from the National Oceanic and Atmospheric Administration Geostationary Operational Environmental Satellites (GOES)
  - SPACE ENVIRONMENT DATA SERVICE: 150-baud text and data service containing realtime information of the geomagnetic, solar, ionospheric and space environments and includes forecasts, alerts, warnings, and other special support messages from NOAA's Space Environment Services Center (SESC).

#### SUBSYSTEMS

Zephyr has two subsystems -- WEATHERPLUS and METPLAN.

- WEATHERPLUS is a fully integrated personal computer system with software for processing high-speed weather information services. With a properly configured system, a user can do the following:
  - Preselect data messages being transmitted on the NWS Domestic Data Service, NWS International Data Service, NWS Public Product Service, and the FAA604 Service
  - Archive selected data
  - Review and print data messages on a selective basis.
- METPLAN provides high resolution maps and charts from the NWS DIFAX Service. It also provides other products that can be displayed with graphics terminals or dot matrix printers.

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PRODUCTS

Zephyr offers three levels of service:

- Level 1
  - Satellite Receive Antenna and Low Noise Amplifier (LNA)
  - Zephyr Network Receiver
  - NWS NAFAX, NWS DIFAX
  - NWS Domestic Data Service
  - NWS Public Product Service
- Level 2
  - All items in level 1
  - Environmental Satellite Data (ESD) Imagery and Graphics
- Level 3
  - All items in level 2
  - METPLAN Service instead of NAFAX/DIFAX.

REQUIRED  
EQUIPMENT

To access Zephyr, a user needs the following:

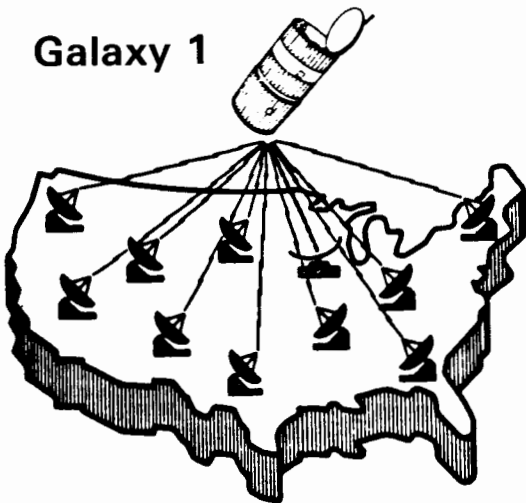
- Terminal
  - Text: any ASCII terminal
  - Graphics: several types available
- Satellite receiver and decoder or modem (see Figure 1.12-1)
- Printer (optional)

ACCESS

Zephyr is a menu-driven system with the requirements and services for access identified below.

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## Galaxy 1

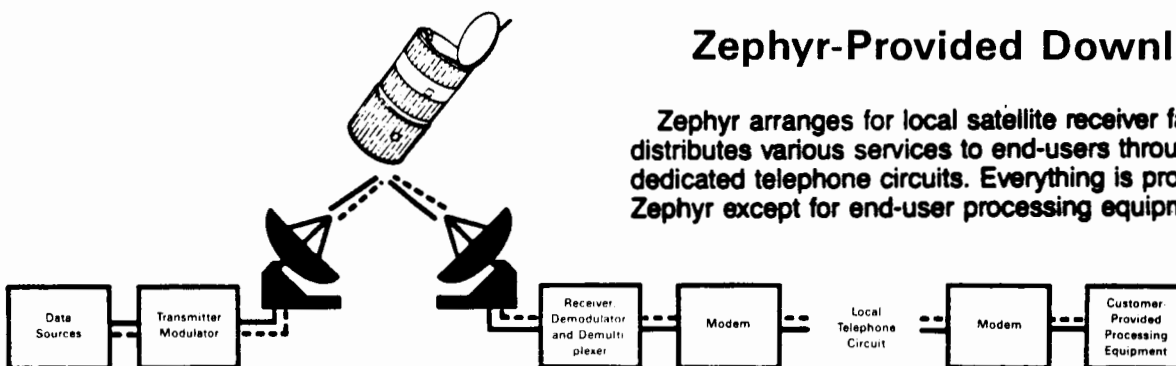


## National Distribution Network

Data services are uplinked from United Video's Satellite Transmission Facility near Chicago to the GALAXY 1 communications satellite. From there, they are beamed to a national network of over 6,000 local receiving systems. This network gives Zephyr a distribution capability unequalled by any other private weather service.

## Zephyr-Provided Downlink

Zephyr arranges for local satellite receiver facilities and distributes various services to end-users through local dedicated telephone circuits. Everything is provided by Zephyr except for end-user processing equipment.



## Customer-Provided Downlink

Zephyr customers may choose to locate their own satellite receive antenna at the facility where Zephyr services will be used. In this case, Zephyr provides the receiver-demodulator-demultiplexer unit as part of the service. Data are normally transmitted from the Zephyr equipment to the processing equipment using local cable.

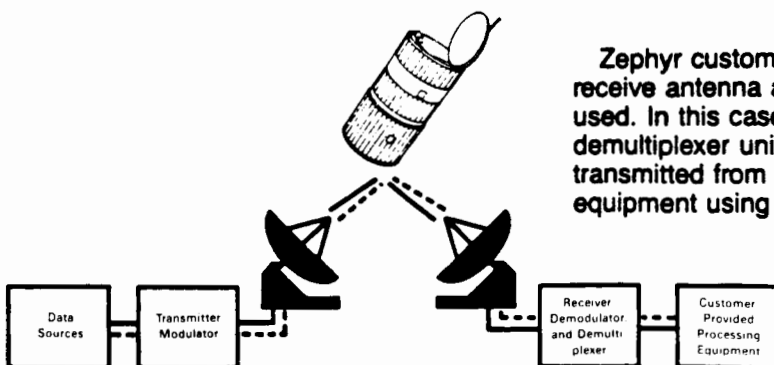


Figure 1.12-1. Zephyr

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Zephyr Account

A user must obtain an account with Zephyr.

Means of Access

Zephyr provides downlink equipment with a subscription.

System  
Availability

Zephyr is available 24 hours per day, 7 days per week.

Consultation

Consultation on use of the system is available at telephone number (800) 331-4806.

Cost

The costs vary according to the three levels of products:

- Level 1: \$395 per month
- Level 2: \$1,400 per month
- Level 3: \$1,650 per month.

FUTURE PLANS

Not known

ADDRESS

Zephyr  
3801 South Sheridan Road  
Tulsa, Oklahoma 74145  
(918) 665-6690



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**EARTHNET FACTS**

**Data Sets**            Multispectral Scanner  
                          Return Beam Vidicon  
                          Thematic Mapper  
  
                          (Data from Landsats 1-5 collected at Fucino, Italy; Kiruna,  
                          Sweden; and Maspalomas, Spain)

**Subsystems**            Catalog (on-line)

**Products**              Textual information from Catalog  
  
                          Standard image products (hardcopy and digital) can be  
                          ordered

**Required  
Equipment**            Terminal  
  
                          Modem  
  
                          Printer (optional)  
  
                          Emulation and/or communications software (if applicable)  
  
                          (Equipment above relevant to Catalog System)

**Access**                Open access to data  
  
                          Access via X.25 networks and dial-up lines  
  
                          Account required for Catalog  
  
                          System available at specified hours Monday through Friday  
  
                          Consultation services available  
  
                          Cost information available from Earthnet

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## EARTHNET

The European Space Agency (ESA) Earthnet (Landsat element) is responsible for acquiring, archiving, preprocessing, and distributing remote sensing data from LANDSATS 1-5. These data are collected at three sites in Western Europe: Fucino Italy; Kiruna, Sweden; and Maspalomas, Spain. Earthnet covers areas with a radius of 2,500 kilometers around each station. The coverage extends, then, from the polar zones (Greenland, Iceland, Westspitzberg), Scandinavia, and Western Russia to the West and North African countries, the Middle East, and part of Saudi Arabia.

Currently, only the data catalog feature is on-line.

## DATA SETS

The following imaging sensors are used at the European ground stations:

- Multispectral Scanner (MSS) on all satellites
- Return Beam Vidicon (RBV) on LANDSAT 3
- Thematic Mapper (TM) on LANDSAT 4 (December 1982 to February 1983) and LANDSAT 5 (April 1984 onwards).

## SUBSYSTEMS

The Catalog System is on-line via the ESA Informal Retrieval Service (IRS).

## PRODUCTS

The Catalog System yields textual information about data sets. Standard hard copy and Computer Compatible Tape (CCT) data products may be ordered using this information. They are sent to requesters by mail.

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**REQUIRED  
EQUIPMENT**

The equipment identified below is relevant to the Catalog System:

- Terminal
- Modem
- Printer (optional)
- Emulation and/or communications software (if applicable).

**ACCESS**

Anyone can order data from Earthnet. Access specifications are given below.

Earthnet Account

An account with ESA IRS is required for catalog access.

Means of Access

Access is provided via X.25 networks (including Tymnet and DATAPAC) plus dial-up lines.

System  
Availability

The system is available (European time) from 8:15 a.m. to 1:00 p.m. and from 1:45 p.m. to 5:15 p.m. on Monday through Thursday. Working hours are 8:15 a.m. to 1:00 p.m. and 1:45 p.m. to 4:00 p.m. on Friday.

Documentation

Information sheets are available upon request.

Consultation

Assistance on use of the system is available during business hours by calling the following numbers:

- Telephone: (06) 9401360
- Telex: 610637 ESRIN I.

Cost

The current price list can be obtained from Earthnet.

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**FUTURE PLANS**

Not known

**ADDRESS**

ESA-ESRIN  
Earthnet Programme Office  
Via Galileo Galilei  
00044 Frascati, Italy  
(06) 94011

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**ESDD FACTS**

**Data Sets**                    Access provided to information about earth science and natural resource data sets, not to the data sets themselves

**Systems and Subsystems**        Searching supported by a number of parameters, including keywords, area of coverage, and responsible organization

**Products**                    Output directed to terminal

**Required**                    IBM PC or compatible

**Equipment**

Modem (at least 1200 bps)

Printer (optional)

Emulation and/or communications software

**Access**                    User friendly, menu-driven system

Account with U.S. Geological Survey (USGS) required prior to use

Access provided by USGS private network and Tymnet

System available 24 hours per day, 7 days per week

Documentation and consultation services available

No computer charges; telecommunications charges will apply

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## **EARTH SCIENCE DATA DIRECTORY**

The Earth Science Data Directory (ESDD) was established to provide extensive referencing of earth science and natural resource data. Currently, the system describes over 750 State and Federal data sets.

### **DATA SETS**

ESDD provides access to information about earth science and natural resource data sets, not to the data sets themselves. Each record contains the following information:

- Data set name
- Data set acronym
- Responsible organization
- Contact
- Contact's address and telephone number
- Data set format
- Data set description
- Keywords
- Geographic coverage
- Time span
- Access method
- Number of records
- Length of records
- Type and location of host computer and data base management system
- Documentation
- Comments.

### **SYSTEMS AND SUBSYSTEMS**

ESDD does not have subsystems; all data are accessed through one system. A number of parameters, including keywords, area of coverage, and responsible organization, support searching on that system. The use of these parameters is accomplished through screen prompts and menu item selection.

### **PRODUCTS**

Output directed to the terminal.

---

**REQUIRED  
EQUIPMENT**

To access the system, a user needs the following:

- IBM PC or compatible
- Modem (at least 1200 bps)
- Printer (optional)
- Emulation and/or communications software

**ACCESS**

ESDD is a user friendly, menu-driven system with the access specifications indicated below.

ESDD Account

An account must be established with the U.S. Geological Survey (USGS) prior to use of the system.

Means of Access

Access is provided by USGS and Tymnet.

System  
Availability

ESDD is available 24 hours per day, 7 days per week.

Documentation

A user's guide and on-line help are available.

Consultation

Consultation is available Monday through Friday from 8:30 a.m. to 4:30 p.m. Eastern Standard Time at (703) 648-7133.

Cost

The only costs are telecommunications charges.

**FUTURE PLANS**

The long-range goals of ESDD is to become one of the most comprehensive directories available about earth science/natural resource data sets.

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ADDRESS

Earth Science Data Directory  
U.S. Department of the Interior  
U.S. Geological Survey  
804 National Center  
Reston, Virginia 22092  
(703) 860-7123



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INORAC FACTS

Data Sets            Imagery data base

Subsystems           INquiry  
ORder (not open to outside users)  
ACcounting (not open to outside users)

Products            Textual information about images directed to user's terminal

Required  
Equipment           Terminal (any ASCII)  
                      Modem (300-1200 bps)  
                      Printer (optional)  
                      Emulation and/or communications software (if applicable)

Access                An account with EROS Data Center (EDC) required prior to use  
                      Access provided by dial-up lines  
                      System available on Monday through Thursday from 7:00 a.m.  
                      to 6:00 p.m. Central Time and on Friday from 7:00 a.m. to  
                      5:00 p.m. Central Time  
                      Documentation, training, and consultation services available  
                      Cost based on use of computer resources

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## INORAC

The Inquiry, Order, and Accounting (INORAC) system provides information referencing and transaction processing capability for the EROS Data Center. Only the IN (Inquiry) portion of this system is available to outside users. The following information pertains only to IN.

### DATA SETS

The data sets accessed by IN contain information on over 6 million frames of aircraft and satellite imagery.

### SUBSYSTEMS

IN allows several types of geographic searching:

- Single-Point
- Circle
- Rectangle
- Polygon
- Path-Row.

### PRODUCTS

Each output record contains information on individual images matching the requisites developed in the geographic search. Information includes date, corner points, center point, ID number, and quality indices.

### REQUIRED EQUIPMENT

To access IN, the user needs the following:

- Terminal (any ASCII)
- Modem (300-1200 bps)
- Printer (optional)
- Emulation and/or communications software (if applicable).

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ACCESS The following information concerns access requirements and services for IN.

INORAC Account An account must be established with EDC prior to use.

Means of Access Access is provided by dial-up lines.

System Availability IN is available on Monday through Thursday from 7:00 a.m. to 6:00 p.m. Central Time and on Friday from 7:00 a.m. to 5:00 p.m. Central Time.

Documentation Upon approval of terminal access, each user will be sent a manual describing inquiry functions and search procedures.

Consultation Consultation is available on Monday through Friday from 7:30 a.m. to 4:00 p.m. Central Time at the following telephone number: (605) 594-6511.

Training EDC will provide followup training by telephone. If required, an organization may send its terminal operator to EDC for additional training.

Cost The cost is based on the use of computer resources, which involves the amount of central processor time, input/output processor time, memory occupancy, terminal connect time, and total lines of research data output. An organization is required to make an initial deposit of \$10,000, which will be used to establish a 1-year account against which all costs will be charged. An annual renewal deposit bringing the account up to \$10,000 will be required at the start of each account year.

Users can receive credit for purchases made as a result of a search. A ratio of three inquiries to every order and an

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average order of \$215 have customarily been sufficient to achieve free access through the products-ordered credit.

**FUTURE PLANS**            Not known

**ADDRESS**                EROS Data Center  
Sioux Falls, South Dakota 57198  
(605) 594-6511

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**NEDRES FACTS**

**Data Sets**

NEDRES data base, with over 15,000 entries

**Systems and  
Subsystems**

Searching and selecting relevant data sets best accomplished by specifying environmental parameters, geographical locations, and periods of interest

**Products**

Directed to terminal

Printed off-line and sent to user

Searches can be performed by NEDRES staff, printed off-line, and sent to user

**Required  
Equipment**

Terminal

Modem (300-1200 bps)

Printer (optional)

Emulation and/or communications software (if applicable)

**Access**

User friendly, command-driven system

Account required with NEDRES or BRS prior to use

Access provided by GTE Telenet, Tymnet, and Uninet, as well as through BRS

Documentation, training, and consultation services available

Costs based on service requested

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## NATIONAL ENVIRONMENTAL DATA REFERRAL SERVICE

The National Oceanic and Atmospheric Administration (NOAA) developed the National Environmental Data Referral Service (NEDRES) in response to a national need for improved access to a broad range of environmental data. NEDRES functions as a yellow pages directory referencing environmental data in the United States. The types of data can be categorized as follows:

- Climatological and meteorological
    - Standard surface and upper atmosphere
    - Atmospheric radiation, physical, and chemical
    - Air quality
  - Oceanographic
    - Physical, chemical, biological
    - Ocean mineral and energy resources
    - Ocean pollution
  - Geophysical and geological
    - Geomagnetic and seismological
    - Marine geological and geophysical
    - Solar-terrestrial
    - Glaciological
  - Geographic
    - Geodetic
    - Cartographic
    - Land use/ground cover
  - Hydrological and limnological
    - Precipitation
    - Surface and ground water
-

- 
- Aquatic ecological
  - Water quality.

The only restriction is that the data must be made available to the public.

NEDRES currently references over 15,000 sources of environmental data.

#### DATA SETS

The NEDRES data base is a computer-searchable catalog and index of environmental data. The directory identifies the existence, location, characteristics, and availability of environmental data sets, but the actual data are not available on-line. The system directs the user to a contact (or source of the data) with full address and telephone number, and describes the terms or costs of availability. Figure 1.16-1 specifies the types of information available through NEDRES.

#### SYSTEMS AND SUBSYSTEMS

Searching and selecting relevant data sets is best accomplished by specifying environmental parameters, geographical locations, and periods of interest. Searching may also be performed by subject category, record type, corporate author codes and, when available, by principal investigators, program/project name or acronym, or contract or grant identification numbers. Where appropriate, subject descriptors, including chemical and biological names and codes, are provided as well. References to source publications closely associated with the data set, and to other data sets in NEDRES, are also provided.

#### PRODUCTS

User-generated searches can be directed to a terminal or printed off-line and sent to the user. A user can also request that the NEDRES staff perform the search and send the results.

#### REQUIRED EQUIPMENT

To access the system, a user needs the following:

- Terminal
- Modem (300-1200 bps)

## WHAT DO YOU GET WHEN YOU USE NEDRES?

A search of the NEDRES data base gives you a complete description of available data sources that satisfy the criteria you specify. The information you get should be adequate to enable you to decide whether to contact the data holder for specific details or to arrange to acquire the data. A NEDRES record gives the following information:

TI	Title or name of the data set
AB	Abstract describing the purpose and general characteristics of the data
DC	Data collection methods description
DD	Data processing and quality control description
PE	Period of record covered by the data
LR	Length of record, including gaps or other temporal characteristics
GE	Geographic area covered by the data--as named places
GC	Geographic area covered by the data--as Federal Information Processing Standard (FIPS) Country, State, County, and named place codes as U.S. Geological Survey Hydrologic Unit Codes as U.S. Forest Service/U.S. Fish & Wildlife Service Ecoregion codes
GL	Geographic area covered by the data--as latitude/longitude coordinates
PA	Parameters reported in the data set
DE	Descriptors--subject terms (in addition to parameters) that help describe the data set, e.g., mineral, chemical, or biological names
CO	Contact where the data may be obtained
AV	Availability characteristics--volume, media, conditions of use
PI	Principal investigator

**Figure 1.16-1. The Types of Information Available Through NEDRES**



WHAT DO YOU GET WHEN YOU USE NEDRES?

PR	Program, project name or acronyms, contract or grant identification
PO	Processing organization (if different from contact)
PU	Publication closely associated with the data set
AN	Accession number
DT	Accession date
CC	Codes for discipline, type of data, and organization

**Figure 1.16-1. The Types of Information Available Through NEDRES  
(continued)**

- 
- Printer (optional)
  - Emulation and/or communications software (if applicable).

#### ACCESS

NEDRES is a user friendly, command-driven system with the access requirements and services itemized below.

#### NEDRES Account

A potential user may obtain a password to access the data base by contacting BRS Information Technologies, 1200 Route 7, Latham, New York 12110, (800) 345-4277, or by completing a User Agreement, available upon request from the NEDRES Program Office, and by sending the document and a \$25.00 payment to NEDRES.

#### Means of Access

Access is provided by GTE Telenet, Tymnet, and Uninet, or through BRS Information Technologies, a commercial vendor located in Latham, New York.

#### System Availability

The system is available 24 hours per day, 7 days per week.

#### Documentation

Several publications, including the following, are available free of charge to NEDRES members:

- Environmental Data Review: A newsletter
- Finding the Environmental Data You Need: Brochure describing NEDRES
- Guidelines for the Description of Environmental Data Files for the NEDRES Database: Detailed instructions on the preparation of records for NEDRES
- NEDRES Database User Guide: Detailed explanation of NEDRES and how to use the database on the BRS on-line information retrieval system.

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Consultation

The NEDRES Program Office provides user services from 7:00 a.m. to 4:30 p.m. Eastern Standard Time, Monday through Friday, at the following numbers: (202) 673-5404 or FTS 673-5404. The services and functions include:

- Establishing general policy and procedures regarding the development, expansion, and use of the data base
- Preparing input for the data base
- Monitoring outside contracts for input to the data base
- Providing searches on the data base
- Generating special products, such as printed catalogs
- Developing training materials
- Presenting training sessions upon request.

Training

Regular training classes in search techniques are provided at various locations. In addition, specialized training is occasionally scheduled as required.

Cost

Charges for on-line use of NEDRES follow:

- Computer Connect Time: \$45.00 per hour
- Password Maintenance: \$25.00 per year
- Off-line pages printed: \$ 0.35 per page
- Off-line print packages mailed: \$ 2.00 each
- Telecommunications Connect Time: varies according to network used
- Search (by NEDRES Office): \$25.00 per hour or fraction thereof in addition to charges above, excluding password

- 
- Direct access to BRS: varies according to usage plan; discount for nighttime use

**FUTURE PLANS**

Plans are to make NEDRES the referral system of NOAANET/NOAAPORT and to develop direct linkages within the next 2 years to the NASA Oceanographic Data System (NODS). A long-range goal is to establish NEDRES as a national network of Federal, State, and private organizations cooperating to improve access to environmental data.

**ADDRESS**

National Environmental Data Referral Service (NEDRES)  
NEDRES Program Office  
NOAA/AISC, (E/AIX3)  
1825 Connecticut Avenue, N.W.  
Room 524  
Washington, D.C. 20235  
(202) 673-5404

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**NODCS FACTS**

**Data Sets**

CODD a directory containing information on space and Earth science-related data sets

DDCS to provide access to detailed catalogs describing data sets at NSSDC or elsewhere

**Systems and Subsystems**

Central On-line Data Directory (CODD)

Distributed Data Catalog System (DDCS), partly operational

Access provided by CODD to general information on data sets as a whole, including data set name, parameters, history, archive/catalog location, contact name and address, cost/format of reproduction, and access procedure

Connection made, where possible, to the DDCS

**Products**

Output can be directed back to user's terminal

Products from DDCS dependent on specific catalog system to be accessed

**Required Equipment**

Terminal (VT100 or compatible)

Modem (300-1200 bps) or SPAN network connection

Printer (optional)

Emulation and/or communications software (if applicable)

**Access**

CODD a user friendly, menu-driven system

No authorization required for CODD use

Access to CODD provided through dial-in numbers or SPAN

CODD available 24 hours per day, 7 days per week

CODD intended to operate without a user's guide, although documentation is available

User services provided by CODD managers

No cost for use

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## NATIONAL SPACE SCIENCE DATA CENTER'S ON-LINE DATA CATALOG SYSTEM

The National Space Science Data Center (NSSDC) On-Line Data Catalog System (NODCS) provides access to information on a broad range of space and Earth science data sets. NODCS consists of two systems: the Central On-line Data Directory (Codd) and the Distributed Data Catalog System (DDCS). The purpose of Codd is to provide the general scientist with a computer-accessible first place to search for information about data sets of interest that may be scattered throughout the scientific community. The purpose of DDCS, which is partially operational, will be to provide the science community with access to a wide range of distributed catalogs containing specific and detailed information on data set granules.

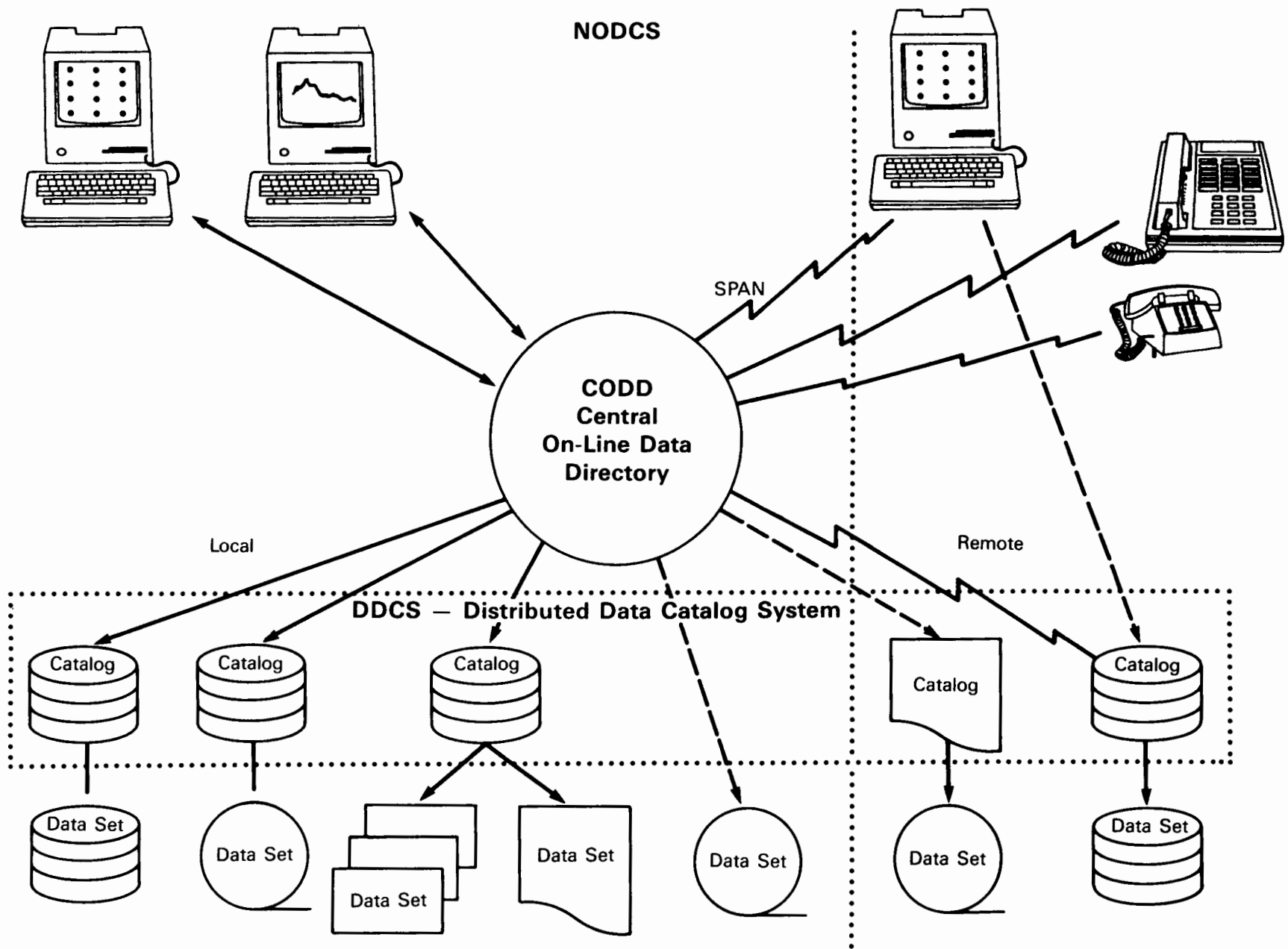
Figure 1.17-1 presents a diagram of this system.

### DATA SETS

Codd is a directory that contains information on space and Earth science-related data sets. The data sets are selected according to the needs of the scientific community, as perceived by NSSDC. Initial Codd development has concentrated on currently important data sets within the solar-terrestrial discipline, including the following:

- Dynamics Explorer
- International Sun-Earth Explorer
- Voyager
- Pioneer
- Interplanetary Monitoring Platform.

Other disciplines will receive similar emphasis in the future. It is anticipated that a committee of representative scientists within each community will determine the priority of data set entry. The only restrictions on data



**Figure 1.17-1. NSSDC On-Line Data Catalog System**

---

set information entry into CODD are that the data set should be:

- Available to all CODD users
- Sufficiently interesting to a reasonable number of users
- Well documented.

DDCS will provide access to a wide range of distributed catalogs containing specific and detailed information on data set granules. Currently, only a few catalogs are contained in DDCS associated with:

- Dynamics Explorer.

Other catalogs will be added in parallel with the addition of data set descriptions to CODD.

DDCS and CODD are designed to complement each other. Based on information obtained through a CODD search, users may be able to access the appropriate catalog via DDCS. However, not all data sets listed in CODD will have corresponding catalogs in DDCS. Remote access to a catalog via DDCS may require an access fee.

#### SYSTEMS AND SUBSYSTEMS

CODD provides access to general information on data sets as a whole, including the following:

- Data set name
- Time period of data
- Parameters included
- Resolution (spatial and temporal)
- History
- Quality indices
- Storage medium
- Archive/catalog location
- Contact name and address
- Cost/Format of reproduction



- 
- Access procedure
  - Experiment information
  - Principal investigator
  - Processing cycle
  - Spacecraft information
  - Bibliographic references.

CODD supports queries on the criteria listed below:

- Spacecraft
- Sensor/experiment name
- Investigator
- Keywords (disciplines, parameters, etc.)
- Time of interest.

#### PRODUCTS

Information from Codd queries is directed back to the user's terminal. The products from DDCS will depend on the specific catalog system being accessed.

#### REQUIRED EQUIPMENT

To access Codd, a user needs the following:

- Terminal (VT100 or compatible; other types to be supported in the future)
- Modem (300-1200 bps) or SPAN connection
- Printer (optional)
- Emulation and/or communications software (if applicable).

The requirements for DDCS will depend on the capabilities and content of the catalog system being accessed.

#### ACCESS

Codd is a user friendly, menu-driven system notable for its accessibility.

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CODD Account

A CODD account is not required, since there are no restrictions regarding who may use the system. The user must simply obtain access to the NSSDC VAX.

Means of Access

Access to the NSSDC VAX can be accomplished through dial-in numbers or through the Space Physics Analysis Network (SPAN). At the prompt for user name, the researcher should type NSSDC and select the CODD option on the subsequent menu.

System Availability

CODD is available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

Documentation

CODD is intended to operate without a user's guide. The input interface systems, however, have abbreviated user's manuals, but these will be needed only by the persons requested by NSSDC to enter data. In addition, a general document describing the CODD system is available.

Consultation

User services are provided by CODD managers Monday through Friday, from 8:00 a.m. to 4:30 p.m. Eastern Time, at (301) 286-4995. Information on data sets pointed to by CODD should be directed to the contact listed within the data set.

Cost

There are no costs associated with using CODD. There may, however, be costs involved in accessing the catalogs/data sets to which CODD connects or points.

FUTURE PLANS

The primary changes anticipated for the future include those listed below:

- Expand information data base in CODD and the associated catalogs in DDCS.
- Provide non-VT100 access to CODD.

- 
- Establish discipline-specific committees to recommend the data sets to be summarized in CODD and the catalogs to be connected to DDCS.
  - Migrate CODD from a VAX 11/780-ORACLE data base management system to a VAX 8600-IDM 500/OMNIBASE data base management system.
  - Provide automatic interface to local or remote data request modules after successful CODD/DDCS queries.
  - Promote standardization in directory and catalog formation, which will facilitate automated entry and update into the system.
  - Implement access via GTE Telenet and other networks in common use.

ADDRESS

National Space Science Data Center (NSSDC) On-Line Data  
Catalog System (NODCS)  
NASA Goddard Space Flight Center  
Code 633  
Greenbelt, Maryland 20771  
(301) 286-4995

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**RESORS FACTS**

**Data Sets**

RESORS A

RESORS B

RESORS C

Slides

**Systems and  
Subsystems**

Search accomplished through keywords

**Products**

Results from keyword search

Remote sensing acronyms

Lists of past, present, and future satellites

List of remote sensing contacts

Information directed to terminal or printed off-line and sent to user

**Required  
Equipment**

Terminal (any ASCII)

Modem (300-1200 bps)

Printer (optional)

Emulation and/or communications software (if applicable)

**Access**

Menu-driven system

Account with Canada Centre for Remote Sensing (CCRS) required prior to use

Access provided through DATAPAC

System available from 8:30 a.m. to 11:00 p.m. Eastern Standard Time, Monday through Friday

Documentation and consultation services available

No cost for use

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## REMOTE SENSING ON-LINE RETRIEVAL SYSTEM

The Remote Sensing On-line Retrieval System (RESORS) was created to provide timely and effective response to users of bibliographic remote sensing information. RESORS, which is owned by the Canada Centre for Remote Sensing (CCRS) and operated under a contract to Gregory Geoscience Ltd., is the largest remote sensing data base in the world.

### DATA SETS

RESORS consists of four data bases:

- RESORS A: citations of documents published before 1979
- RESORS B: citations of documents published between 1979 and 1984
- RESORS C: citations of documents published after 1984
- Slides: all dates.

### SYSTEMS AND SUBSYSTEMS

RESORS is searched through keywords. Each document has keywords ranked one to three according to their importance in the document.

### PRODUCTS

Output products include the following:

- Results from keyword search
- Remote sensing acronyms
- Lists of past, present, and future satellites
- List of remote sensing contacts.

Information can be directed to the user's terminal or printed at CCRS and sent to the user.

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**REQUIRED  
EQUIPMENT**

To access the system, a user needs the following:

- Terminal (any ASCII)
- Modem (300-1200 bps)
- Printer (optional)
- Emulation and/or communications software (if applicable).

**ACCESS**

RESORS is a menu-driven system with the access specifications indicated below.

**RESORS Account**

Potential users must apply in writing to CCRS for on-line access.

**Means of Access**

On-line access is worldwide through DATAPAC or direct dial. Potential users should contact local telephone companies for details on the particular requirements of the user's area.

**System  
Availability**

RESORS is available from 8:30 a.m. to 11:00 p.m. Eastern Standard Time, Monday through Friday.

**Documentation**

User's guides are automatically sent to all account holders. On-line help is also available.

**Consultation**

Consultation is available Monday through Friday from 7:30 a.m. to 4:30 p.m. Eastern Standard Time at (613) 990-5870.

**Cost**

There are no charges for searching the system on-line or off-line at present. On-line account holders are requested to send new remote sensing documents published by their department or organization in exchange for this service.

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**FUTURE PLANS**

Increased international awareness of RESORS and increased international accessibility are major goals. Future plans include the following:

- Author searching will be available by 1987.
- Bilingual searching will be incorporated into the system in a few years.
- Charges for searching are possible in a few years.

**ADDRESS**

RESORS  
Canada Centre for Remote Sensing  
2464 Sheffield Road (mailing address only)  
Ottawa, Ontario  
K1A 0Y7  
Telex No.: 0533777  
(613) 990-5870

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**SDCS FACTS**

**Data Sets**

SIR-B Inventory

SEASAT SAR Inventory

**Systems and  
Subsystems**

On-line tutorial

User's directory

Utilities menu

**Products**

Textual information about data sets directed to user's terminal

**Required  
Equipment**

Terminal

Modem (300-2400 bps)

Printer (optional)

Emulation and/or communications software (if applicable)

**Access**

User friendly menu-driven system

Account with Jet Propulsion Laboratory required prior to use

Access provided by dial-up lines

System available 24 hours per day, 7 days per week

Documentation and consultation available

No cost for use of system

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## SAR DATA CATALOG SYSTEM

The SAR Data Catalog System (SDCS) is a menu-driven user-interactive hierarchical system designed to store and retrieve information on SAR data and related missions. The current version (2.0) includes information on SEASAT SAR and SIR-B. Figure 1.19-1 presents a block diagram of the system.

### DATA SETS

Two data sets are currently available on SDCS: SIR-B Inventory and SEASAT SAR Inventory. Tables 1.19-1 and 1.19-2, given at the end of this section, identify the parameters of the two data sets.

### SYSTEMS AND SUBSYSTEMS

SDCS supports logical searching on all data base parameters:

- A system tutorial describes the features of the system and how to use these capabilities. General information on the SEASAT and SIR-B missions is also included.
- A user's directory provides the names, addresses, and telephone numbers of catalog users and others in the SAR community.
- A utilities menu provides access to VAX/VMS utilities on the resident Jet Propulsion Laboratory (JPL) VAX, including Mail, Phone, Directory, Type, Print, KERMIT, Delete, Copy, Rename, and Set Password.

### PRODUCTS

Users can select the parameters to be displayed at the conclusion of a logical search. Output is directed to the terminal. Interface to a product request module is also possible.

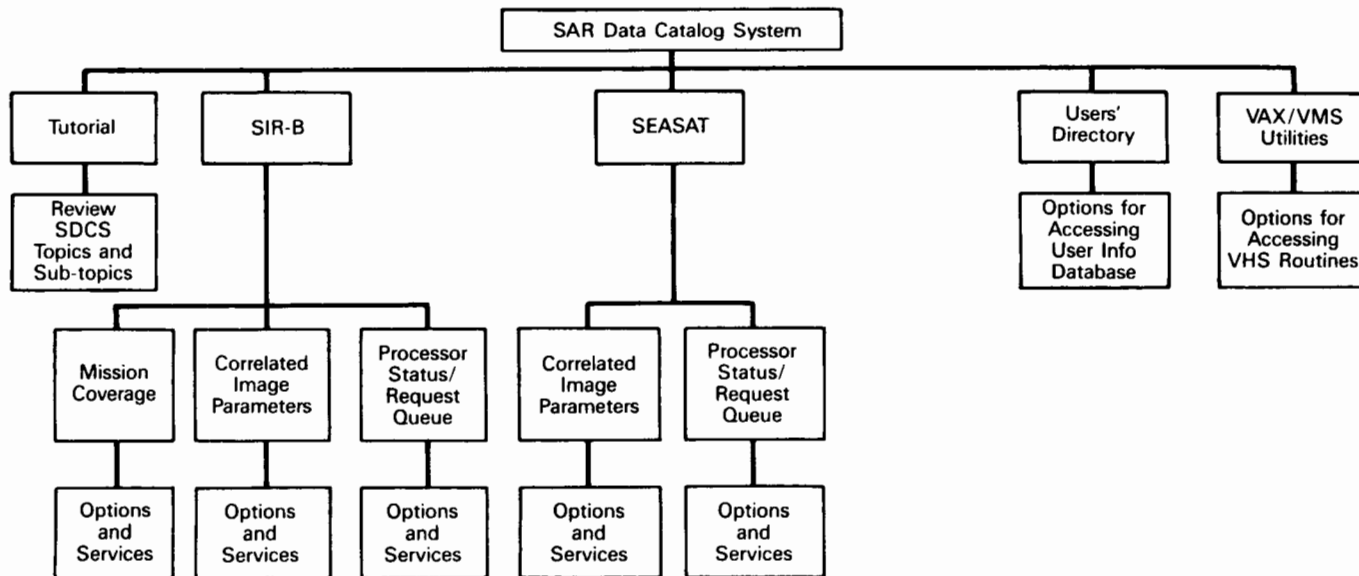


Figure 1.19-1. The SAR Data Catalog System

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**REQUIRED  
EQUIPMENT**

To access the system, a user needs the following:

- Terminal (any ASCII, text only; VT100 with Selener SG100 plus board-graphics)
- Modem (300-2400 bps)
- Printer (optional)
- Emulation and/or communications software (if applicable).

**ACCESS**

SDCS is a user friendly menu-driven system with the access specifications listed below.

SDCS Account

Before gaining access to the system, a potential user must establish an account with JPL. Requests should be directed to the address given at the end of this section.

Means of Access

Access is provided by dial-up lines. Internal JPL users can access the system through ILAN (Host: MADVAX).

System  
Availability

The system is available 24 hours per day, 7 days per week.

Documentation

An SDCS user's guide is available.

Consultation

Consultation is available Monday through Friday from 8:30 a.m. to 4:30 p.m. Pacific Time at the following telephone number: (818) 354-3386.

Cost

The only costs involved with use of the system are long distance communications charges, if applicable.

**FUTURE PLANS**

Plans call for the inclusion of SIR-A and aircraft SAR inventories into SDCS.

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ADDRESS

SDCS  
Jet Propulsion Laboratory  
California Institute of Technology  
4800 Oak Grove Drive MS 156-119  
Pasadena, California 91109  
(818) 354-3386

Table 1.19-1. Parameters of the SIR-B Inventory

Parameter	Abbr. Name	Description
IMAGE_ID	ID	Group name for SERIES_DATA_TAKE, SCENE_NO.
SERIES_DATA_TAKE	SDT	Data take series ID and No. (joined).
DATA_TAKE	(None)	Data take series ID and No. in 2 column form.
SERIES	SER	Data take series ID.
DT	(None)	Data take number.
SCENE_NO	SCENE	Correlated image scene number.
CENTER_GMT	TIME	Correlated image center GMT.
CORR_DATE	(None)	Image correlation date.
CENTER_LATITUDE	LAT	Image center latitude.
LAT_DEG	(None)	Degrees-part of image center latitude.
LAT_MIN	(None)	Minutes-part of image center latitude.
CENTER_LONGITUDE	LONG	Image center longitude.
LONG_DEG	(None)	Degrees-part of image center longitude.
LONG_MIN	(None)	Minutes-part of image center longitude.
SITE	(None)	Name of site in image.
CENTER_RESOLUTION	(None)	Range and azimuth resolution at center of ground range image.
BITS_PER_SAMPLE	BPS	Raw data bits/sample.
PIXEL_SIZE	(None)	The image pixel size.
CENTER_INCIDENCE_ANGLE	THETA	Incidence angle at image center.
TRACK_DEG_TO_TRUE_NORTH	TRACK	Track angle to true North.
SHUTTLE_POSITION	(None)	Shuttle x, y, z position.
X_POSITION	XSO	Shuttle x-position.
Y_POSITION	YSO	Shuttle y-position.
Z_POSITION	ZSO	Shuttle z-position.
SHUTTLE_VELOCITY	(None)	Shuttle x, y, z velocity.
X_VELOCITY	VSXO	Shuttle x-velocity.
Y_VELOCITY	VSYO	Shuttle y-velocity.
Z_VELOCITY	VSZO	Shuttle z-velocity.
NEAR_SLANT_RANGE	NSR	Slant range to range pixel 1.
EARTH_RADIUS_AT_TARGET	ERAT	Earth radius at target.
SHUTTLE_ALTITUDE	ALT	Shuttle altitude.
SHUTTLE_ATTITUDE	(None)	Shuttle roll, yaw, pitch angles.
ROLL	(None)	Shuttle roll angle.
YAW	(None)	Shuttle yaw angle.
PITCH	(None)	Shuttle pitch angle.

Table 1.19-1. Parameters of the SIR-B Inventory (continued)

Parameter	Abbr. Name	Description
GAIN	(None)	Receiver gain.
PRF	(None)	Pulse repetition frequency.
CAL_LEVEL	CAL	Calibrator level setting.
BORE_ANGLE	BOR	Look angle.
DATA_WINDOW_POSITION	DWP	Data window position.
DATA_RATE	DR	Data downlink rate.
NO_OF_SAMPLES_PER_LINE	NSPL	Pixels/line in ground range image.
TOTAL_NO_OF_LINES	TNOL	No. of image lines in ground range image.
DOPPLER_FREQUENCY	FD	Doppler frequency.
FDA	(None)	Second order coeff. to calculate FD.
FDB	(None)	First order coeff. to calculate FD.
FDC	(None)	Constant coeff. in FD calculation.
DOPPLER_FREQUENCY_RATE	FR	Doppler frequency rate.
FRD	(None)	Second order coeff. to calculate FR.
FRE	(None)	First order coeff. to calculate FR.
FRF	(None)	Constant coeff. in FR calculation.
FR_ALONG_TRACK_UPDATE	FRA	Doppler frequency rate increment along track.
FRA1	(None)	Second order coeff. to calculate FR increment.
FRA2	(None)	First order coeff. to calculate FR increment.
FRA3	(None)	Constant Coeff. to calculate FR incr.
EARTH_RADIUS_AT_NADIR	ERAN	Earth radius at nadir.
AZIMUTH_SKEW	SKEW	No. pixels deskewed in geometric correction.
CORNER_COORDINATES	(None)	Coordinates at four corners of image.
NEAR_EARLY_LATITUDE	LATNE	Latitude at near range, beginning of image.
NEAR_EARLY_LONGITUDE	LONGNE	Longitude at near range, beginning of image.
NEAR_LATE_LATITUDE	LATNL	Latitude at near range, end of image.

Table 1.19-1. Parameters of the SIR-B Inventory (continued)

Parameter	Abbr. Name	Description
NEAR_LATE_LONGITUDE	LONGNL	Longitude at near range, end of image.
FAR_EARLY_LATITUDE	LATFE	Latitude at far range, beginning of image.
FAR_EARLY_LONGITUDE	LONGFE	Longitude at far range, beginning of image.
FAR_LATE_LATITUDE	LATFL	Latitude at far range, end of image.
FAR_LATE_LONGITUDE	LONGFL	Longitude at far range, end of image.
CAL_TONE_ESTIMATE	CALEST	Calibrator tone.
BIT_ERROR_RATE	BER	Raw data bit error rate (estimated at time of transfer from HDDT to SDPS).
START_TIME_GMT	STIME	Correlated image start GMT.
STARTING_SAMPLE_NO	STSNO	Starting raw data sample to process.
SCALE_FACTOR	SCALE	Image scale factor.
FR_AZ_UPDATE_FLAG	FRA_FLAG	Flag indicating FR update along track.
BLOCKS_PER_FRA_UPDATE	BLOCKS	No. of single-look blocks between FR along track incr.
LINES_PER_REFERENCE_UPDATE	LPRU	No. of lines to update azimuth reference.
SMPLS_PER_SLNT_RNGE_IMAGE_LINE	SPSRIL	No. pixels/line in slant range image.
NO_OF_SLNT_RNGE_IMAGE_RECORDS	NSRIR	No. lines in slant range image.
SIGNAL_TO_NOISE_RATIO	SNR	Signal to noise ratio.
NOISE	(None)	Estimated noise floor.
REQUEST_NUMBER	RN	Image request number.
REMARKS	(None)	Remarks regarding image.
IMAGE_ON_FILE	IOF	Flag indicating image availability.
CCT_ON_FILE	TOF	Entry indicating image tape availability.
SOFTWARE_VERSION	SW	SDPS S/W version number.
SQUINT_ANGLE	SQTANG	Squint angle.
SWATH_VELOCITY	SV	Swath velocity.
GR_PIXEL_SIZ_R	GRPSR	Ground range image range pixel size.
GR_PIXEL_SIZ_A	GRPSA	Ground range image azimuth pixel size.

Table 1.19-2. Parameters of the SEASAT SAR Inventory

Parameter	Abbr. Name	Description
P_NO	(None)	Image priority number.
PROC_DATE	(None)	Date image was processed.
DATE_TO_PI	(None)	Date image was delivered to Principal Investigator.
EDIS	(None)	Indicates if the image is also in the NOAA archive.
SITE	(None)	Image site name.
REV	(None)	SEASAT revolution (orbit) number.
PASS	(None)	Indicates whether the image is of an ascending or descending pass.
STA	(None)	Receiving station ID.
GMT_CENTER	(None)	Image center GMT and a field indicating whether the time is exact (E) or approximate (A).
GMT	(None)	Image center GMT.
PRECISION	(None)	A field indicating whether the image center GMT is exact or approx.
LAT_DEG_MIN	LAT	Image center latitude in degrees, minutes, and direction.
LAT_DEG	(None)	The degrees-part of the image center latitude.
LAT_MIN	(None)	The minutes-part of the image center latitude.
LAT_DIR	(None)	The direction of the image center latitude--"N" or "S."
DEC_LAT_CP	(None)	Image center latitude in degrees.
LONG_DEG_MIN	LONG	Image center longitude in degrees, minutes, and direction.
LONG_DEG	(None)	The degrees-part of the image center longitude.
LONG_MIN	(None)	The minutes-part of the image center longitude.
LONG_DIR	(None)	The direction of the image center longitude--"E" or "W."
DEC_LONG_CP	(None)	The image center longitude in degrees.
PI	(None)	Name of the Principal Investigator.
FILE_NUMBER_CCT	FN_CCT	File number of the image CCT.



Table 1.19-2. Parameters of the SEASAT SAR Inventory (continued)

Parameter	Abbr. Name	Description
FILE_NUMBER_NEG	FN_NEG	File number of the image negative.
REMARKS	(None)	Remarks regarding the image.
DOPPLER_CENTER_FREQUENCY	FD	Doppler frequency at the image center.
DOPPLER_CENTER_FREQUENCY_OFFSET	FDD	Doppler frequency offset.
DOPPLER_FREQUENCY_RATE	FRATE	Doppler frequency rate at the near edge of the image.
RANGE_WALK_COMPENSATION	ISTEP	Range walk compensation over 1024 lines.
GEOM_CORRECTED	GEOC	Indicates whether the image was rectified.

---

**BRS FACTS**

**Data Sets**

Over 80 data sets with more than 50 million citations

**Systems and  
Subsystems**

BRS After Dark

BRS/BRKTHRU

BRS/Search Service

BRS/PDS

**Products**

Bibliographic citations

Textual information

Output directed to terminal or printed off-line and sent to users

**Required  
Equipment**

Terminal

Modem

Printer (optional)

Emulation and/or telecommunications software (if applicable)

**Access**

Account with BRS required prior to use

Access provided by BRSnet, GTE Telenet, and Tymnet

System available over 140 hours per week

Documentation, consultation, and training available

Costs determined by type of access, plus printing and telecommunications requirements

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## BRS INFORMATION SERVICES

BRS offers access to information in the fields of medicine, the biosciences, education, science, health, business, politics, social sciences, and related interdisciplinary areas. Through a compatible terminal or microcomputer, the user can retrieve any of the nearly 50 million records available through the BRS/Search Service.

## DATA SETS

The data bases identified below are relevant to space-related science. A complete list of all data bases is available from BRS. A sample record is depicted below in Figure 1.20-1.

---

AN 02679 72-1. 8501.  
AU HOYT-KENNETH-B.  
IN KANSAS STATE U, MANHATTAN.  
TI GETTING TO WORK.  
SO TRAINING & DEVELOPMENT JOURNAL.  
1984 Sep VOL 38 (9) 71-80.  
IS 0041-0861.  
LG EN..  
YR 84..  
CC 3650.  
PT 10..  
MJ OCCUPATIONS. WORKING-CONDITIONS. SOCIAL-CHANGE.  
ADULTHOOD. SC 35110 57120 48110 01150.  
ID OCCUPATIONAL REVOLUTION, US.  
CT HUMAN.  
AB DISCUSSES CONCEPTS OF WORK IN THE US, NOTING THAT  
THE US IS MOVING.

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**Figure 1.20-1. Sample Citation**

● **Life Sciences**

- **AGRICOLA (CAIN):** The CAIN data base contains citations to journal articles, Government reports, serials, monographs, pamphlets, and other material as required by the National Agricultural Library (NAL).

---

CAIN offers worldwide coverage of agricultural literature, including agricultural economics, rural sociology, agricultural products, animal industry, agricultural engineering, entomology, nutrition, forestry, pesticides, plant science, soils, and fertilizers. Publications from the U.S. Department of Agriculture, State Agricultural Experiment Stations and Extension Services, the FAO of the United Nations, and other agencies are included.

- BIOSIS: BIOSIS offers comprehensive, international coverage of journal articles, research reports, reviews, conference papers, symposia, books, and other sources in biology, medicine, and interdisciplinary life sciences.
- Pollution Abstracts (POLL): Pollution Abstracts covers international technical literature of environmental science and technology.

- Physical/Applied Sciences

- CA Search (CHEM) and Backfile (CHEB): The CA Search data base provides comprehensive international coverage of literature published in all fields of chemistry.
- COMPENDEX (COMP): The COMP data base is the computerized version of the Engineering Index, which covers worldwide technical literature in civil, environmental, geological, petroleum, mechanical, nuclear, aerospace, computer, electrical, chemical, and industrial engineering.
- HAZARDLINE (HZDB): HZDB provides access to safety and regulatory information on over 3,000 hazardous substances.
- IHS Vendor Information Database (VEND): VEND provides a convenient means for purchasing officers, contractors, marketing staff, engineers, and technical librarians to locate information on products available from over 30,000 vendors.
- Industry and International Standards (STDS): STDS contains voluntary engineering standards from private sector societies and organizations in the United States, in addition to selected foreign national standards and international standards.

- 
- INSPEC (INSP) and Backfile (INSB): The INSPEC data base offers physicists, engineers, computer scientists, and information specialists access to international journal articles, conference reports, dissertations, and technical literature covering physics, electronics, computers, and engineering.
  - Kirk-Othmer Encyclopedia of Chemical Technology (KIRK): KIRK is the full-text on-line version of the 25 volume Kirk-Othmer Encyclopedia of Chemical Technology (3rd Edition), which is recognized as the most authoritative and comprehensive reference work in its field.
  - MathSci (MATH): The MATH data base offers worldwide coverage of journal articles, conference proceedings, and books on pure mathematics, as well as relevant works in applied mathematics, physics, engineering, computer science, biology, operations research, and other fields.
  - Military and Federal Specifications and Standards (MLSS): MLSS is the most complete source available for information on the active and historical standards and specifications of the Department of Defense and Federal Government.
  - Online Microcomputer Software Guide and Directory (SOFT): SOFT offers a convenient way to discover microcomputer software packages appropriate for specific applications.
  - Robotics Information (RBOT): Robotics Information is a significant new resource providing access to literature in all aspects of robotics, ranging from sensor systems to machine intelligence and offering coverage of both industrial and business aspects of the field.
  - Voluntary Standards Information Network (VSIN): VSIN offers information on voluntary standards, for use by engineers, Government contractors, technical librarians, and research and development staff.
- Reference/Multidisciplinary
    - Academic American Encyclopedia Database (AAED): AAED, the on-line edition of the Academic American Encyclopedia, provides information specialists, students, and other encyclopedia users with a full-text tool that is both current and comprehensive.
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- 
- ACS Directory of Graduate Research (DGRF): DGRF contains information on colleges and universities offering degrees in chemistry and biochemistry, and biographical information on faculty members.
  - American Men and Women of Science (MWSC): MWSC contains some 130,000 biographical citations on scientists in the physical, biological, and computer sciences.
  - Associations' Publications in Print (APIP): The APIP data base contains detailed information on conference proceedings, pamphlets, journals, newsletters, bulletins, books, and other print materials published by national, State, regional, local, and trade associations in the United States and Canada.
  - Books in Print (BBIP): The BBIP data base is the only current, comprehensive, and continually updated source of information on virtually the entire U.S. book publishing output.
  - BOOKSINFO (BOOK): BOOKSINFO contains citations to English language monographs currently available from over 10,000 U.S. publishers (including academic and small presses) and hundreds of foreign publishers.
  - California Union List of Periodicals (CULP): CULP is a current and continuously updated file of bibliographic and location data for periodicals and serials held by nearly 1,000 special, public, community college, private, academic, State, and Federal agency libraries in California.
  - Dissertation Abstracts Online (DISS): DISS provides on-line access to citations on virtually every doctoral dissertation accepted at North American universities since 1861.
  - FILE: FILE contains extensive descriptions of all publicly available BRS data bases.
  - GPO Monthly Catalog (GPOM): The GPOM data base indexes the wide variety of public documents produced under the provenance of the U.S. Government, including legislative and judiciary materials, presidential publications, committee and commission reports, and documents of independent and regulatory agencies.

- 
- **National Technical Information Service (NTIS):** NTIS is the major resource for locating U.S. Government-sponsored research reports and studies in the physical sciences, technology, engineering, biological sciences, medicine and health sciences, agriculture, and social sciences.
  - **Superindex (SUPE):** Superindex (SUPE) is a unique, interdisciplinary data base consisting of back-of-the-book indexes from almost 2,000 professional-level reference books in science, engineering, and medicine.
  - **Ulrich's International Periodicals Directory and Irregular Serials and Annuals (ULRI):** The ULRI data base is a unique, current, and comprehensive source of information on selected periodicals and serials published in the United States and worldwide.

#### SYSTEMS AND SUBSYSTEMS

BRS comprises the following systems and subsystems:

- **BRS After Dark:** A special evening service available from 6:00 p.m. to midnight that offers subscribers low-cost access to several BRS data bases
- **BRS/BRKTHRU:** a user friendly, menu-driven system that provides access to most BRS data bases
- **BRS/PDS (Private Data Base Services):** a service allowing customers to construct on-line private data bases containing proprietary information.
- **BRS/Search Service:** the original command driven service, which allows access to all BRS data bases.

#### PRODUCTS

Output that allows access to all BRS data bases can be directed to the user's terminal or printed off-line and sent to the user.

- Bibliographic citations
- Textual information.

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**REQUIRED  
EQUIPMENT**

To access the system, a user needs the following:

- Terminal
- Modem
- Printer (optional)
- Emulation and/or communications software (if applicable).

**ACCESS**

BRS access specifications are itemized below.

BRS Account

To set up an account, a prospective user can call (800) 345-4277 or write BRS Customer Service at the address given at the end of this section.

Means of Access

Access is provided by BRSnet, GTE Telenet, DATAPAC, and Tymnet.

System  
Availability

The system is available from 6:00 a.m. to 2:00 p.m. Eastern Time on Monday through Saturday and from 6:00 a.m. to 2:00 p.m. and 7:00 p.m. to 4:00 a.m. on Sunday.

Documentation

A BRS/SEARCH Service User's Manual is available, as is a monthly newsletter.

Consultation

Customer service representatives are available at (800) 345-4277 to respond to user questions.

Training

Training sessions are held throughout the United States and Canada. Information on these sessions is available by calling (800) 345-4277.



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Cost

A user can select an annual subscription or a pay-as-you-go plan. Annual subscriptions are available for 25 to 240 connect hours at costs ranging from \$16 to \$30 per hour; the pay-as-you-go option is more expensive. Group and shared subscriptions are also available. Additional charges are incurred for printing and telecommunications.

**FUTURE PLANS**

Not known

**ADDRESS**

BRS Information Technologies  
1200 Route 7  
Latham, New York 12110  
(518) 783-7251  
(800) 345-4277

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**DIALOG FACTS**

**Data Sets** Over 250 data bases containing over 120 million items of information

**Systems and Subsystems** DIALOG KNOWLEDGE INDEX (sm)  
DIALMAIL (sm)  
DIALOG BUSINESS CONNECTION

**Products** Textual information  
Bibliographic citations  
Directed to terminal  
Printed off-line and sent to user

**Required Equipment** Terminal (any ASCII) or personal computer  
Modem (300-1200 bps)  
Printer (optional)  
Emulation and/or communications software (if applicable)

**Access** DIALOG account required prior to use  
Access provided by DIALNET, GTE Telenet, and Tymnet  
System available 120 hours per week  
Consultation, documentation, and training available  
Rates determined by connect time, printing requirements, and telecommunications charges

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## DIALOG INFORMATION SERVICES

DIALOG provides immediate access to more than 120 million items of information, including references to books, patents and directories, journals and newspaper articles. Over 250 data bases cover all areas of science technology, business, medicine, social science, current affairs, and humanities. Users include researchers from business, industry, and Government.

### DATA SETS

Identified below are the data sets relevant to space-related science. A complete list of data bases is available from DIALOG.

- Chemistry

- CA SEARCH: Source information and Chemical Abstracts Registry Numbers for all documents covered by the Chemical Abstracts Service, including patents, reviews, journal articles, reports, books, dissertations, and proceedings -- spans the field of chemistry and chemical research.
- CHEMICAL EXPOSURE: Chemical, toxicity, and body-burden information as it relates to human and animal exposure to food, air, and water contaminants and pharmaceuticals -- traces toxic substances and their effects.
- CHEMICAL BUSINESS NEWSBASE (CBNB): Abstracts of international trade and business journal articles, market research and stock broker reports, Government and other documents on the chemical industry -- tracks products, production quantities, plant capacity, and industry regulations.
- CHEMNAME, CHEMSEARCH, CHEMSIS: Dictionaries of chemical substances cited in CA SEARCH during a specific Collective Index Period or a time. Includes CAS Registry Number, molecular formulae. CA Substance Index Names, synonyms, ring data, and other chemical substance data -- provides substance searching and

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identification on the basis of nomenclature, trade-names, element count, synonyms, and other chemical substructure data.

- CHEMZERO: Listing of chemical substances registered by Chemical Abstracts Service but not indexed in the sources covered in CA SEARCH -- supports specific substance and substructure searching.
- HEILBRON: Complete text of Dictionary of Organic Compounds and Dictionary of Organometallic Compounds with chemical substance, properties, and identification information -- supports chemical research and use.

● Science, Technology

- AEROSPACE DATA BASE: Summaries of key scientific and technical documents pertaining to all aspects of aerospace research and development in 40+ countries -- supports basic and applied research, technology development in electronics, communications, physics, and related areas.
- BUSINESS SOFTWARE DATA BASE: Descriptions of 3,000+ business application software packages for mini-and/or microcomputers -- assists in locating software packages, price information, and manufacturers.
- COMPENDEX: Synopses of worldwide engineering publications and articles, including the entire engineering field and its specialties -- reviews international engineering developments.
- COMPUTER DATA BASE: Comprehensive summaries of computer-related articles and publications, spanning telecommunications, hardware, software, and services -- tracks the computer industry and related developments.
- Ei ENGINEERING MEETINGS: Index to significant published proceedings of major engineering conferences, symposia, meetings, and colloquia -- monitors engineering conferences, research, and papers.
- FEDERAL RESEARCH IN PROGRESS: Descriptions of current, multidisciplinary research under the sponsorship of U.S. Government agencies -- locates current research.

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- FLUIDEX, formerly BHRA Fluid Engineering: References and abstracts for all aspects of fluid engineering -- supports international scientific research.
  - FOOD SCIENCE AND TECHNOLOGY ABSTRACTS: Leading information source for research and development literature in all areas of food science -- supports food research and development.
  - GEOARCHIVE: Index of publications covering geophysics, geochemistry, geology, paleontology, mathematical geology -- supports research in the geosciences.
  - GEOREF: Surveys of worldwide technical literature on geology and geophysics from the American Geological Institute -- supports geological, petrological, and related research.
  - INSPEC: One of the largest English-language data bases in the fields of physics, electrical engineering, electronics, computers, and control engineering -- supports research and study in engineering and related fields.
  - ISMEC: References to leading international journal articles and conferences on the full range of mechanical engineering subjects -- supports research in mechanical engineering.
  - MATHFILE: Reviews and summaries of publications in pure mathematics, applied mathematics, and related fields -- supports mathematics research on an international level.
  - MENU, THE INTERNATIONAL SOFTWARE DATA BASE: Directory of 60,000+ commercially available software packages for micro, mini, and mainframe computers -- locates software with prices, manufacturers, warranty, and other information.
  - METADEX: Through coverage of international literature on the science and practice of metallurgy, providing references and briefs -- supports metals research.
  - METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS: Synopses of worldwide meteorological and geostrophysical research.
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- **MICROCOMPUTER INDEX:** Brief summaries of magazine articles from microcomputer journals -- tracks microcomputer products and developments.
  - **NONFERROUS METALS ABSTRACTS:** Brief overviews of literature in all areas of nonferrous metallurgy and technology -- supports metallurgical research and development.
  - **NTIS:** Catalog of Government-sponsored research, development, and engineering, plus analyses prepared by Federal agencies, their contractors, or grantees -- identifies research, sponsors, and reports.
  - **PACKAGING SCIENCE AND TECHNOLOGY ABSTRACTS:** Research and development information on all aspects of packaging science -- supports packaging research, equipment, storage, and testing.
  - **PAPERCHEM:** Index and summaries of publications covering every area of the pulp and paper industry -- locates scientific and technical industry information.
  - **PTS DEFENSE MARKETS AND TECHNOLOGY:** All summaries of major articles and reports from defense sources, including contracts, the industry, and more -- defense industry contracting and tracking.
  - **SCISEARCH:** A multidisciplinary index to scientific and technical literature with unique access to author-cited references -- reviews worldwide sci-tech literature and authors.
  - **SOVIET SCIENCE AND TECHNOLOGY:** Abstracts of journal articles, patents, and reports covering multidisciplinary sci-tech information from Soviet Bloc countries -- monitors technological developments and research.
  - **SPIN:** Current index and abstracts of major American and Russian physics and astronomy journals -- supports research in physics, astronomy, geophysics.
  - **STANDARDS AND SPECIFICATIONS:** Index to all Government and industry standards, specifications, and documents containing such requirements -- identifies standards and specifications.

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- **TEXTILE TECHNOLOGY DIGEST:** Overview of textile production, processing, automation, management publications -- follows developments in textile production and processing.
  - **TRIS:** Resumes of documents and research projects on air, highway, rail, and other transportation modes -- provides latest transportation research information.
  - **WELDASEARCH:** Primary coverage of international literature on all facets of the joining of metals and plastics and related areas -- supports research on welding technology and applications research.
  - **WORLD ALUMINUM ABSTRACTS:** Worldwide technical literature briefs on aluminum, from ore processing to end users -- contributes to industrial research and current awareness.
  - **WORLD TEXTILES:** Overview of worldwide scientific and technical literature of textiles and related materials -- reviews textile standards, patents, and research.
- **Energy, Environment, Agriculture**
- **AGRICOLA:** Comprehensive index to worldwide sources of information on agriculture and a host of related topics -- supports agricultural and nutritional research.
  - **AGRIS:** References to non-U.S., worldwide trade and scientific agriculture literature -- supports agriculture research and development.
  - **APTIC:** Summaries of research and legal administrative practices for air pollution topics -- supports environmental research.
  - **AQUACULTURE:** Index to a wealth of sources on all aspects of aquaculture -- supports environmental and biological research.
  - **AQUALINE:** Summaries of reports and articles from worldwide information sources on all aspects of water and wastewater -- supports environmental research.
  - **AQUATIC SCIENCES AND FISHERIES ABSTRACTS:** Broad-based source of information on life sciences, legal, political, and social issues related to the seas and inland waters -- supports biological and environmental research.
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- CAB ABSTRACTS: Detailed summaries of agricultural and biological research from worldwide sources -- supports agricultural and biological research.
  - CRIS/USDA: Extensive descriptions of current research in agriculture and related areas sponsored by the U.S. Department of Agriculture and State institutions -- contributes to awareness for agricultural research.
  - DOE ENERGY: A leading source of information on all aspects of energy, produced by the U.S. Department of Energy -- supports research and energy policy development.
  - ELECTRIC POWER DATA BASE: Descriptions of research and development projects related to electric power -- supports utilities industry research.
  - ENERGYLINE: Summaries from a wide range of sources on energy policy, current news, and research -- energy policy, planning, tracking.
  - ENERGINET: Directory of companies, Government agencies, nonprofit organizations, and people in energy-related fields -- functions as a location and key contacts guide.
  - ENVIROLINE: Summaries of environmental research, planning, policy, and news from thousands of publications -- supports environmental research and planning.
  - ENVIRONMENTAL BIBLIOGRAPHY: Index to the leading environmental journals -- supports environmental research.
  - OCCUPATIONAL SAFETY AND HEALTH (NIOSH): References to journals, technical reports, and other publications covering all aspects of occupational safety and health -- supports research into hazardous agents, unsafe work environments, etc.
  - OCEANIC ABSTRACTS: Major source of worldwide information on oceanography and marine resources -- supports marine science research.
  - WATER RESOURCES ABSTRACTS: Summaries of research reports and articles; a major source for water planning and quality -- supports environmental planning.
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- **WATERNET:** Comprehensive index to the publications of the American Water Works Association, covering all areas of water utilities -- supports utilities planning and research.
  - **Education, Reference**
    - **DATA BASE OF DATA BASES:** Directory of publicly available on-line data bases -- supports data base selection and analysis.
    - **EVERYMAN'S ENCYCLOPEDIA:** Complete text of the British encyclopedia containing over 50,000 articles on topics, people, and places -- functions as a general information source.
    - **REMARC:** Retrospective coverage of the cataloged collection of the U.S. Library of Congress, complementing LC MARC -- provides library services.
  - **People**
    - **BIOGRAPHY MASTER INDEX:** Index to biographical information from more than 600 source publications, including biographical dictionaries, handbooks, and directories -- identifies noteworthy individuals and personalities.

**SYSTEMS AND  
SUBSYSTEMS**

DIALOG provides the following capabilities:

- **DIALOG KNOWLEDGE INDEX:** gives personal computer owners low-cost off-hour access to a selected group of DIALOG data bases. Information on the system is available by calling (800)-3-DIALOG.
- **DIALMAIL:** functions as an electronic mail service for DIALOG users.
- **DIALOG BUSINESS CONNECTION**

**PRODUCTS**

Contents of the data bases can be directed to the user's terminal or printed off-line and sent to the user.

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**REQUIRED  
EQUIPMENT**

To access the system, a user needs the following:

- Terminal (any ASCII)
- Modem (300-1200 bps)
- Printer (optional)
- Emulation and/or communications software (if applicable).

**ACCESS**

DIALOG access specifications are itemized below.

DIALOG Account

To request an order form and establish a system account, a prospective user should call (800)-3-DIALOG or write to DIALOG at the address given at the end of this section. Within 2 weeks after the form has been returned to DIALOG, the user will be sent a password for use of the system.

Means of Access

Access is provided by DIALNET, GTE Telenet, and Tymnet.

System  
Availability

DIALOG is available 120 hours per week.

Documentation

Each new customer is encouraged to order a copy of the Guide to DIALOG Searching.

User Services

Consultation, documentation, and training are available from DIALOG.

Consultation

Consultation is available by calling 800-227-1927.

Training

Training is available to new users by calling 800-3-DIALOG. Registrants for the new user session will be told where these are being held in the local area.

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Cost

Rates are determined by connect time per minute at charges ranging from \$0.25 to \$2.50 depending on the data base, in addition to printing costs per record and telecommunications expenses. There is no start up fee or minimum charge.

**FUTURE PLANS**

Not known

**ADDRESS**

DIALOG Information Services, Incorporated  
3460 Hillview Avenue  
Palo Alto, California 94304  
(415) 858-3785  
(800) 334-2564  
TELEX 334499

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**ESA IRS FACTS**

**Data Sets** More than 80 data bases and data banks

**Subsystems** On-line services  
Off-line services  
Specialized services  
Support services

**Products** Textual information  
Bibliographic citations  
Directed to terminal  
Printed off-line and sent to user

**Required Equipment** Terminal or personal computer  
Modem  
Printer (optional)  
Emulation and/or communications software (if applicable)

**Access** User friendly  
User account required with ESA  
Access provided by dial-up and leased lines, ESANET, Tymnet, TRANSPAC, DATEX-P, and other public packet-switched networks  
System operational from 11:30 p.m. to 7:30 p.m. Central European Time, Monday through Friday  
Documentation, consultation, and training available  
Cost determined by amount of time in data base, as well as by retrieval and printing charges per record

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## EUROPEAN SPACE AGENCY INFORMATION RETRIEVAL SERVICE

The European Space Agency (ESA) Information Retrieval Service (IRS) was formed to ensure the provision of on-line information to ESA and the European aerospace-related industry in support of their various projects. IRS provides a variety of information services in most fields of science and technology in the form of on-line access to bibliographic references and factual data, and on-line ordering of original documents.

### DATA SETS

Most of the 83 data sets, and two of four data banks, are relevant to science and technology. Some examples are described below. Contact ESA-IRS for a complete description of all data sets.

- Data Sets

- ACOMPLINE: contains all documentation needed by engineers, scientists, and sociologists involved in urban matters; produced in Europe.
- AGRIS: is a decentralized, international bibliographic system with input supplied by over 100 national AGRIS centers. Literature input includes journal articles, conference proceedings, monographs, theses, patents, maps, technical reports, standards, films, and computer media. Broad subject areas relating to agriculture are research methods, history and geography, education, economics, rural development, rural sociology, marketing, plant production, soil science, plant protection, forestry, animal production, veterinary medicine, aquatic sciences and fisheries, buildings and machinery, natural resources, water resources, irrigation and drainage, food science and food processing, home economics, human nutrition, pollution, mathematics and statistics, and documentation.
- BIOSIS: includes the contents of Biological Abstracts and BA/RRM, and thus covers biology in its traditional areas, such as zoology; interdisciplinary areas, such as research medicine; and related areas, such as instrumentation.

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- CAB: contains all records in some 30 journals published by the Commonwealth Agricultural Bureau. It covers all agricultural sciences, including buildings, cooperatives, education, engineering, pollution, immunology, legislation, marketing, microbiology, pest control, rural planning, energy resources, taxonomy, and water management.
  - CHEMABS: is the IRS on-line implementation of the Chemical Abstracts Service CA-Search tapes. It contains information similar to the printed Chemical Abstracts Journal, except that abstracts are not included.
  - COMPENDEX: contains the contents of over 3,500 sources of engineering literature--professional trade journals, publications of engineering organizations, papers from conferences, and symposia and books. This data set is a machine-readable version of Engineering Index.
  - CONFERENCE PAPERS INDEX: covers the latest international research findings and papers presented at scientific and technical conferences and meetings throughout the world. Much of the data retrievable appears a year or more in advance of any other publication. Each citation includes paper title; author names; address if available; conference title, date, location, and sponsors; and pertinent data on conference publications issued or planned for issuance.
  - EDF-DOC: is a multidisciplinary file containing records from various sources, including internal reports and conference proceedings. Main subject categories are energy sources; electric power production, transmission, and distribution; domestic and industrial applications of electricity; environment and pollution; nuclear power plants; electric machines; computer systems and applications; and applied mathematics. This data set is produced by the French Electricity Board.
  - ENERGYLINE: covers journal articles, books, conferences, surveys, and reports in the broad energy field.
  - ENVIROLINE: provides interdisciplinary coverage of citations in 2,000 of the world's most significant environmental publications, including periodicals, books, reports, conference proceedings, patents, and speeches.

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- FSTA (Food Science and Technology Abstracts): covers the entire field of food science, including microbiology, hygiene, engineering, packaging, additives, toxicology, economics, standards, legislation and processing, agriculture, biochemistry, and fish.
  - INIS: is a decentralized, international bibliographic system with current participation of 62 national INIS centers and 13 international organizations. Type of literature input includes journal articles, books, and conference proceedings, as well as information not available through normal commercial channels, such as patents and theses.
  - INSPEC: contains references from the world's published literature in physics, electrical engineering and electronics, and computer science and control engineering.
  - INSPEC INFORMATION: is a subset of the INSPEC data base available at a low access fee for the purpose of bona fide training, instruction, and demonstration.
  - INSPEC TRAINING: is a subset of the INSPEC data base available at a low access fee for user training.
  - ISMEC: provides information selected from a wide range of mechanical engineering journals and conference publications.
  - METADEX: provides comprehensive coverage of journals, books, conferences, and symposia in applied and theoretical metallurgy and related aspects of physics and chemistry.
  - NASA: corresponds to the unpublished (report) literature in Scientific and Technical Aerospace Reports (STAR) and the open literature (journals, books, conferences) in International Aerospace Abstracts (IAA). It covers aeronautics, astronautics, chemistry and materials, engineering, geosciences, life sciences, mathematical and computer sciences, physics, social sciences, and space sciences. Access to this data base, which covers 1962 to the present, is subject to special agreement.
  - NTIS: announces information released to the public by U.S. Government agencies and departments. Announcements in this multidisciplinary file, which specializes in report literature, are made in a wide range of subject categories and cover the period of 1964 to the present.
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- OCEANIC: scans some 2,500 titles, including journals, conference papers, trade publications, books, and research progress reports. Specific areas of coverage are marine biology and biological oceanography; physical and chemical oceanography; meteorology; geology; geophysics and geochemistry; marine pollution; marine resources; ships and shipping; remote sensing; and other aspects, such as engineering and materials, Government and law, instruments, and methods. The period of coverage is 1964 to present.
  - ODE: is a file reserved for on-line data entry in view of the creation of private files, using MIKROTEL package.
  - PASCAL: corresponds to the French abstract journal Bulletin Signaletique and includes serials, theses, reports, patents, and conference proceedings. The following sections are taken: Earth sciences; physics, computer science, electrical engineering, electronics, and chemical physics; fuels and energy; metallurgy, mechanical and civil engineering and transportation; pollution; and biology/medicine. The timespan is 1973 to present.
  - POLLUTION: scans some 2,500 primary sources, including journals, conference papers, monographs, Government reports, books, and research progress reports. Specific areas of coverage are air pollution, marine pollution, freshwater pollution, sewage and wastewater treatment, solid wastes, land pollution, pesticides and chemical contaminants, noise pollution, radiation, and environmental action. The period of coverage is 1970 to present.
  - WTI (World Transindex): gathers the translation announcements collected by the International Translation Center, the Commission of the European Communities, and the Centre National de la Recherche Scientifique. It announces translations of literature relating to all fields of science and technology, from East European and Asiatic languages into Western languages.
- On-line Factual Data Banks
    - LEDA: contains the basic information needed to identify scenes and images remotely sensed from space by LANDSAT 1 and LANDSAT 2 satellites and acquired by a ground station located at Fucino, Italy.
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- SPACECOMPS: provides information on components for spacecraft use and is produced from various information sources, such as project parts lists, qualified/preferred parts lists, manufacturers, CECC approved parts, construction analysis reports, quality audits, manufacturers test reports, and radiation sensitivity reports.

## SUBSYSTEMS

ESA IRS comprises the subsystems identified below:

- On-line services
  - On-line ordering of original documents
  - On-line save and automatic reexecution of search profile
- Off-line services
  - Subscriptions to standard titles or files
  - Subscription to custom subset of files
  - Supply of ESA and NASA reports
- Specialized services
  - Availability of high-speed terminal package
  - Ability to create new data file for personal use
  - Consultation
- Support services
  - Training
  - User guide
  - Newsletters.

## PRODUCTS

The information can be directed to the user's terminal or printed off-line and sent to the user.

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**REQUIRED  
EQUIPMENT**

To access the system, a user needs the following:

- Terminal or personal computer
- Modem
- Printer (optional)
- Emulation and/or communications software (if applicable).

**ACCESS**

ESA IRS is a user friendly system with the access requirements and services identified below.

**ESA Account**

A user must establish an account with ESA by signing a standard sign-up contract.

**Means of Access**

The system is accessible through the following:

- Dial-up lines (110-1200 bps)
- Leased lines (up to 2400 bps)
- ESANET
- TYMNET (United States)
- TRANSPAC (France)
- DATEX (Federal Republic of Germany)
- Other public packet-switched networks.

**System  
Availability**

The system is operational 20.5 hours per day (11:30 p.m. to 7:30 p.m. Central European Time), Monday through Friday.

**Documentation**

A user's guide is available, as is a bimonthly newsletter.

**Consultation**

Assistance on use of the system is available from the following national centers.

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**Belgium**

Mr. E. Lapeysen, C.N.D.S.T.  
4, Bd de l'Empereur,  
1000 Bruxelles  
Tel. (02) 519 5643, twx 21157

**Denmark**

Mr. D. Nag, DTB Library  
Anker Engelunds Vej 1,  
2800 Lyngby  
Tel. (02) 883 088, twx 37148

**France**

Mr. Ph. Lequain, ESA-IRS  
8-10 rue Mario-Nikis,  
75738 Paris Cedex 15  
Tel. (01) 4273 7201, twx 202 746

**Ireland**

Miss N. Breen, IIRS  
Ballymun Road,  
Dublin 9  
Tel. (01) 370 101, twx 25449

**Netherlands**

Mr. P.J.C. Rosenbrand, COBIDOC  
P.O. BOX 16601,  
1001 RC Amsterdam  
Tel. (020) 223 955, twx 18766

**Spain**

Mr. E. de La Fuente  
INTA  
Torrejon de Ardoz  
Madrid  
Tel. (01) 675 5263, twx 22026

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**Sweden**

Mr. A. Nord, IDC-KTHB  
Valhallavagen 81  
100 44 Stockholm  
Tel. (08) 787 8970, twx 10389

**United Kingdom**

Mr. R. Kitley  
IRS DIALTECH,  
Dept. of Trade and Industry, Room 392  
Ashdown House  
123 Victoria St.  
London SW1E 6RB  
Tel. (01) 212 5638, twx 8813148

Training

Training seminars are given regularly.

Cost

No subscription or minimum fee is required. Cost is determined by the amount of time in the data base, as well as by retrieval and printing charges per record.

**FUTURE PLANS**

Not known

**ADDRESS**

ESA Information  
Retrieval Service  
Online Services Division  
ESRIN, Via Galileo Galilei  
00044 Frascati (Rome), Italy  
Tel. (06) 94011; Telex 610637 ESRIN I  
Telefax (06) 9401361

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**MEAD DATA CENTRAL, INC. FACTS**

**Data Sets** Over 1,000 data bases containing more than 45 million articles, patents, and references

**Subsystems**

LEXIS <sup>®</sup>	EXCHANGE <sup>™</sup>
AUTO-CITE <sup>®</sup>	MEDIS <sup>™</sup>
SHEPARD'S <sup>®</sup> CITATIONS	NAARS <sup>™</sup>
LEXTRACK <sup>®</sup>	REFSRV <sup>®</sup>
NEXIS <sup>®</sup>	LEXPAT <sup>®</sup>
APOLIT	

**Products**

- Textual information
- Bibliographic citations
- Directed to terminal or personal computer
- Printed off-line and sent to user or printed on-line

**Required Equipment**

- Terminal or personal computer
- Modem (1200 bps)
- Printer (optional)
- Emulation and/or communications software (if using PC)

**Access**

- Account with Mead Data Central required for use of system
- Access provided by GTE Telenet, Tymnet, and MEADnet, or through WATS lines
- Consultation services available at regional offices
- Costs include monthly subscription fee, connect fee, telecommunications fee per hour, and searching fees

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MEAD DATA CENTRAL, INC.

Mead Data Central, Inc. offers the largest full-text data base in the world. Accessible through the system are over 1,000 data bases containing over 45 million articles, legal cases, patents, and references. Components of the system include LEXIS®, AUTO-CITE®, SHEPARD'S® CITATIONS, LEXTRACK®, NEXIS®, APOLIT, EXCHANGE™, MEDIS™, NAARS™, REFSRV™, and LEXPAT® SERVICES.

Data Sets

Of the over 1,000 data bases accessible by Mead Data Central, those most directly related to environmental and space-related science are found in NEXIS® SERVICE and REFERENCE SERVICE (REFSRV®). Users may search a wide variety of files and file combinations in the NEXIS® library. The following identifies the contents of the group file of publications and wire services that cover a trade, science, or technology.

● NEXIS® Trade/Technology

File Name	Description
TRDTEC	Group file
ADMANF	Advanced Manufacturing Technology
AEROAM	Aerospace American
AIRLTR	Interavia Air Letter
AMCPT	Advanced Military Computing
AVWEEK	Aviation Week & Space Technology
BIOPRO	Bioprocessing Technology
BIOTEC	McGraw-Hill's Biotechnology Newswatch
BYTE	BYTE
CHEMEN	Chemical Engineering
CHEMWK	Chemical Week
CMPWLD	Computerworld
COALAG	Coal Age
COALIN	Coal Week International
COALOT	Coal Outlook

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File Name	Description
COALWK	Coal Week
COMDLY	Communications Daily
CST	Coal & Synfuels Technology
CWNEWS	ChemWeek Newswire
DATA	Data Communications
DEFELC	Defense Electronics
DEFIND	Defense Industry Report
DISCOV	Discover
ELECTR	Electronics
ELMKT	Electrical Marketing
ELUTL	Electric Utility Week
EMJ	Engineering and Mining Journal
EMJMAD	E&MJ Mining Activity Digest
ERW	Enhanced Recovery Week
FNGAS	Foster Natural Gas Report
GENTEC	Genetic Technology News
GRNMKT	Green Markets
HITECH	High Technology
HTMTRL	High-Tech MATERIALS Alert
IDR	International Defense Review
INAERO	Interavia Aerospace Review
INERGY	Inside Energy/with Federal Lands
INFERC	Inside F.E.R.C.
INFWLD	InfoWorld
INNRC	Inside N.R.C.
INRD	Inside R&D
KEYNEW	Keystone News Bulletin
MECHEN	Mechanical Engineering
MELOG	Marine Engineering/Log
METLWK	Metals Week
MICSYS	Microwave Systems News & Communications Technology
MILSPC	Military Space
MINJNL	Mining Journal
MINMAG	Mining Magazine

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File Name	Description
MINREV	Mining Annual Review
NUFUEL	Nuclear Fuel
NUNews	Nuclear News
NUWEEK	Nucleonics Week
OFFSHR	Offshore
OILGAS	Oil & Gas Journal
PETCHM	International Petrochemical Report
PONEWS	Platt's Oilgram News
PPRICE	Platt's Oilgram Price Report
SPBUSN	Space Business News
SPR	The Spang Robinson Report
SYNFLS	Clean-Coal/SynFuels Letter

REFSRV includes references and abstracts of articles and research publications in over 100 subject areas, in addition to data, facts, and statistics from directories, handbooks, data bases, almanacs, and other information sources. The contents are itemized below:

● Reference Service

File Name	Description
Bibliographic Abstract Files	
ABI	ABI/INFORM Business and Management Database
AERO	The Aerospace Database
BIOBUS	BioBusiness™
BIOSIS	Biosis Previews®
COMPUT	The Computer Database
DOE	Department of Energy - Energy Data Base
FINIS	Financial Industry Information Service
INABS	The Information Bank Abstracts selected from newspapers, magazines, and journals

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File Name	Description
INAMI	Advertising and Marketing Intelligence Abstracts
INALL	Combined file INABS and INAMI
INDASO	Industry Data Sources
LGLIND	Legal Resource Index™
MAGIND	Magazine Index™
MGMT	Management Contents®
NTIS	National Technical Information Service
NWSIND	National Newspaper Index™
TRDIND	Trade & Industry Index™
WORLD	World Wide Economic & Financial Information
REFS	Combined ABI, COMPUT, FINIS, INABS, INAMI, INDASO, LGLIND, MAGIND, MGMT, NWSIND, TRDIND, WORLD

File Name	Description
<b>Structured Information Files</b>	
AMPOL	The Almanac of American Politics
BLCAST	Billcast™ Legislative Forecasts
CNSULT	Geneva Consultants Registry
DDWA	Deadline Data on World Affairs
DFAHBK	Defense & Foreign Affairs Handbook
EXPERT	Forensic Services Directory
FORBAD	Forbes Annual Directory
FRIP	Federal Research in Progress Directory
HAZARD	Hazardline®, Occupational Health Services
MSDS	Material Safety Data Sheets
WHDRCT	White House Phone Directory

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**File Name      Description**  
**Structured Information Files**

**FACTS**              Combined AMPOL, BLCAST, CNSULT, DDWA,  
DFAHBK, EXPERT, FORBAD, WHDRCT

**File Name      Description**  
**Profiles Online Search Aids**

**PFABI**              Profile ABI  
**PFAMPO**            Profile AMPOL  
**PFBLCA**            Profile BLCAST  
**PFCOMP**            Profile COMPUT  
**PFDDWA**            Profile DDWA  
**PFDFAH**            Profile DFAHBK  
**PFDOE**            Profile DOE  
**PFEYPE**            Profile EXPERT  
**PFFINI**            Profile FINIS  
**PFFORB**            Profile FORBAD  
**PFFRIP**            Profile FRIP  
**PFHAZA**            Profile HAZARD  
**PFINDA**            Profile INDASO  
**PFMGMT**            Profile MGMT  
**PFNTIS**            Profile NTIS  
**PFWORL**            Profile WORLD

**TO COME:**

**ACT I**              Advertised Computer Technologies I  
**ACT II**             Advertised Computer Technologies II  
**NWSRCH**            Newsearch™

A complete list of the data bases accessible through Mead Data Central is available at the company address identified at the end of this section.

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**SUBSYSTEMS**

Mead Data Central has the following subsystems:

- **LEXIS:** U.S. and State law, Government documents, trade, and commerce
- **AUTO-CITE:** case-law citations and verifications
- **SHEPARD'S CITATIONS:** case-law citations
- **LEXTRACK:** litigation-support private libraries
- **NEXIS:** newspaper, magazine, newsletter, business, finance, Government publications, news, trade and technology, patents, and encyclopedia files
- **Associated Press Political (APOLIT):** information on election campaigns, political issues, and events relating to past, present, and future elections
- **Exchange (EXCHNG):** stock market and related financial information
- **Medical (MEDIS):** medical journals and reference files from NLM's MEDLINE
- **National Automated Accounting Research System (NAARS):** accounting materials, including the annual reports of certain public corporations and selected accounting literature
- **Reference Service (REFSRV):** references and abstracts in over 100 subject areas
- **LEXPAT:** U.S. patents from 1975 to the present.

**PRODUCTS**

Information from a Mead Data Central search can be directed to a user's terminal be printed off-line and sent to the user, or be printed while on-line.

**REQUIRED EQUIPMENT**

The equipment used to access this system consists of the following:

- Mead Data Central, Inc.'s custom terminal or one of the terminals or personal computers listed below, all of which are currently supported by Mead Data Central.

- 
- AMBI VDT
  - ATEX
  - AT&T PC6300
  - Apple IIc
  - Apple IIe
  - Apple III
  - Apple Macintosh
  - Barrister
  - Compaq Portable
  - CPT Phoenix Jr.
  - Crosstalk XVI
  - Data General One (Veralex)
  - Data General MV4000
  - DEC Rainbow 100
  - DEC Professional 300
  - DEC VAX
  - DEC VT101
  - DEC VT220
  - Direct Aid Prosearch
  - Four Phase 495 (DOJ)
  - HP 150 (Emulation mode)
  - HP 2622
  - GridCase 3
  - IBM 3101
  - IBM Displaywriter
  - IBM PC
  - IBM PCjr
  - IBM PC/AT
  - IBM Portable
  - IBM PC/XT
  - ITT XTRA
  - Jazz
  - Lanier
  - Leading Edge Model M
  - Matra Scanset 415
  - Matra Scanset XL
  - Md Computer Svcs (HP 125)
  - MDC Tote II
  - NBI 64
  - NBI 4100S
  - NCR Model 4
  - Rolm Cypress
  - Sanyo PC
  - Sperry PC
  - Syntrex Acquarius
  - Tandy 1000
  - Tandy 1200
  - Televideo 924
  - Televideo 950
  - Texas Instruments PC
  - Thompson VDT-3000
  - Visual Commuter
  - Wang PC
  - Wang VS
  - Xerox 820-II
  - Zenith 171 (DOS 1.3).
- Modem (1200 bps)
  - Printer (optional)
  - Emulation and/or communications software (if applicable).

**ACCESS**

The access requirements and services for Mead Data Central are itemized below.

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Mead Data  
Central, Inc.  
Account

A potential user should contact the nearest Mead Data Central Office to initiate procedures for a subscription. Once the subscription is approved, a process that takes about 4 weeks, the user is instructed to attend a short training session focusing on efficient searching strategies. Passwords are distributed during the training session.

Means of Access

Access is provided by GTE Telenet, Tymnet, and Mead Data Central's MEADnet. WATS access is also available for users not having a local dial-up number.

System  
Availability

The system is available 23 hours 55 minutes per day, Monday through Friday (down 2:00 a.m. - 2:05 a.m.) Saturday until 10:00 p.m., Sunday from 6:00 a.m.

Consultation

Information on use of the system is available on (800) 227-4908 and at the regional offices identified in Table 1.23-1.

Cost

The cost of using the system involves the following:

- Monthly subscription fee
- Installation and monthly rental fee for terminal/printer (if applicable)
- Connect fee (per hour)
- Telecommunications fee (per hour)
- Printing fee (per line, if applicable)
- Searching fee.

Specific information concerning fees is available from Mead Data Central.

**Table 1.23-1. Mead Data Central Offices**

Suite 113  
234 N. Central Avenue  
Phoenix, Arizona 85004  
602-256-0454

300 Spring Building  
3rd at Spring Street  
Little Rock, Arkansas 72001

Suite 2850  
1 Century Plaza Towers  
Century City, California 90067  
213-627-1130

Two Town Center  
Suite 640  
3200 Park Center Drive  
Costa Mesa, California 92630  
714-662-0196

Suite 1850  
611 West Sixth Street  
Los Angeles, California 90017  
213-627-1130

Distributed Products Group  
2730 Sand Hill Road  
Menlo Park, California 94025  
415-854-4660, ext. 161

Suite 1000  
1121 L Street  
Sacramento, California 95814  
916-441-6626

Suite 1300  
701 B Street  
San Diego, California 92101  
619-231-8381

Suite 2500  
101 California Street  
San Francisco, California 94111  
415-781-1707

812 N. Barbara Street  
Santa Maria, California 93454

Mead Data Central  
International, Ltd.  
Sun Life Centre  
Suite 1901, West Tower  
200 King Street West  
P.O. Box 81  
Toronto, Ontario  
CANADA M5H 3T4  
416-591-8740

1760 Petro Lewis Tower  
717 17th Street  
Denver, Colorado 80202  
303-298-8693

Micromedex, Inc.  
(A Wholly-owned Subsidiary)  
660 Bannock Street  
Suite 350  
Denver, Colorado 80204-4506  
800-525-9083

Suite 100  
5 Landmark Square  
Stamford, Connecticut 06901  
203-325-8338

Suite 1090  
1050 Connecticut Avenue, N.W.  
Washington, D.C. 20036  
202-785-3550

International Information Products  
Suite 310  
1825 K Street, N.W.  
Washington, D.C. 20006  
202-331-4340

Mead Data Central International  
International House  
1 St. Katherine's Way  
London, England E19UN  
011-441-488-9187

710 Miami Center  
100 Chopin Plaza  
Miami, Florida 33131  
305-358-1388

**Table 1.23-1. Mead Data Central Offices (continued)**

785 Ashley Tower  
100 South Ashley Drive  
Tampa, Florida 33602  
813-229-6621

Harris Tower  
Suite 601  
233 Peachtree Street, N.E.  
Atlanta, Georgia 30303  
404-577-1779

1777 Pioneer Plaza  
900 Fort Street Mall  
Honolulu, Hawaii 96813  
808-531-4795

Suite 2127  
135 South LaSalle Street  
Chicago, Illinois 60603  
312-236-7903

1345 One American Square  
Box 82054  
Indianapolis, Indiana 46282  
317-631-2862

2424 First National Tower  
Louisville, Kentucky 40202  
502-589-9233

1971 Pan Am Life Center  
601 Poydras Street  
New Orleans, Louisiana 70130  
504-525-2958

Suite 401  
222 St. Paul Plaza  
Baltimore, Maryland 21202  
301-685-0277

Old City Hall  
3rd Floor  
45 School Street  
Boston, Massachusetts 02108  
617-367-8427

Suite 1636  
100 Renaissance Center  
Detroit, Michigan 48243  
313-259-1156

707 First Bank Plaza West  
Minneapolis, Minnesota 55402  
612-333-4886

1311 Pioneer Building  
St. Paul, Minnesota 55101  
612-292-9380

1012 Mercantile Tower  
1101 Walnut Street  
Kansas City, Missouri 64106  
816-221-2135

Executive Office Building  
Suite 406  
515 Olive Street  
St. Louis, Missouri 63101  
314-241-2211

980 Woodmen Tower  
1700 Farnam Street  
Omaha, Nebraska 68102  
402-341-2411

43rd Floor  
200 Park Avenue  
New York, New York 10166  
212-309-8100

29 Kingsberry Drive  
Rochester, New York 14626  
716-227-3316

4621 Magnolia Commons  
Greensboro, North Carolina 27405  
919-282-1540

6000 Applewood Lane  
Raleigh, North Carolina 27609  
919-282-1540

1606 Provident Tower  
One East Fourth Street  
Cincinnati, Ohio 45202  
513-721-8565

Eaton Center, Suite 1620  
111 Superior Avenue  
Cleveland, Ohio 44114  
216-566-7819

**Table 1.23-1. Mead Data Central Offices (continued)**

The Leveque Tower  
Suite 1231  
50 West Broad  
Columbus, Ohio 43215

9393 Springboro Pike  
Miamisburg, Ohio 45342  
513-865-6800  
Mailing Address:  
P.O. Box 933  
Dayton, Ohio 45401

American First Tower  
Suite 820  
101 North Robinson Street  
Oklahoma City, Oklahoma 73102  
405-236-3448

Orbanco Building  
Suite 1000  
1001 S.W. 5th  
Portland, Oregon 97204  
503-227-7617

Suite 2100  
Two Mellon Bank Center  
Philadelphia, Pennsylvania 19102  
215-564-1788

One Oxford Center  
Suite 930  
301 Grant Street  
Pittsburgh, Pennsylvania 15219  
412-261-5595

Capitol Center-Suite 1040  
919 Congress Avenue  
Austin, Texas 78701-2453  
512-476-8144

Suite 959  
One Main Place  
Dallas, Texas 75250  
214-742-4394

Suite 3430  
1200 Milam  
Houston, Texas 77002  
713-655-3400

Suite 600  
50 South Main Street  
Salt Lake City, Utah 84144  
801-355-8651

James Center-Suite 1212  
901 East Cary Street  
Richmond, Virginia 23219  
804-783-2440

Suite 700  
1111 Third Avenue  
Seattle, Washington 98101  
206-621-1761

The Plankinton Building  
Suite 6017  
161 West Wisconsin Avenue  
Milwaukee, Wisconsin 53203  
414-272-5655



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**FUTURE PLANS**

Not known

**ADDRESS**

Mead Data Central  
9393 Springboro Pike  
P.O. Box 933  
Dayton, Ohio 45401  
(513) 865-6800  
(800) 227-4908

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**PERGAMON INFOLINE FACTS**

**Data Sets**                      Approximately 50 data bases

**Systems and  
Subsystems**                      Not known

**Products**                        Bibliographic citations

Textual information

Output directed to the terminal or printed off-line and sent to user

**Required  
Equipment**                        Terminal or personal computer

Modem

Printer (optional)

Emulation and/or communications software (if applicable)

**Access**                            Registration for use of system initiated through telephone call or letter to Pergamon InfoLine; Federal Government agencies can apply through FEDLINK

Access provided by GTE Telenet and Tymnet in the United States, and by DATAPAC in Canada

System available 18 hours per day, 3:00 a.m. to 9:00 p.m. Eastern Time, 7 days per week

Documentation, training, and consultation services available

Costs based on connect time per hour to a data base

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**PERGAMON INFOLINE**

Pergamon InfoLine provides on-line access to information on patents, manufacturing technology, engineering, health and safety, biosciences, business, chemistry, mining, and construction. The system comprises approximately 50 data bases.

**DATA SETS**

Of the 50 data bases, those most directly related to environmental and space-related science are itemized below according to descriptive name, file name, and coverage. Users can secure a complete list of available data bases directly from Pergamon InfoLine. A sample record is given in Figure 1.24-1.

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ACN: JA:83 UP:8508 (PIN:6300833)

TTL: Dimension control of Space Shuttle tiles during manufacturing

AUT: Fitchett B T J

REF: DT:A JN:Ceram Eng Sci Proc

CI: 4(7-8) 578-90  
CO:CESPDK PY:83

DES: CT:Refractories; Production Processes and Equipment; Tile; Spacecraft; Quality Control

ABS: Ceramic-tile dimensional changes that occur during the coating-glazing cycle require precise machining offsets to meet tolerance requirements. Development of tile matching-offset equations for simple geometries, implementation during manufacture, and dimensional yields obtained for the first 3 Shuttle orbiters are discussed.

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**Figure 1.24-1. Sample Record from CERAB**

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- **Analytical Abstracts (ANABS):** A bibliographic reference data base that covers literature published all over the world on all aspects of analytical chemistry, including organic, inorganic, biochemical, pharmaceutical, environmental, and agricultural, as well as general analytical chemistry, apparatus, and techniques.
  - **Aqualine (AQUALINE):** Reference data base covering worldwide literature on water resources and supplies, water quality, monitoring and analysis of water and wastes, low cost technology, water treatment, industrial effluents, sewage, effects of pollution, and underground services and water use.
  - **Ceramic Abstracts (CERAB):** CERAB covers all scientific, engineering, and commercial literature pertaining to ceramics and related materials, including processing and manufacturing aspects.
  - **Chemical Business NewsBase (CBNB):** A file of news summaries and related factual items covering trends and current affairs in the chemical industry and its end markets, including information on companies that produce and use chemicals, the amount produced and used, plant capacities, economic factors, and trends in supply and demand.
  - **Chemical Engineering Abstracts (CEA):** A reference data base covering worldwide scientific and technical literature in chemical engineering, including process, mechanical, civil, electrical, and instrumentational engineering aspects.
  - **Chemical Hazards in Industry (CHI):** A reference data base covering worldwide literature on hazards likely to be encountered in chemical and allied industries, including fires and explosions, waste management and storage, biological effects, safety of chemicals, and legislation.
  - **Compendex (CMPX):** A reference data base covering worldwide literature in all disciplines of engineering technology and applied science.
  - **COMPUTERPAT (COMPAT):** A reference data base covering all U.S. patents issued for digital data processing systems hardware.

- 
- **Current Awareness in the Biological Sciences (CABS):** A reference data base covering worldwide literature in biological sciences, including biochemistry, cell biology, genetics, microbiology, ecology, plant science, pharmacology, physiology, immunology, and toxicology.
  - **Current Biotechnology Abstracts (CBA):** A reference data base covering worldwide scientific, technical, and commercial literature in biotechnology, including legal and safety issues, pharmaceuticals, energy production, food, and agriculture.
  - **Directory of American Research and Technology (DART), formerly Industrial Research Laboratories:** A directory data base listing research and development facilities of industrial organizations in the United States, including nonprofit and privately financed firms carrying out research and development in support of industry with names of key personnel, addresses, details of staffing, and areas of research.
  - **Electronic Publishing Abstracts (EPA):** A reference data base covering worldwide literature dealing with electronic publishing and information technology, particularly the machine readable input, transmission, storage, and retrieval of text and images as an alternative to publication of printed documents.
  - **Fine Chemicals Directory (FCD):** A directory of sources of commercially available research chemicals, including catalogs from more than 50 international chemical suppliers.
  - **GeoMechanics Abstracts (GMA):** A reference data base covering worldwide literature on rock mechanics, soil mechanics, and engineering geology, including properties, hydrogeology, mining, slope stability, improvement techniques, and testing.
  - **HSELINE (HSELINE):** A reference data base covering worldwide literature on the health and safety aspects of manufacturing industries, agriculture, production, occupational hygiene, explosives, engineering, mining, nuclear technology, and industrial air pollution.
  - **Laboratory Hazards Bulletin (LHB):** A reference data base covering worldwide literature on hazards likely to be encountered by workers in chemical and biochemical research laboratories, including hazardous chemicals and reactions, new safety precautions, legislation, and biological hazards.
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- 
- **Mass Spectrometry Bulletin (MSB):** A reference data base of worldwide literature in mass spectrometry, including instrument design and techniques, isotopic analysis, chemical analysis, organic chemistry, atomic and molecular processes, surface phenomena, solid state studies, thermodynamics, and reaction kinetics.
  - **Pesticide Databank (PESTMAN):** A directory data base of agricultural, horticultural, veterinary, industrial, and domestic chemicals used worldwide to combat undesirable living organisms, including nomenclature and development, properties, toxicology, uses, analysis, and formulations.
  - **RAPRA Abstracts (RAPRA):** A reference data base covering worldwide literature on all aspects of the rubber and plastics industries, including hazards and toxicology, environmental effects, products, applications, processes, synthesis, and testing.
  - **Safety Science Abstracts (SAFETY):** A bibliographic reference data base that covers literature published all over the world in the broad, interdisciplinary science of safety, including industrial safety, environmental concerns, medicine, and product liability.
  - **World Surface Coatings Abstracts (WSCA):** A reference data base covering worldwide literature on all aspects of the paint and surface coatings industries, including synthetic resins, adhesives, corrosion, testing, polymers, hazards, solvents, storage, transport, marketing, and legislation.
  - **Zinc, Lead, and Cadmium Abstracts (ZLC):** A reference data base covering worldwide literature on all aspects of the production, properties, and uses of zinc, lead, and cadmium, their alloys, and compounds. Economic, environmental, and health issues are included.

**SYSTEMS AND  
SUBSYSTEMS**

Not known

**PRODUCTS**

Output is directed to the terminal or printed off-line and sent to the user.

- Bibliographic citations
- Textual information

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**REQUIRED  
EQUIPMENT**

To access the system, a user needs the following:

- Terminal -- any ASCII
- Modem (300-1200 bps)
- Printer (optional)
- Emulation and/or communications software (if applicable).

**ACCESS**

The information given below indicates access requirements and services pertinent to Pergamon InfoLine.

**Pergamon  
InfoLine Account**

To become registered for use of the system, a potential user should call or write Pergamon InfoLine and request an order form. Within 5 working days upon receipt of the completed form at Pergamon, information on the system and a password will be sent to the user. Federal Government agencies can apply through FEDLINK by calling (202) 287-6454.

**Means of Access**

Access is provided by GTE Telenet and Tymnet in the United States, and by DATAPAC in Canada.

**System  
Availability**

The system is available 18 hours per day, 3:00 a.m. to 9:00 p.m. Eastern Time, 7 days per week.

**Documentation**

A Complete InfoLine User Guide is available, as is documentation on each data base and data base search aids.

**Consultation**

If a user has problems while searching or has questions concerning commands, data bases, or search strategy, he or she should contact the Help Desk, available Monday through Friday, 8:30 a.m. to 5:30 p.m., Eastern Time. The telephone numbers are as follows:

- United States toll-free: (800) 336-7575
  - District of Columbia and Virginia: (703) 442-0900
  - Canada: (416) 497-8337.
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**Training**

Subject specific training courses are provided regularly throughout the year to give an introduction to searching the data bases on InfoLine. In addition to the scheduled courses, 1-day inhouse training sessions can be customized to an organization's needs.

**Cost**

There is no sign-up or subscription fee. The user pays for connect time to a data base at prices ranging from \$12 to \$198 per hour. Display, off-line print, and telecommunication charges are extra.

**FUTURE PLANS**

Not known

**ADDRESS**

Pergamon InfoLine, Incorporated  
1340 Old Chain Bridge Road  
McLean, Virginia 22101  
(703) 442-0900  
(800) 336-7575  
Telex 901811

Pergamon InfoLine, Ltd.  
12 Vandy Street  
London EC2A 2DE  
England  
Telephone 01 377 4650  
Telex 8814614

Pergamon Press Canada  
Suite 104  
150 Consumers Road  
Willowdale, Ontario  
M2J 1P9 Canada  
Telephone (416) 497-8337



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**QL SYSTEMS LIMITED FACTS**

**Data Sets** Over 80 Canadian data bases

Over 200 U.S. data bases

**Subsystems** QL/SEARCH

VU/TEXT

WESTLAW

QL/MAIL

**Products** Textual information

Bibliographic citations

Directed to terminal

Generated at QL Systems and sent to user

**Required** Terminal (any ASCII)

**Equipment**

Modem

Printer (optional)

**Access** System with bold user friendly and expert query techniques

QL Systems account required

Access provided by DATAPAC in Canada and GTE Telenet and Tymnet in the United States

Documentation, consultation, and training services available

Cost dependent on connection speed, length of access, and time of access

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**QL SYSTEMS LIMITED**

QL Systems is Canada's largest public information data bank. Components include QL/SEARCH, containing data bases of many disciplines; VU/TEXT, a newspaper data base; and WESTLAW, a legal information retrieval service. A mail service called QL/MAIL is also available to subscribers. Some QL data bases contain the full text of publications, others present abstracts, and still others reference titles.

**DATA SETS**

Of the nearly 300 data sets available from QL Systems, only a selected number from QL/SEARCH are of direct interest to environmental and space-related science. They can be categorized as follows.

● **Agriculture**

AST: Arctic Science and Technology

BNT: Boreal Northern Titles (index to News from the North)

GDOC: Guelph Documents (Government documents held by Guelph University)

CEN: Canadian Environment

ENV: Environment

YKB: Yukon Bibliography

● **Energy**

AOSI: Alberta Oil Sands Information

AST: Arctic Science and Technology

BNT: Boreal Northern Titles

COAL: IEA Coal

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ENG: Energy Projects  
ENS: Energy Nova Scotia  
HERI: Heavy Oil Enhanced Recovery

● Environment

ASB: Asbestos Information  
AST: Arctic Science and Technology  
BNT: Boreal Northern Titles  
CEN: Canadian Environment  
CHM: Canadian Hydrological Operational Multipurpose  
Subprogramme  
DEL: Delft Hydro  
DREF: Data Reference System  
ENV: Environment  
YKB: Yukon Bibliography

Information on the other data bases is available at QL Systems, the address of which is given at the end of this section.

**SUBSYSTEMS**

QL Systems comprises the subsystems identified below:

● QL SEARCH

- Has 90 data bases covering a wide range of topics
- Is designed for use by the layman
- Includes capability for complex Boolean searches
- Has user manuals and practice data bases available
- Has formal training courses available

- 
- VU/TEXT
    - Incorporates full text of 30 newspapers, periodical indexes, and stock market quotations
  - WESTLAW
    - Has over 100 law data bases
  - QL/MAIL
    - Is available to all QL customers
    - Provides on-line directory of participants.

**PRODUCTS**

Information derived from a QL Systems session can be directed to the user's terminal or printed off-line at QL and sent to the user for cost.

**REQUIRED  
EQUIPMENT**

The following equipment is used to access the system:

- Terminal (any ASCII)
- Modem
- Printer (optional).

**ACCESS**

QL Systems has both user friendly and expert query techniques. Information on access requirements and services is identified below.

**QL Systems  
Account**

Potential users must contact QL Systems and request a standard-speed connection (300-1200 bps) or a high-speed connection (4800 bps). The high-speed connection is available only in Calgary, Edmonton, Halifax, Montreal, Ottawa, Regina, Toronto, Vancouver, Victoria, and Winnipeg. After the contract has been signed and payment received, QL Systems issues each user a password and search manual.

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Means of Access

Dial-up access is provided by DATAPAC in Canada and GTE Telenet and Tymnet in the United States.

System Availability

QL Systems is available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

Documentation

QL/Search Mini Manual is provided free of charge to each customer. Available for purchase is QL/Search User's Manual, several other user manuals, and application-specific indexes.

Consultation

Users can receive information on use of the system by calling the following telephone number: 1-800-267-9470.

Training

Several practice data bases are available for customer use at any time at a cost of \$10.00 per hour. In addition, QL schedules training sessions regularly throughout the year at various locations in Canada. It will also conduct private half-day training sessions for up to three persons per terminal.

Cost

The cost of using QL Systems depends on connection speed, length of access, and time of access. The high-speed connection has a \$90.00 per week minimum use requirement. Information on charges for the use of each subsystem is given in the QL/Search Catalogue: Data Bases and Services, and is also available upon request at the address and telephone number given below.

FUTURE PLANS

Not known

ADDRESS

QL Systems Limited  
2021 Brunswick Street  
Suite 430  
Halifax, Nova Scotia B3K 2Y5  
(902) 429-3725

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**SDC ORBIT FACTS**

**Data Sets** Over 70 data bases containing more than 55 million citations

**Products** Directed to terminal  
Printed off-line and sent to user

**Required Equipment** Terminal (any ASCII)  
Modem (300-1200 bps)  
Printer (optional)  
Emulation and/or communications software (if applicable)

**Access** An account with SDC required prior to use  
Access provided by GTE Telenet and Tymnet  
System available 24 hours per day, 7 days per week  
Documentation, training, and consultation services available  
Rates determined according to computer connect time

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SYSTEM DEVELOPMENT CORPORATION ORBIT SEARCH SERVICE

The ORBIT Search Service of System Development Corporation (SDC) provides access to over 70 data bases in the general subject categories of business and economics, chemistry, energy and environment, engineering and electronics, Government and legislation, industry, multidisciplinary fields, patents, science and technology, and the social sciences. The data bases contain over 55 million citations.

DATA SETS

The data bases most directly relevant to environment and space-related sciences are listed below. Users desiring a list of the more than 70 data bases available should contact SDC.

- **APILIT:** covers worldwide refining literature, including petroleum refining, petro-chemicals, air and water conservation, transportation and storage, and petroleum substitutes.
- **BIOTECHNOLOGY:** provides coverage of all technical aspects of biotechnology, from genetic manipulation and biochemical engineering to fermentation and downstream processing; also covers industrial use of micro-organisms, inplant breeding, cell hybridization, industrial waste management, and related fields.
- **CAS82/CAS77/CAS72/CAS67:** provides worldwide coverage of the chemical sciences literature from over 12,000 journals, patents from 26 countries, new books, conference proceedings, and Government research reports.
- **CASSI (Chemical Abstracts Source Index):** compiles bibliographic and library holdings information for scientific and technical primary literature relevant to the chemical sciences.
- **CEH80/CEH132/CEHINDEX:** provides annual supply/demand and price data for many of the 1300 major commodity and specialty chemicals, chemical groups, chemical-related industries, and U.S. economic indicators covered in the Chemical Economics Handbook.

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- CHEMDEX/CHEMDEX2/CHEMDEX3: function as chemical dictionary files specifying all compounds cited in the literature from 1972 to date; serve as companion files to the Chemical Abstracts data bases.
  - COLD: covers all disciplines dealing with Antarctica, the Antarctic Ocean, and subantarctic islands; snow, ice, and frozen ground; navigation on ice; civil engineering in cold regions; and behavior and operation of materials and equipment in cold temperatures.
  - COMPENDEX: covers worldwide significant engineering literature from approximately 3,500 sources (including journals, monographs, technical reports, and standards); covers aerospace engineering, bioengineering, chemical engineering, civil engineering, construction materials, control engineering, electrical engineering, electronics and communications engineering, engineering geology, marine engineering, mining engineering, nuclear technology, and petroleum engineering.
  - CORROSION: contains data on the effects of over 600 agents on the most widely used metals, plastics, non-metallics, and rubbers over a temperature range of 40° to 560° Fahrenheit.
  - CRDS (Chemical Reactions Documentation Service): provides up-to-date information on new developments in the field of synthetic organic chemistry; based on the monthly Journal of Synthetic Methods.
  - DBI (Data Base Index): functions as the master index to all ORBIT Search Service data bases; used as a selection tool to obtain a list of appropriate data bases on a given subject.
  - EBIB: covers worldwide literature on energy from the Texas A&M Library collection.
  - EIMET (EI Engineering Meetings): functions as a companion file to COMPENDEX; covers significant papers from published proceedings of engineering and technical conferences, symposia, meetings, and colloquia from over 40 different countries.
  - ENERGYLINE: screens over 2,000 journals, as well as reports, surveys, monographs, conference proceedings, and irregular serials, to provide comprehensive coverage of energy information.
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- **ENVIROLINE:** provides coverage of air environment, environmental health, land environment, resource management, and water environment.
  - **EPIA (Electric Power Industry Abstracts):** provides access to literature on electric power plants and related facilities.
  - **FEDREG (Federal Register):** includes rules, proposed rules, public law notices, meetings, hearings, and Presidential proclamations on subjects including agriculture, arts and humanities, athletics, business, constitutional rights, consumer affairs, contracts, defense, environment, foreign affairs, law enforcement, parks/recreation, taxation, technology, trade, transportation, and veterans' affairs.
  - **FOREST:** covers worldwide literature pertinent to the entire wood products industry, from harvesting the standing tree through marketing the final product.
  - **GEOREF (Geological Reference):** covers geo-sciences literature from 3,000 journals, plus books, conference proceedings, Government documents, maps, and theses; subjects include geology, economic geology, engineering environment geology, geochemistry, geochronology, geomorphology, igneous and metamorphic petrology, solid earth physics, and stratigraphy.
  - **GRANTS:** contains references to grant programs offered by Federal, State, and local Government, commercial organizations, and private foundations in over 88 disciplines.
  - **INSPEC/INSPEC6976:** provides worldwide coverage of the literature in physics, electrical and electronics engineering, and computers and control.
  - **LC/LINE,LC/PRE84:** provides extensive coverage of the monographic literature, serials, maps, manuscripts, and other materials cataloged by the U.S. Library of Congress, as well as CONSER and National Library of Canada publications.
  - **MDF/I (Metals Information Designations and Specifications):** provides designation and specification numbers for ferrous and non-ferrous metals and alloys, composition, forms, and applications, manufacturers, element concentrations, physical properties, including condition, tensile strength, yield point, shear and impact strength, hardness, fatigue life, density, specific heat, melting temperature, conductivity, etc.
-

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- **METADEX:** provides international literature on metals and alloys concerning the following topics: processes, properties, materials classes, applications, specific alloy designations, intermetallic compounds, and metallurgical systems.
  - **NTIS-NTIS6476:** covers U.S. Government-sponsored research and development from over 200 Federal agencies; includes technical reports, some reprints, federally sponsored translations, and foreign-language reports in areas of major technical interest.
  - **ORBCHM/ORBPAT:** assist CROSSFILE searching of chemical and patents data bases.
  - **PIE (Pacific Islands Ecosystems):** contains biological, ecological, physical, and socioeconomic information on the Pacific islands, including the Hawaiian Islands, American Samoa, Guam, Trust Territory of the Pacific Islands, and other Pacific islands under U.S. jurisdiction or claimed by the United States.
  - **POWER:** consists of catalog records for books, monographs, proceedings, and other material in the book collection of the Energy Library, U.S. Department of Energy; a collection particularly strong in general works on energy, physical and environmental sciences, technology, economics, renewable energy resources, and water resources.
  - **TROPAG:** covers worldwide literature on tropical and subtropical agriculture, including crop production, crop protection, fertilizers and soils, plant nutrition, agricultural techniques, crop processing and storage, sociology, economics, and commercial statistical information; also covers animal husbandry, inland fisheries, forestry, human nutrition, and public health.
  - **TSCA (Toxic Substances Control Act) PLUS:** lists chemicals in the TSCA initial inventory of 1976, plus additions as of 1981, and includes Plant and Production data exclusive to SDC; chemical records include molecular formula, registry number, chemical name, synonyms, and data on manufacturers, amount produced, and use.
  - **USGCA:** provides access to more than 39,000 contracts awarded by the Federal Government and its agencies to both public and private sectors; award information includes descriptive title, subject category, funding, awardee name and location, date of award, granting agency, and contract and RFP number.
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**SUBSYSTEMS**

There are no subsystems.

**PRODUCTS**

Information from an ORBIT search can be directed to a user's terminal or be printed off-line and sent to the user.

**REQUIRED  
EQUIPMENT**

To access the system, a user needs the following:

- Terminal (any ASCII)
- Modem (300-1200 bps)
- Printer (optional)
- Emulation and/or communications software (if applicable).

**ACCESS**

Access to the ORBIT Search Service is available throughout the world. The information itemized below specifies access requirements and services.

**SAIC ORBIT  
Account**

Potential users in the United States should contact SDC Information Services by telephone or mail and request copies of the "Getting Started" packet. Upon returning the enclosed forms, the user will be assigned an identification number and information needed to begin using the system. Non-U.S. users should contact the nearest SDC affiliated offices for information about local procedures and costs.

**Means of Access**

Access is provided by GTE Telenet and Tymnet.

**System  
Availability**

The system is available 24 hours per day, 7 days per week.

**Documentation**

Each new subscriber is given a descriptive catalog with information on all ORBIT data bases and a publication list for ordering specific reference and data base manuals.

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Consultation

The telephone numbers for the Customer Service Action Desks, where the user can refer questions, are as follows:

- (800) 421-7229 (toll-free in continental United States)
- (800) 352-6689 (toll-free in California)
- (213) 453-6194 (collect from Canada).

Figure 1.26-1 identifies the SDC Information Services' Offices.

Training

A variety of regional training workshops are offered regularly at SDC facilities and at other major U.S. cities. For specific training dates, a user can refer either to the printed training schedules available from SDC, enter EXPLAIN TRAINING on-line, or call a local Customer Service Action Desk.

Cost

No installation or subscription fees are associated with use of the system. Each data base has a connect fee ranging from \$35 to \$142 per hour. To determine computer connect costs for a data base, a user can check the price list included in the ORBIT Search Service Database Catalog, made available by SDC. Off-line print charges are extra, as are telecommunications charges, which are usually between \$8 and \$10 per connect hour.

FUTURE PLANS

Not known

ADDRESS

SDC Information Services  
2500 Colorado Avenue  
Santa Monica, California 90406  
(213) 453-6194

**West Coast**  
(Headquarters)

2500 Colorado Avenue  
Santa Monica, CA 90406  
(213) 453-6194 (collect  
calls accepted from  
Canada)  
(213) 820-4111, x6194  
(800) 421-7229 (toll-  
free in the conti-  
nental U.S. outside  
California)  
(800) 352-6689 (toll-  
free in CA)  
Telex:65-2358  
TWX:(910) 343-6443

**East Coast**

7929 Westpark Drive  
McLean, VA 22101  
(703) 790-9850 (collect  
calls accepted from  
Canada)  
(800) 336-3313 (toll-  
free outside Virginia)

**Australia**  
SDC Information Services

30 Alfred Street  
(P.O. Box 439)  
Milsons Point  
NSW 2061  
Australia  
(02)922-9308  
(02)922-9302  
(008)226-474 (toll-free  
in Australia)  
Telex: BURAD AA 23015

**Japan**

SDC of Japan, Ltd.  
Nishi-Shinjuku Showa Bldg.  
1-13-12, Nishi Shinjuku  
Shinjuku-Ku  
Tokyo 160, Japan  
(03)349-8520  
(03)349-8528  
Telex: 2322262 SDCJJ

**Europe**

SDC Information Services  
Bakers Court, 4th Floor  
Baker Road  
Uxbridge  
Middlesex UB8 1RG  
United Kingdom  
(0895)37137  
Telex:8958961

**Representatives**  
Barroslearn

Rua 24 de Maio 62-5.0  
Caiza Postal 6182  
Cep. 01000  
Sao Paulo, SP  
Brazil  
(011)223-6011  
Telex:01131770 PBAS BR

For Singapore, Malaysia,  
Brunei, Hong Kong,  
Thailand, and Indonesia:

Integrated Information  
PTE Ltd.  
Marketing Department  
456 Alexandria Road  
18-00 NOL Building  
Singapore 0511  
(65)278-9811  
Telex: RS 37071

**Figure 1.26-1. SDC Information Services' Offices**

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## SUPERCOMPUTER FACILITIES

The supercomputer facilities are divided into three subgroups based on their relationships to the National Science Foundation (NSF). The first group comprises the NSF National Supercomputer Centers (Phase II), which were established to provide supercomputing support to U.S. researchers. The second subgroup consists of the NSF Resource Centers (Phase I). Originally, NSF purchased cycles from these existing supercomputer centers as an interim measure until the National Centers became operational. Funding for the Resource Centers was to be phased out as the National Centers became operational. However, because of the success of the Resource Centers and the high demand for supercomputer cycles, NSF will continue funding the Resource Centers, although the participating sites are subject to change. The third subgroup contains supercomputer centers that do not provide allocations through NSF.

Table 2.1-1 identifies the supercomputer facilities discussed in this section according to the order in which they are considered. Table 2.1-2 summarizes the information collected on these facilities. The questionnaire used to collect the data is given in Appendix B.

This section has been designed to highlight key information and to facilitate cross referencing of supercomputer capabilities. For these reasons, the same format is used to discuss each facility.

## **Table 2.1-1. Supercomputer Facilities Surveyed**

### **NSF National Supercomputer Centers (Phase II)**

- Cornell Theory Center (CTC)
- John von Neumann Center for Scientific Computing
- National Center for Supercomputing Applications (NCSA)
- Pittsburgh Supercomputer Center (PSC)
- San Diego Supercomputer Center (SDSC)

### **NSF Resource Centers (Phase I)**

- Digital Productions
- Minnesota Supercomputer Institute (MSI)
- Purdue University Computing Center (PUCC)
- University Computer Center (UCC at Colorado State University)

### **Other Supercomputer Centers**

- Advanced Computational Methods Center (ACMC at the University of Georgia)
- Boeing Computer Services Data Center (BCS)
- Florida State University Computing Center (FSUCC)
- Murray Hill Computation Center (MHCC) at AT&T Bell Labs
- NASA Space and Earth Sciences Computing Center (NASA Goddard)
- National Magnetic Fusion Energy Computer Center (NMFEECC)
- National Center for Atmospheric Research (NCAR)
- Numerical Aerodynamics Simulation (NAS)

Table 2.1-2. Supercomputer Facilities

Supercomputer Facility	Configuration		Software						Communications			Job Submission	
	Machine	Operating System	Languages	Utilities	Math/Stat	Graphics	Applications	Other	Public Network	Research/ Science Networks	Other	Interactive	Batch
<b>NSF National Centers (Phase II)</b>													
Cornell Theory Center	IBM 3090	VM/CMS	*	*	*	*	*	*	1	3	2	*	*
John Von Neumann Center	Cyber 205	VSOS 2.2	1	7	5	7	7	JVNCPOOL	0	2	3		*
NCSA (Univ. of IL)	CRAY X-MP/24	CTSS	2	2	4	2	0	0	1	2	5	*	*
Pittsburgh SC	CRAY X-MP/48	COS	3	7	2	2	1	0	1	3	0		*
San Diego SC	CRAY X-MP/48	CTSS	6	7	13	9	45	7	1	3	2	*	*
<b>NSF Resource Centers (Phase I)</b>													
Digital Productions	CRAY X-MP/22	COS 1.14	4	7	1	7	3	DP3D	0	0	2		*
Minnesota Super-computer Institute	CRAY 2 CRAY 2 Cyber 205	UNIX UNIX VSOS	4	2	17	6	9	0	1	1	4	*	*
Purdue Univ. CC	Cyber 205	VSOS 2.1.6	4	8	9	4	4	0	1	2	2		*
UCC (Colorado State)	Cyber 205	VSOS 2.1.6	8	7	18	7	8	3	1	1	2		*
<b>Others</b>													
ACMC (Univ. of GA)	Cyber 205 Cyberplus	VSOS 2.1.6 7	4	12	23+	5+	2	0	0	0	2		*
Boeing Computer Services	CRAY X-MP/24	COS 1.12	10	24	2	9+	162	25+	0	0	1		*
Florida State	Cyber 205	VSOS 2.2	6	2	12	2	0	0	1	2	2		*
MHCC (AT&T Bell Labs)	CRAY X-MP/24	UNIX 5.2	8	3	12	3	1	5	1	0	1	*	*
NASA Space and Earth Sci. CC	Cyber 205	VSOS	7	7	2	3	0	0	1	3	2		*
National Magnetic Fusion Energy CC	CRAY 1 CRAY 1S CRAY X-MP/22 CRAY 2	CTSS CTSS CTSS CTSS	*	*	*	*	*	*	1	2	2	*	*
National Center for Atmospheric Research	CRAY X-MP/48 CRAY 1A	COS 1.15 COS 1.15	*	*	*	*	*	*	1	0	2		*
Numerical Aerodynamics Simulation	CRAY 2	UNIX V	*	*	*	*	*	*	1	1	1	*	*

1. Allocations by NSF; no charge to user 2. Cost based on utilization of resources (i.e., CPU, I/O, storage, etc.) 3. Allocations by NASA, no charge to user 4. Allocations by DOE, no charge to user

FOLDOUT FRAME

2 FOLDOUT FRAME



Access									
Accessibility		Allocations		Availability		User Service			Cost
Open	Restricted	NSF	Other	24 Hours/Day	< 24 Hours/Day	Documentation	Consultation	Training	(See Footnotes)
.		.	.	.		.	.	.	1, 2
.		.	.	.		.	.	.	1, 2
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35%	65%		.	.		.	.	.	2, 4
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.			.	.		.	.	.	2
	.		.	.		.	.	.	3

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CORNELL THEORY CENTER FACTS

**Configuration**      IBM 3090-400 VF  
                         IBM 4381  
                         4 FPS 264 SPs  
                         2 FPS 164 SPs  
                         1 FPS 164 SP w/MAX Board  
                         Gould 9050  
                         4 Graphics Hubs

**Software**            Language processors  
                         Programming utilities  
                         Mathematics/Statistics libraries  
                         Graphics libraries/packages  
                         Applications packages

**Communications**    ARPANET  
                         NSFnet  
                         BITNET  
                         800 dial-up lines  
                         Smart nodes  
                         NYSERNet

**Access**              Allocations made by the National Science Foundation and  
                         Cornell University

                         Center systems available 24 hours per day, 7 days per week,  
                         except for Monday from 2:00 a.m. to noon and Wednesday from  
                         6:00 a.m. to noon

                         Documentation, consultation, and training available

                         Cost based on amount of Service Units used; free to  
                         researchers submitting proposals for time to NSF or Center

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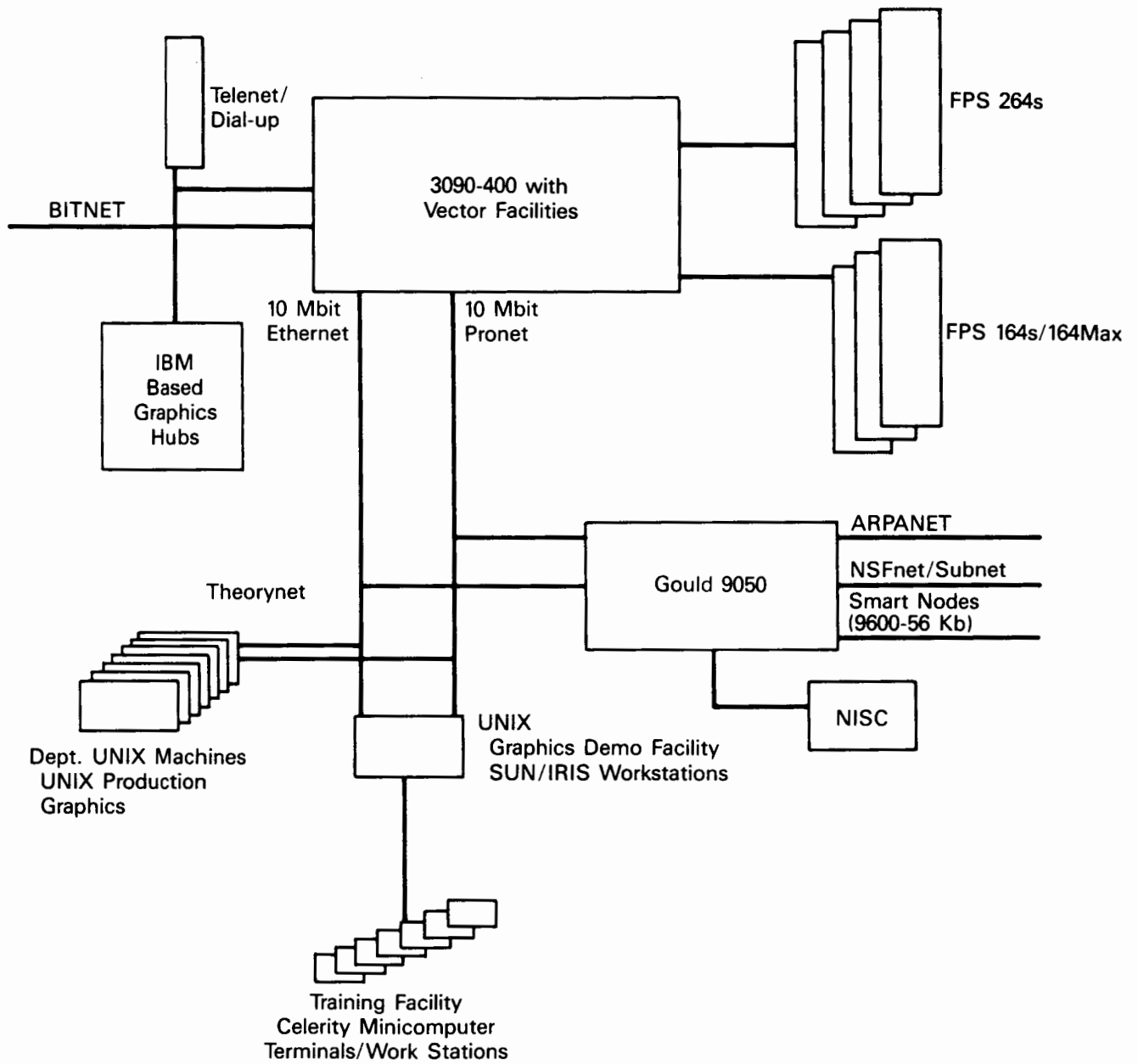
## CENTER FOR THEORY AND SIMULATION IN SCIENCE AND ENGINEERING

The Center for Theory and Simulation in Science and Engineering at Cornell University (Cornell Theory Center [CTC]) is developed around two supercomputing programs. The Production Supercomputer Facility (PSF) provides super computing resources for current research activities, and The Advanced Computing Facility is developing highly parallel processing technologies to meet the anticipated super-computing needs of the 1990's and beyond. The Cornell Theory Center is one of five National Science Foundation (NSF) National Supercomputing Centers.

### CONFIGURATION

The PSF, illustrated in Figure 2.2-1, consists of an IBM 3090 mainframe attached to seven FPS Scientific Processors. Some hardware specifications follow:

- IBM 3090
  - Number of processors: 4
  - Memory:  $128 \times 10^6$  bytes, plus  $512 \times 10^6$  bytes of extended memory
  - Local disk storage:  $105 \times 10^9$  bytes
  - Peak speed:  $432 \times 10^6$  flops
  - Operating system: VM/XA
- Scientific Processors (SP)
  - 4 FPS 264 SP
    - Memory:  $2 \times 10^6$  64-bit words
    - Local disk storage:  $650 \times 10^6$  bytes
  - 2 FPS 164 SP
    - Memory:  $2 \times 10^6$  64-bit words
    - Local disk storage:  $405 \times 10^6$  bytes



**Figure 2.2-1. Cornell Theory Center Production Supercomputer Facility/Network**

- 
- 1 FPS 164 SP w/MAX Board
  - Memory:  $2 \times 10^6$  64-bit words
  - Local disk storage:  $650 \times 10^6$  bytes
  - IBM 4381
  - Gould 9050 (network front-end)
    - Operating system: VTX/321.3 (based on Berkeley 4.3 UNIX)
  - Graphics Hubs, a collection of peripheral devices in four campus locations consisting of the following:
    - IBM 5080 work station w/dedicated 3179 (AT/GX)
    - Two IBM 3270-PC/GX (AT/GX) work stations
    - One PC-AT
    - Two 3179-G terminals
    - Matrix QCR Digital camera w/35 mm slide capacity (one hub only)
    - IBM 3290 Display
    - IBM 4250 Erosion Printer
    - IBM 3812 Page printer
    - IBM 7375 Drafting Plotter.

**SOFTWARE**

The following software is available on the PSF:  
(Note: software is continually added)

- ACRITH
- APAL64
- APDBG64
- APFTN64
- APLINK64
- APL2
- APM
- APMATH64
- ARCHIVER
- BSPLINE

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- CDPF (4250)
  - Composition Facility
  - CDF (=SCRIPT/VS)
  - DI-TEXTPRO
  - DI-3000
  - DVI4250 (TEX4250)
  - EISPACK
  - Elem Math Library
  - FMSLIB
  - FUNPACK
  - GAM (Graph Access Meth)
  - GDDM
  - GRAFMAKER
  - Graph Data & Query Facil
  - HASM
  - IMSL
  - ISPF/Program Devl. Facil.
  - KERMIT
  - LINPACK
  - LISP/VM
  - Math Formula Formatter
  - Math Pgm Sys Extended/370
  - MATLAB
  - METAFILE TRANSLATOR
  - MINPACK-1
  - NAG Library
  - PASCALVS
  - PLI Optimization Compiler
  - PROLOG
  - QUADPACK
  - SAS GRAPH
  - SETL
  - SJE
  - SPARSPAK
  - SSORT
  - TEX
  - The Contouring System
  - TWODEPEP
  - VMBATCH
  - VMTAPE.
-

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COMMUNICATIONS

Access to CTC can be made through the following:

- ARPANET: 56 kbps link to sites on the Defense Data network
- NSFnet: node on 56 kbps backbone
- BITNET: VMBatch jobs and mail; passthrough
- NYSERNet: Node on 56 kbps Regional network
- Public dial-up lines: 1200 bps, 2400 bps, and 9600 bps
- Smart Nodes: clusters of remote users with various access capabilities (call Linda Morris at 607-255-8686 for additional information).

ACCESS

Access requirements and services are identified below.

Allocation

Requests for time on the PSF should be submitted to the NSF, which allocates 60 percent of the available time. The CTC will allocate startup time to those waiting to hear from NSF and extra time to those who need time in excess of that granted by NSF. For further information, contact Ms. Linda Morris at (607) 255-8686 or Ms. Irene Lombardo at the NSF Office of Advanced Scientific Computing at (202) 357-7558.

Corporate interaction with the CTC is accomplished, in part, through the CTC Research Institute. This program provides a vehicle for corporate researchers to work in cooperation with Cornell faculty members on a variety of discipline-specific and interdisciplinary topics. Further information on participation through the Research Institute is available from Linda Morris at (607) 255-8686.

The PSF supports five priorities, levels 4 through 8. All remote log-ins default to priority 6. Users wishing a higher (lower) or lower (higher) number must establish the desired priority at log-in.

System  
Availability

The PSF is available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

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Documentation

On-line assistance is available by typing HELP, followed by the command in question. In addition, an on-line bulletin board called Cuinfo is generated on a regular basis.

Documentation available from CTC includes PSF user information, a CMS Primer, UNIX documents, and a full complement of IBM and FPS manuals.

CTC publications include a monthly newsletter called Forefronts and information sheets called "Hot Tips." The CTC also publishes various technical reports and research abstracts.

Consultation

Consulting is available from 8:00 a.m. to 6:00 p.m. Eastern Standard Time on weekdays at (607) 255-9400. Consultants come from the various departments on campus and, thus, offer a wide range of expertise. Consulting is also offered over electronic mail.

Training

Training workshops are offered each semester, as well as during the summer. Those interested in obtaining further information should contact Ms. Elizabeth Schermerhorn at (607) 255-3985.

The CTC Training Facility houses a color graphic work station and 6 terminals for extensive hands-on training and orientation. Future plans include upgraded work stations.

Cost

The cost of using the PSF is based on the amount of Milliservice Units (MSU) used. One Service Unit (SU) is equivalent to 1 hour of CRAY X-MP Central Processing Unit (CPU) time, 5 hours on an FPS 264, 20 hours on an FPS 164, or 20 hours on an IBM 3081, and it costs \$1,000. The amount of MSU's used for a given application is a function of CPU utilization, storage, I/O operations, priority, and user class.

FUTURE PLANS

Not known



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**ADDRESS**

Center for Theory and Simulation in  
Science and Engineering  
Cornell University  
265 Olin Hall  
Ithaca, New York 14853-5201  
(607) 255-8686



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## JOHN VON NEUMANN CENTER FOR SCIENTIFIC COMPUTING

The Consortium for Scientific Computing has contracted with the National Science Foundation (NSF) and the State of New Jersey to develop and operate a National Supercomputing Center. The center, located near Princeton University, is named for John von Neumann, who built the first digital electronic computer in the United States at the Institute for Advanced Study and was one of the great mathematicians of the century.

The center will provide state-of-the-art computing and communications to university, Government, and industrial researchers. The initial 13-member campuses of the Consortium represent a major resource of computer science ability to support the service as well as an internationally renowned community of scientists in every field who will be major users of the system. The von Neumann Center will develop and install a high speed network to the campuses. The NSF is also building a national network running at 56 kb to link all the supercomputer centers and many campuses.

Participating institutions are as follows:

- Brown University
- Columbia University
- Harvard University
- Institute for Advanced Study
- Massachusetts Institute of Technology
- New York University
- Pennsylvania State University
- Princeton University
- Rutgers University
- University of Arizona
- University of Colorado
- University of Pennsylvania
- University of Rochester.

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## CONFIGURATION

The system comprises the hardware identified below:

- Cyber 205
  - Number of pipelines: 2
  - Memory:  $4 \times 10^6$  64-bit words
  - On-line storage:  $10 \times 10^9$  bytes
  - Peak speed:  $800 \times 10^6$  flops
  - Operating system: VSOS 2.2 (Virtual Storage Operating System)
- VAX 8600 (front end)
  - Number of processors: 4
  - Memory:  $4 \times 10^6$  32-bit words
  - On-line storage:  $40 \times 10^9$  bytes
  - Operating system: VMS 4.3
- Graphics Hardware
  - SUN work station
  - 2 electrostatic plotters
  - Laser printer
  - 42-inch 16-color laser printer
  - DICOMED film recorder (Rochester)
- Peripherals
  - CYBER 205: 6 Dual Density, 200 IPS (inches per second), 1600/6250 BPI (bits per second) tape driven
  - VAX 860: 8 Dual Density, 125 IPS, 1600/6250 BPI tape driven.

## SOFTWARE

The languages available on the CYBER 205 are as follows:

- FORTRAN FTN200 (CDC's FORTRAN-77 with vector extensions)
    - General-purpose programming language, especially for utilities
    - Vectorising version to be obtained from Florida State University
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- Mathematical Software

- IMSL: International Mathematical and Statistical Library (versions of routines vectorised by Purdue are installed)
- NAG: Numerical Algorithms Group library
- MAGEV: Vectorised Mathematical routines
- LINPACK: Linear Systems routines
- ITPACK: Sparse Linear Systems
- Current list of libraries accessible as a group in JVNCPool.

The VAX 8600s operate under the VMS system. This is fully interactive, and a new user is led through a series of exercises and procedures right from the point of log-in. The HELP utility also gives on-line descriptions of communications, use of magnetic tapes, and all the commands to submit and debug jobs on the CYBER 205. The PEP (Procedures for Executing Programs) commands generate batch commands for the VSOS operating system on the 205.

The CYBER software is designed to run in a local batch environment with local 132 column printers as the output medium. Utilities have been written to reformat some of this output for remote viewing on a network. Several text editors are supplied, EMACS being the most widely known screen-oriented editor outside the UNIX world. The others are the DEC products, EVE and EDT, which work well with DEC VT220/240 terminals.

The primary services offered on the VAX 8600s are text editing, job submission to the 205, graphics editing, printing, and plotting; and electronic mail and conferencing. Users are discouraged from running scientific applications on these machines. LISP, the symbolic programming language, is available on the 8600s.

## COMMUNICATIONS

Networking with TCP/IP protocol is an integral part of the UNIX system. Communications at 1 Mb in office environments is commonplace, and Ethernet local networking at 10 Mb is widely used. Use of these capabilities over T1 transmission lines has still required a sustained development effort at

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the von Neumann Center. The University of Rochester is served by a 56 kb line, and the Universities of Arizona and Colorado are served by satellite at 56 kb. The present dial-up facilities and links to other networks will be maintained to serve new users for whom such high speed communications are not available. Additional networks providing access are ARPANET, NSFnet, and some 800-numbers.

Dial-up communications are supported by a variety of well-known packages used on personal computers: KERMIT, MACX, and XMODEM. These are run on 2400 baud error correcting modems to give reliable dial-up. Running at 10000 baud on Telebit modems, the BLAST package is installed on the 8600s and on VMS VAX machines on some campuses for more rapid file transfer.

#### ACCESS

Access specifications and services are identified below.

#### Allocation

Supercomputer time is allocated by peer review at several different levels. The NSF will allocate some 60 percent of the available resources. Scientists who need computing as part of their NSF support or need very large amounts of time should apply there. The remaining time is administered by the von Neumann National Allocations Committee (NAC), which will consider any research project. NAC also gives a block of time to each member of the Consortium for Campus Computing Support, small or initial research projects. This is allocated by the local Campus Supercomputing Committee. Finally, between the NSF and the NAC, some 10 percent of the total time is reserved for industrial research that can be carried out in the open environment of these services.

Contacts for allocations are as follows:

- Allocation of computer time by NSF
  - (202) 357-7558, Irene Lombardo, NSF Office of Advanced Scientific Computing
- Allocation of computer time by NAC
  - (609) 520-2000, Brenda McNamara, John von Neumann Center

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- Industrial relations

- (609) 452-6206, S. Orszag, Princeton University.

System  
Availability

The capabilities of the Center are available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

Documentation

Each new user receives a copy of the Introductory Manual and all the latest information. As significant changes occur in this documentation, updates are mailed to all users and on-line messages note the update.

Vendor manuals may be purchased through the campus computing centers or through the von Neumann Center. The campuses already have several copies of all the manuals, and the von Neumann Introductory Manual tells which subset should be acquired by user groups.

Consultation

Consultants are available during regular working hours, Eastern Standard Time, at the von Neumann Center on (609) 520-2042. They will assist with all problems. The lead consultant is Bernie Siebers, ETA.

On-line help is available on the VAX 8600s by typing WHO and PHONE to interact with consultants logged onto the system.

Each campus computing center is responsible for supporting the supercomputing service locally.

The log-in messages HELP and HELP NEWS provide interactive information on the development of the system.

Training

The von Neumann Center will offer courses frequently on every aspect of the services. Some will be for support personnel and others for users. Some places will be available at the Florida State University courses, which are now well developed. Many of the courses will be videotaped for presentation on campuses by the local support personnel. Control Data Corporation, ETA, and DEC all offer extensive training, and their offerings will be incorporated in the von Neumann Center courses.

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Cost

Qualified users, meaning those supported by NSF, pay no costs for use of the system.

FUTURE PLANS

The von Neumann Center is to acquire the first production ETA-10 supercomputer in April 1987. This will be the first Class VII machine, an order of magnitude faster than its Class VI predecessors, such as the CYBER 205. This service will be supplied to university campuses over a network currently being developed to run TCP/IP UNIX protocols over T1 transmission lines running at speeds up to 1.5 Mb, also an order of magnitude faster than current practice.

ADDRESS

John von Neumann Center for Scientific Computing  
P.O. Box 3717  
Princeton, New Jersey 08540  
(609) 520-2000



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**NCSA FACTS**

**Configuration**      CRAY X-MP/24 with SSD  
                         2 clustered VAX 11/785s (front-end)  
                         Common File System  
                         Graphics Work Stations  
                         Peripherals

**Software**            Language processors  
                         Graphics libraries/packages  
                         Mathematics/statistics libraries

**Communications**    GTE Telenet  
                         WATS lines  
                         Dial-up lines  
                         Sytek Network (local campus)  
                         TCP/IP Network (local campus)  
                         NSFnet  
                         BITNET  
                         KERMIT

**Access**              Allocations made by NSF and NCSA  
                         System available 24 hours per day, 7 days per week  
                         Documentation, consultation, and training available

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## NATIONAL CENTER FOR SUPERCOMPUTING APPLICATIONS

The National Center for Supercomputing Applications (NCSA) is a university-based supercomputing facility and research center designed to serve the national research community. The supercomputing facility is funded primarily by the National Science Foundation (NSF). The State of Illinois and the University of Illinois at Urbana-Champaign cosponsor NCSA and are the primary supporters of the Interdisciplinary Research Center, a facility designed as a "think tank" for researchers using NCSA equipment. Major contributions from Cray Research, Inc. and from work station vendors have greatly enhanced the resources of the NCSA and fostered new research and development programs. Facilities management of the project's supercomputer is provided by the UIUC Computing Services Office, which is also responsible for the campus computing systems.

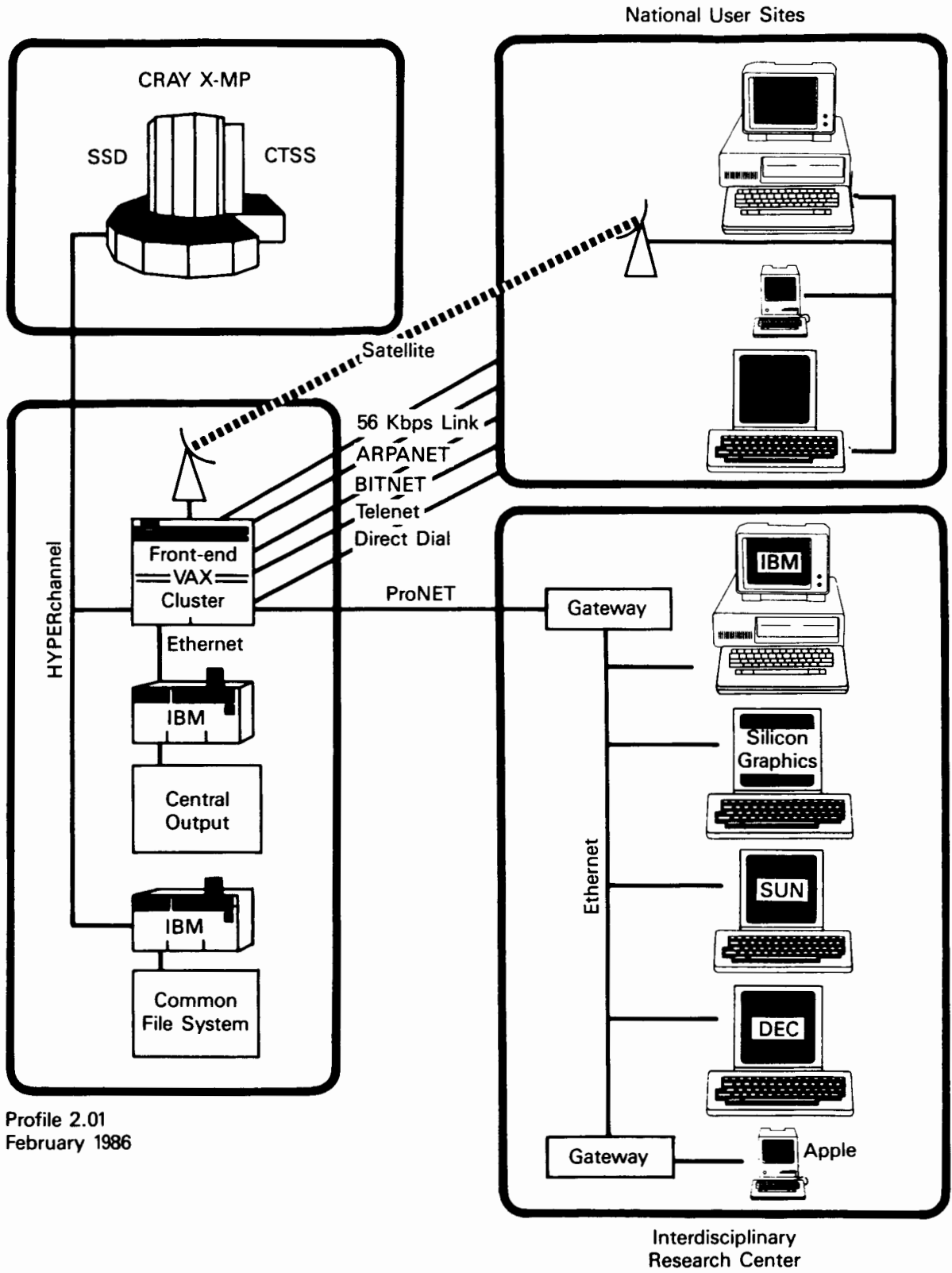
### CONFIGURATION

The system, depicted in Figure 2.4-1, comprises the following:

- CRAY X-MP/24
  - Number of processors: 2
  - Memory: 4 x 10<sup>6</sup> 64-bit words  
32 x 10<sup>6</sup> 64-bit words SSD (Solid State Storage Device)
  - On-line storage: 7.2 x 10<sup>9</sup> bytes
  - Operating system: CTSS (CRAY Time-Sharing System)

NOTE: After November 1986, this system will be upgraded to an X-MP/48 with a 128 x 10<sup>6</sup> 64-bit words.

- 2 clustered VAX 11/785s (front-end)
- Common file system
- Graphics work stations (SUN, DEC, Silicon Graphics)



Profile 2.01  
February 1986

**Figure 2.4-1. NCSA System**

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- Peripherals

- IBM 3800: A high-speed laser printer for text and graphics
- Campus printers: Printers supported by the campus computing center available for local users and visitors
- Microfiche: Under consideration for 1986
- Slides and Movies: Under consideration for 1986
- Video production: Equipment being ordered and evaluated to provide video production facilities during 1986
- Magnetic tape: A 9-track tape recorded at 1600 or 6250 BPI available on the front-end machine.

**SOFTWARE**

NCSA supports the software identified below:

- System

- CFT: Cray Research, Inc., FORTRAN-77 compiler
- CAL: Cray Research, Inc., macro assembler
- DDT: Cray Research, Inc., Dynamic Debugging Tool
- FRED: Line-mode text editor for use on the CRAY.

- Graphics

- NCAR: Graphics package supplied by the National Center for Atmospheric Research
- DI-3000: Graphics package from Precision Visuals, Inc. (available in spring 1986)

- Math Libraries

- SCILIB: From Cray Research, Inc., and includes LINPACK, EISPACK, and fast Fourier transforms
  - CFTMATH: From Los Alamos National Laboratory with over 900 routines and on-line documentation
-

- 
- NAGLIB: From the Numerical Algorithms Group with on-line interactive documentation (available in spring 1986)
  - BCSLIB: From Boeing Computer Services (available in spring 1986).

#### COMMUNICATIONS

The following networks are available for accessing NCSA:

- GTE Telenet: at 300, 1200, and 2400 baud (2400 available in selected areas).
- Toll Free: at 300, 1200, and 9600 baud for users outside Illinois.
- Direct Dial: at 300, 1200, and 2400 baud.
- Sytek Network: at 9600 baud on the University of Illinois campus only.
- TCP/IP Network: Access over the local campus network with the TCP/IP protocols is available to a limited number of campus buildings. The network backbone is running at 10 mbps, with plans to upgrade to 80 mbps during 1986.
- NSFnet: Several satellite links are scheduled for 1986 along with the 56 kbps links to other NSF national centers and a few campuses. Additional 56 kbps links to other campuses around the country are under consideration.

Files are transferred to the CRAY through the front-end VAX. To get files to the VAX, use one of the following:

- BITNET: Files can be moved to the VAX across the BITNET network.
- KERMIT: Files may be uploaded/downloaded from personal computers, other work stations, and other computers using the KERMIT protocol, supported in many public domain and commercial packages.
- Magnetic Tape: Tapes should be 9-track, 1600 or 6250 BPI in one of these formats: ANSI Labelled, ASCII blocked, or VMS BACKUP.

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ACCESS

Access specifications and services for NCSA are identified below.

Allocation

The NSF is currently allocating 60 percent of the computer time, while the national NCSA Peer Review Board (PRB) is responsible for 30 percent. The remaining 10 percent is available to the PRB if it is not used for non-NSF program, income-generating projects. The PRB is composed of researchers from around the country who represent many fields of research and methodologies.

Submission. Proposals can be submitted to NSF or to the NCSA PRB for peer review. Application forms and instructions can be obtained from NSF or from NCSA. Ms. Irene Lombardo may be contacted at the NSF Office of Advanced Scientific Computing, (202) 357-7558.

Computer Time. Applicants are encouraged to include not only scientific justification for proposed work but also detailed justification for the requested computer time. This latter justification should include information on code development time, production time, and post-processing time whether done on the CRAY or on another computer system. Small startup accounts (up to 5 hours) will be readily available for researchers preparing proposals so they can implement their codes on the CRAY and establish good estimates for larger requests. Requests should be in service units that are, for a typical user, approximately equivalent to CPU time as discussed in the section on cost.

PRB Review. Allocations are made based on excellence of the proposal and on a set of priorities that will be vital, particularly for larger requests, as the NCSA facility becomes saturated. These priorities have been approved by the NSF and include allocations to programs that have strong potential for producing decisive scientific breakthrough calculations, use special characteristics of the NCSA system, are based in the Interdisciplinary Research Center, are aimed at education, and test the capabilities of NCSA resources. In addition, there will be an effort to keep a disciplinary balance and allow new computational disciplines to be developed.

System  
Availability

NCSA is available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

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Documentation

NCSA sends to approved principal investigators documentation that includes a user's guide and other supporting information. In addition, information on ordering vendor documentation is available. Announcements, consulting news, and systems information will be mailed to users periodically. On-line system documentation is available and will continue to be expanded.

Consultation

Consultants are available by telephone and electronic mail Monday through Friday to aid researchers in using the NCSA facilities.

Visitors'  
Program

The Visitors' Program provides assistance to new and continuing users and coordinates visits to the Interdisciplinary Research Center by scientists and researchers. It also is the central office for dissemination of information about the NCSA. The Coordinator may be contacted by calling (217) 244-0074.

Training

The consulting staff will provide short courses for users of the NCSA facilities on such topics as the basic system, vectorization, debugging, mathematical software, and use of the CRAY in a work station environment. Researchers are encouraged to visit NCSA for training and to schedule their visit by contacting the Coordinator of the Visitors' Program. Network and consulting staff are available on a limited basis to visit remote sites. In addition, video training tapes will be made available for purchase in the future.

Cost

Contact NCSA for details on cost.

**FUTURE PLANS**

CRAY hardware will be updated regularly, allowing scientists access to the latest in supercomputing. Plans for the mainframe upgrade include a 4-processor CRAY X-MP in 1986; another upgrade in 1988; and by 1990, the equivalent of at least a 16-processor machine with one gigaword of fast memory. Upgrades and enhancements to other central facilities are also planned. In addition, the latest in work stations will be available in order to complete a comprehensive state-of-the-art computational facility.

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NCSA is developing postdoctorate and graduate student programs. National workshops and conferences are in the planning stages.

**ADDRESS**

National Center for Supercomputing Applications  
Center for Supercomputing Research & Development  
University of Illinois at Urbana-Champaign  
154 Water Resources Building  
605 East Springfield Avenue  
Champaign, Illinois 61820  
(217) 244-0074



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**PSC FACTS**

**Configuration**

CRAY X-MP/48

2 VAX 8650 (front-end)

Peripherals: 128 MW SSD, disks, tapes

**Software**

Languages: FORTRAN (CFT), Pascal, CAL

Libraries: SCLIB, NAG

Graphics: TEMPLATE, DI-3000, NCAR Graphics

**Communications**

ARPANET

BITNET

Telenet

NSFnet

**Access**

Allocations determined by PSC and NSF

System available 24 hours per day, 7 days per week

Documentation, consultation, and training available

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## PITTSBURGH SUPERCOMPUTER CENTER

On January 17, 1986, the National Science Foundation (NSF) made an award to a University of Pittsburgh/Carnegie-Mellon University/Westinghouse Electric Corporation consortium to establish the fifth national supercomputing center for engineering and scientific research. The center, to be known as the Pittsburgh Supercomputing Center (PSC), became operational in June 1986. It will provide advanced computational resources for engineering and scientific research.

### CONFIGURATION

The system comprises the following:

- CRAY X-MP/48
  - Number of processors: four
  - Memory:  $8 \times 10^6$  64-bit words
  - High Speed Storage:  $128 \times 10^6$  64-bit words in SSD (Solid State Storage Device)
  - Local Disk Storage:  $19.2 \times 10^9$  bytes
  - Peak Speed:  $210 \times 10^6$  flops per processor
  - Operating System: CRAY (Craig Operating System)
- 2 VAX 8650 (front-ends)
- Peripherals, including tape drives on both CRAY and VAX systems.

### SOFTWARE

PSC currently supports the software identified below:

- SCILIB: CRAY's library of mathematical and scientific routines

- 
- NAG Library: library of mathematical and statistical routines from Numerical Algorithms Group Limited
  - NCAR Graphics: National Center for Atmospheric Research graphics library
  - Pascal
  - TEMPLATE: general purpose graphics software system from Megatek Corporation
  - GAUSSIAN 82: quantum chemistry package developed at Carnegie-Mellon University
  - CFT and Pascal: CRAY vectorizing FORTRAN compiler
  - CAL: CRAY's assembly language
  - DI-3000: graphics software from Precision Visuals (being installed).

A number of other packages, including Disspla, Movie BYU, IMSL, BCSLIB, and BCS/VECTORPAK, are under consideration. All users and potential users are urged to make their software preferences known to PSC.

#### COMMUNICATIONS

The following networks are available for accessing PSC:

- ARPANET
- BITNET
- Telenet
- NSFnet (node on NSFnet backbone).

#### ACCESS

PSC has the access specifications identified below.

#### Allocation

Allocations are determined by the PSC Allocation Board and NSF. All potential users are encouraged to apply for time on the Pittsburgh CRAY X-MP/48 by contacting the appropriate NSF program office, the Office of Advanced Scientific

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Computing, or by applying directly to the PSC. All proposals will be judged on scientific merit, suitability of project for implementation on the supercomputer, and the availability of time. Contact Ms. Irene Lombardo at the NSF Office of Advanced Scientific Computing at (202) 357-7558, or PSC at (412) 268-4960.

System  
Availability

PSC is operational 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

Documentation

Assistance to users is available through the following:

- On-line help and documentation
- Electronic mail facilities to relay suggestions and user questions
- Introductory packets and manuals to users awarded time on the CRAY
- The PSC newsletter.

Consultation  
and Training

The contact for consultation and training pertaining to use of PSC is Mr. Robert B. Stock, Manager of User Services, (412) 268-4960.

FUTURE PLANS

Not known

ADDRESS

Pittsburgh Supercomputing Center  
Mellon Institute  
4400 Fifth Avenue  
Pittsburgh, Pennsylvania 15213  
(412) 268-4960

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**SDSC FACTS**

**Configuration**      CRAY X-MP/4800

SCS-40

IBM 4381

2 VAX 11/785

VAX 11/750

**Software**

Language processors

Programming utilities

Mathematics/Statistics libraries

Graphics libraries/packages

Applications packages

**Communications**

SDSCnet

Tymnet

MFENET

NSFnet

ARPANET

Dial-up lines

**Access**

Allocations distributed among National Science Foundation, SDSC Allocation Committee, consortium members, and industrial cost-sharing participants

CRAY X-MP/48 available 24 hours per day, 7 days per week

Documentation, consultation, and training available

Cost based on use of Service Units

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**SAN DIEGO SUPERCOMPUTER CENTER**

The San Diego Supercomputer Center (SDSC), located at the University of California at San Diego, is administered and operated by GA Technologies, Incorporated. The National Science Foundation (NSF) provides major funding. Policy guidance is given by a steering committee with one representative from each of 19 consortium institutions, identified below:

- Agouron Institute
- California Institute of Technology
- National Optical Astronomy Observatories
- Research Institute of Scripps Clinic
- Salk Institute
- San Diego State University
- Southwest Fisheries Center
- Stanford University
- University of California at Berkeley
- University of California at Los Angeles
- University of California at San Diego
- University of California at San Diego Scripps Institution of Oceanography
- University of California at San Francisco
- University of Hawaii
- University of Maryland
- University of Michigan
- University of Utah
- Univeristy of Washington
- University of Wisconsin.

Each consortium center is linked to SDSC by a Remote User Access Center.

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CONFIGURATION

Figure 2.6-1 delineates the SDSC configuration, showing mainframes, operating systems, and network interconnections. The configuration consists of the following hardware:

- CRAY X-MP/4800 Supercomputer
    - Number of processors: 4
    - Memory:  $8 \times 10^6$  64-bit words
    - Local disk storage:  $10 \times 10^9$  bytes
    - Peak speed:  $840 \times 10^6$  flops
    - Operating System: CTSS (CRAY Time-Sharing System)
  
  - SCS-40 Super-MiniComputer
    - Number of processors: 1
    - Memory:  $4 \times 10^6$  64-bit words
    - Local disk storage:  $3 \times 10^9$  bytes
    - Peak speed:  $44 \times 10^6$  flops
    - Operating System: CTSS (CRAY Time-Sharing System)
  
  - Common File System (CFS)
    - Host: IBM 4381
    - Operating system: MVS-XA
    - Local disk storage:  $20 \times 10^9$  bytes
  
  - Print and Graphic Express Station (PAGES)
    - Host: VAX 11/785
    - Operating system: VMS
    - Components: XEROX 8700 Laser Printer  
IMAGEN 12/300 Laser Printer  
IMAGEN 24/300 Laser Printer  
DICOMED D48CR Film Recorder  
9-Track 1600/6250 BPI Tape Drives
  
  - Remote User Access Centers (RUAC)
    - Host: VAX 11/750
    - Operating system: VMS
    - Function: Provide access and print/graphics capability for consortium sites
-

High Speed Links to SDSC Consortium Members

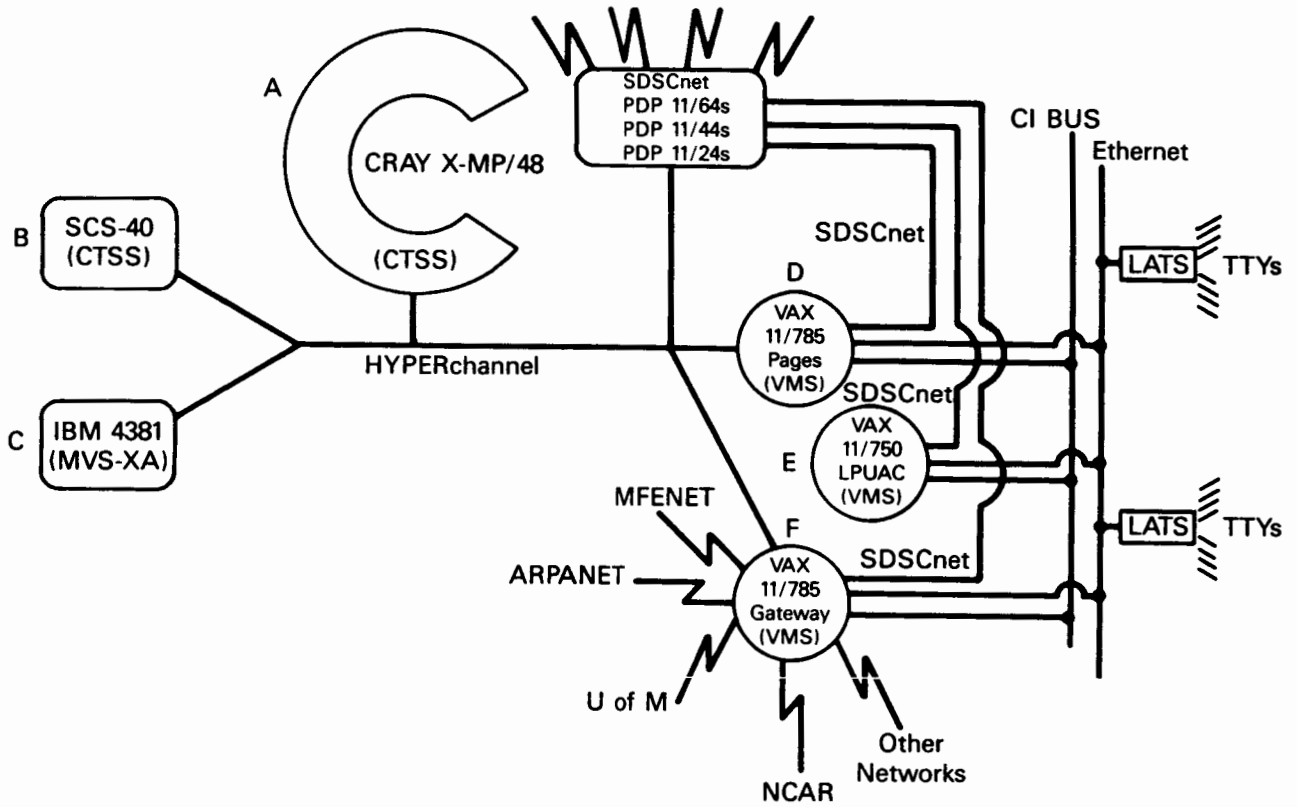


Figure 2.6-1. Overview of the SDSC Configuration



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- Network Gateway

- Host: VAX 11/785
- Operating System: VMS
- Function: Provide access from ARPANET, MFENET, Tymnet, and other computer centers.

**SOFTWARE**

Table 2.6-1 identifies the software supported by center systems.

**COMMUNICATIONS**

Access to the SDSC can be made through the following:

- SDSCnet: 56 kbps link to RUAC's supporting file transfer, graphics, remote output queueing, and virtual terminal capability
- MFENET: 56 kbps link to sites on National Magnetic Energy Network
- ARPANET: 56 kbps link to sites on Defense Data Network
- Tymnet: general public link over packet switched network at 2400 bps
- NSFnet: 56 kbps link to NSF funded centers at NCAR and University of Illinois (NSF Backbone Network)
- Dial-up: access at 2400 bps
- Other: connection to University of California network planned for 1987.

For additional information on accounts and dial-up access, contact Ms. Rachel Chrisman, SDSC Operations Manager, at (619) 455-5025.

**ACCESS**

Access requirements and services are identified below.

Table 2.6-1. SDSC Application Software as of March 5, 1986

Program	Brief Description	Type	Current Status
ABAQUS	Stress and Thermal Analysis	ENGR	Under Evaluation
ADINA	Stress and Thermal Analysis	ENGR	Under Evaluation
ADINAPLOT	Plotting Interface to ADINA	ENGR	Under Evaluation
AMBER	Molecular Dynamics	CHEM	Being Installed
ANSYS	Stress and Thermal Analysis	ENGR	Under Evaluation
BSPICE	Circuit Simulation	ENGR	Being Installed
C,CLIB	C Programming Language and Library	GENERAL	Ordered
CAL	CRAY Assembly Language	GENERAL	Being Installed
CAMBRIDGE DB	Cambridge Crystallographic Data Base	CHEM	Ordered
CAVEAT	Hydrodynamics	ENGR	Under Evaluation
CFT	Vectorized FORTRAN-77	GENERAL	Being Installed
CFTLIB	LANL FORTRAN Library	GENERAL	Being Installed
CHARMM	Molecular Modeling	CHEM	Under Evaluation
CIVIC	Vectorized FORTRAN-77 with LLNL Extensions	GENERAL	Being Installed
DI3000	FORTRAN Graphic Routines	GRAPHICS	Under Evaluation
DISSPLA	FORTRAN Plotting Routines	GRAPHICS	On-Line
DISSPLA-TV80	DISSPLA-TV80 Interface	GRAPHICS	On-Line
DNAMAP		CHEM	Being Installed
DYNA2D	2D Hydrodynamics Code in NIKE-DYNA-TOPAZ Series	ENGR	Ordered
DYNA3D	3-D Hydrodynamics Code in NIKE-DYNA-TOPAZ Series	ENGR	Ordered
ECEPP II	QCPE 454	CHEM	Being Installed
FITPACK	Curve and Surface Fitting	MATH	Under Evaluation
FORMAT	Text Formatter	FORMATER	On-Line
FORTLIB	LLNL FORTRAN Library	GENERAL	Being Installed
FRAMIS	Relational Data Base Management System	DBMS	Under Evaluation
GAMS	Guide to Available Mathematical Software Database	MATH	Being Installed
GAUSSIAN82	Quantum Chemistry	CHEM	Being Installed
GENBANK	Gene Sequence Data Bank	MOL. BIO	Being Installed
GRADSCF	Quantum Chemistry	CHEM	Under Evaluation
HARWELL	Harwell Laboratory Mathematics Library	MATH	On-Line
IMSL	International Mathematics and Statistics Library	MATH	On-Line
INGRID	3-D Mesh Generator for NIKE-DYNA-TOPAZ Series	ENGR	Ordered

**Table 2.6-1. SDSC Application Software as of March 5, 1986  
(continued)**

<b>Program</b>	<b>Brief Description</b>	<b>Type</b>	<b>Current Status</b>
INSTANT GRAPHICS	Los Alamos Graphics Debugging Package	GRAPHICS	Ordered
KIVA	3-D Combustion and Turbulence Code	ENGR	Under Evaluation
MARC	Stress and Thermal Analysis	ENGR	Under Evaluation
MATHLIB	Elementary Functions	MATH	On-Line
MAZE	2-D Mesh Generator for NIKE-DYNA-TOPAZ Codes	ENGR	Ordered
MINOS	Mathematical Programming (Optimization) Package	MATH	Under Evaluation
MM2	Molecular Modeling	CHEM	On-Line
MMHELP	Help for MM2 Code	CHEM	Being Installed
MOHELP	ACPE QCPE 494	CHEM	Being Installed
MOPAC	QCPE 455	CHEM	On-Line
MOSOL	QCPE 495	CHEM	Being Installed
MOVIE.BYU	Graphics Package Including Animation	GRAPHICS	Ordered
MSC/NASTRAN	Structural and Thermal Analysis	ENGR	Under Evaluation
NAG	Numerical Algorithms Group Library	MATH	On-Line
NCAR GRAPH-TV80	NCAR Graphics to TV80 LIB Interface	GRAPHICS	Being Installed
NCAR GRAPHICS	Graphics Utilities	GRAPHICS	Being Installed
NIKE2D	2-D Structural Code in NIKE-DYNA-TOPAZ Series	ENGR	Ordered
NIKE3D	3-D Structural Code in NIKE-DYNA-TOPAZ Series	ENGR	Ordered
NT SYS	Numerical Taxonomy Statistical Program	STAT	Under Evaluation
OMNILIB	CRAY-Specific Routines (Includes SCILIB)	MATH	Being Installed
ORION	2-D Plot Routines for NIKE-DYNA-TOPAZ Series	ENGR	Ordered
PASCAL	ISO Pascal	GENERAL	Ordered
PATRAN	Geometric Modeling	ENGR	Under Evaluation
PCK83	QCPE 481	CHEM	On-Line
PLOTLIB	LLL FORTRAN Plotting Library Used in NIKE-DYNA-TOPAZ Codes	GRAPHICS	Being Installed
POLYATOM	Quantum Chemistry	CHEM	Under Evaluation
PROTEIN DB	Brookhaven Protein Data Base	CHEM	On-Line
PSL	Portable Standard LISP	GENERAL	Under Evaluation

**Table 2.6-1. SDSC Application Software as of March 5, 1986  
(continued)**

Program	Brief Description	Type	Current Status
REDUCE	Symbolic Mathematics	MATH	Under Evaluation
RIM (CTSS)	Relational DBMS with FORTRAN Interface	DBMS	Being Installed
SALE2D AND 3D	Hydrodynamics Code	ENGR	Under Evaluation
SAP4	Structural Analysis	ENGR	Under Evaluation
SAS	Statistical Package	STAT	Under Evaluation
SCEPTRE	Circuit Design	ENGR	Under Evaluation
SIMSCRIPT	Discrete Event Simulation Language	SIM	Under Evaluation
SINDA	Thermal/Fluid Flow Code	ENGR	Under Evaluation
SLAM II	Discrete and Continuous Simulation Language	SIM	Under Evaluation
SLATEC	Math and Statistics Libraries	MATH	On-Line
SMP	Symbolic Mathematics	MATH	Under Evaluation
SOLA	University Hydrodynamics Training Code	ENGR	Under Evaluation
SPIN	3-D Mesh Generator for NIKE-DYNA-TOPAZ Series	ENGR	Ordered
SPSS	Statistics	STAT	Under Evaluation
TAURUS	3-D Plotting Routines for NIKE-DYNA-TOPAZ Series	ENGR	Ordered
TOPAZ2D	2-D Thermal Code in NIKE-DYNA-TOPAZ Series	ENGR	Ordered
TOPAZ3D	3-D Thermal Code in NIKE-DYNA-TOPAZ Series	ENGR	Ordered
TV80LIB	FORTRAN Plotting Routines	GRAPHICS	On-Line
VECTORAL	Vector Compiler	GENERAL	Under Evaluation
RIM (VAX)	Relational DBMS with FORTRAN Interface	DBMS	On-Line

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## Allocation

The 30,000 Central Processing Unit (CPU) hours available annually are distributed in the following manner:

- 18,000 hours (60 percent) to NSF
- 5,000 hours (18 percent) to SDSC Allocation Committee
- 4,000 hours (12 percent) to consortium members
- 3,000 hours (10 percent) to industrial cost-sharing participants.

Requests for NSF allocations should be made to the appropriate NSF research program. For further information, contact Ms. Irene D. Lombardo at the NSF Office of Advanced Scientific Computing (OASC), (202) 357-7558.

Requests for SDSC allocations should be made to Mr. Dan Brender, the SDSC Program Manager at (619) 455-5030. The SDSC Allocation Committee reviews requests quarterly, so all information must be submitted at least 45 days prior to the beginning of the desired calendar quarter.

Requests for allocation from a specific consortium member should be made to the appropriate member of the steering committee. A list of committee members is available from SDSC.

Requests for industrial allocations should be made to Mr. Robert Randall, the SDSC Resource Development Manager, at (619) 455-5060.

## System Availability

The CRAY X-MP/48 is available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

## Documentation

The following documentation is available to users:

- Interactive HELP for CTSS utilities, interactive tutorials, interactive access to reference manuals
  - Information exchange via electronic mail and bulletin boards
  - Gather/Scatter, a monthly user newsletter.
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Consultation

Telephone consulting is available Monday through Friday from 8:00 a.m. to 5:00 p.m. Pacific Time at (619) 455-3966.

Training

SDSC orientation classes are held periodically at all consortium member sites. In addition, workshops on programming techniques or specific applications are convened according to need.

Cost

The cost is based on number of Service Units (SU) used. Each SU involves CPU, memory, and peripheral use. Weights are given to each component in proportion to its cost and availability. One SU is approximately equal to one CRAY X-MP CPU hour at unit (normal) priority.

**FUTURE PLANS**

Not known

**ADDRESS**

San Diego Supercomputing Center  
GA Technologies, Incorporated  
P.O. Box 85608  
San Diego, California 92138

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DIGITAL PRODUCTIONS, A DIVISION OF OMNIBUS SIMULATIONS, INC. FACTS

**Configuration**      CRAY X-MP 22  
                         IBM 4331-2  
                         VAX 11/782  
  
                         Extensive array of both standard and custom graphics  
                         equipment

**Software**            Language processors  
  
                         Mathematics/Statistics libraries  
  
                         Graphics libraries/packages  
  
                         Applications packages

**Communications**    WATS lines  
  
                         Leased lines

**Access**                Through contract with Omnibus Simulations, Inc.  
  
                         Center systems available 24 hours per day, 7 days per week  
  
                         Consultation available  
  
                         Cost determined by number of resources used

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DIGITAL PRODUCTIONS, A DIVISION OF OMNIBUS SIMULATIONS, INC.

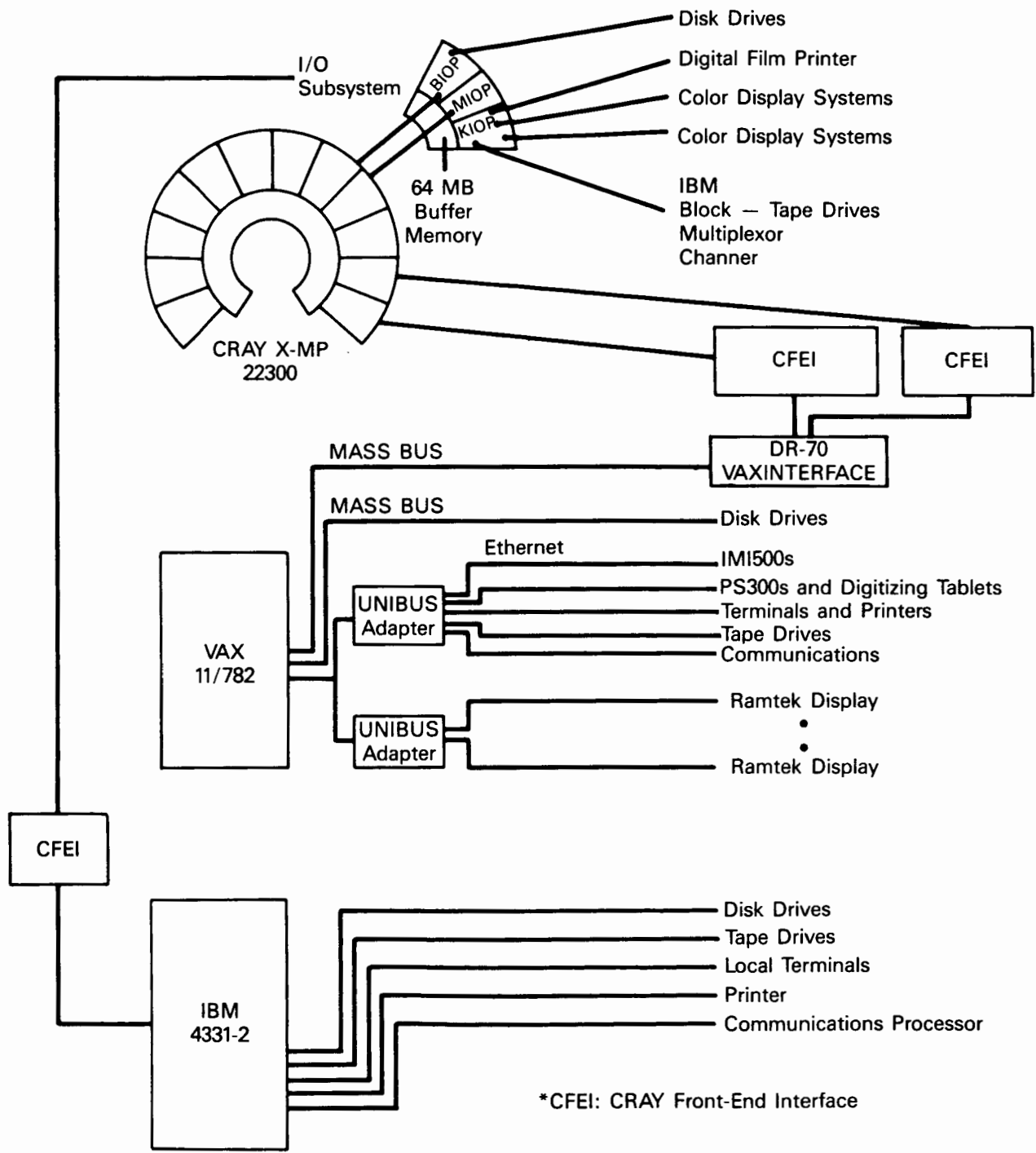
Digital Productions, one of six National Science Foundation (NSF) Supercomputing Resource Centers, specializes in 3D graphic simulation, computer graphics, and Digital Scene Simulation (sm).

CONFIGURATION

Figure 2.7-1 shows the system configuration, which consists of the following hardware:

- CRAY X-MP Supercomputer
  - Number of processors: 2
  - Memory:  $2 \times 10^6$  64-bit words, plus  $8 \times 10^6$  64-bit words
  - Local disk storage:  $6 \times 10^9$  bytes
  - Operating system: COS 1.14
- IBM 4331-2 Computer (front-end)
  - Number of processors: 1
  - Local disk storage:  $1.2 \times 10^9$  bytes
  - Operating system: VM/SP
- VAX 11/782 Computer (front-end)
  - Number of processors: 2
  - Local disk storage:  $3 \times 10^9$  bytes
  - Operating system: VMS
- Graphics Equipment
  - Ramtek frame buffers: models 9460, 9400, and 9050
  - Vector graphic display stations: Evans & Sutherland PS300s; Interactive Machines, Inc. IMI500s





**Figure 2.7-1. Vector Production System Configuration**

- 
- CalComp 1,000 BPI resolution digitizing tablets
  - Digital Film Printer: unique, custom-designed and built film-recorder and scanners (film frame recording time: 7.5 seconds; film frame scan time: 12 seconds) connected directly to a CRAY X-MP high-speed (850 Mbps) channel
  - Graphics Capabilities
    - Graphics displays written directly from CRAY FORTRAN (CFT) applications
    - Precision full-color film recording at: 1280 x 1024 x 8 x 3 bits resolution; 2560 x 2048 x 12 x 3 bits resolution
    - High quality Kodachrome slides recorded at 5120 x 3072 x 12 x 3 bits resolution
    - High quality still-frame or moving film scanning at: 1280 x 1024 x 8 x 3 bits resolution; 2560 x 2048 x 12 x 3 bits resolution
    - Color graphics display monitors at: 1280 x 1024 x 8 x 3 bits resolution; 512 x 512 x 11 bits resolution
    - Black-and-white vector filming from IMI500s for low-detail motion testing.

#### SOFTWARE

Special interest software supported by the CRAY X-MP and the VAX 11/782 is as follows:

- CRAY X-MP
    - FORTRAN 77: (CFT) with multitasking and interjob communications
    - CAL: CRAY Assembly Language
    - SCILIB: LINPACK and EISPACK included
    - SPICE: electronic circuit design
    - ANSYS: finite element modeling for stress and thermal analysis
-

- 
- NASTRAN: finite element modeling for stress and thermal analysis
  - Pascal
  - Prolog: Pascal-based fourth-generation programming language
  - DP3D™: DP's Digital Scene Simulation (sm) software package, featuring: multiple light sources, shadows, transparency, Gouraud Phong, and Blinn shading, textures, object instancing, independent object matrices, color fringing, displacement vectors, anti-aliasing, color and transparency per vertex, and scene complexity to one million polygons
- VAX 11/782
    - COMPILERS: FORTRAN, Pascal, C, LISP, Prolog
    - PREVUE: vector graphic motion previewing package for the IMI500s
    - ENCODE: object modeling package for the Evans & Sutherland PS300s
    - Many additional graphics-oriented utilities, all supporting Omnibus's customized X-MP front-end station software.

**COMMUNICATIONS** Access is available through WATS lines and leased lines, via any telecommunications protocol.

**ACCESS** Access requirements and services are identified below.

**Allocation** Allocations are available through Omnibus Simulations, Inc. at the address listed below and by calling (213) 938-1111. Information on NSF allocations can be obtained from Ms. Irene Lombardo at the NSF Office of Advanced Scientific Computing at (202) 357-7558.

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System  
Availability

Center systems are available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

Documentation

Upon request, documentation is available to users.

Consultation

Consultants are available to users in specialty areas of graphics design and program development.

Cost

Cost is determined by utilization of resources; full accounting to the project level is reported each month. Resources are competitively priced, and benchmarking is encouraged as the way to accurately determine job charges.

FUTURE PLANS

Not known

ADDRESS

Omnibus Simulations, Inc.  
Division of Science & Technology  
3416 S. La Cienega Boulevard  
Los Angeles, California 90016  
(213) 938-1111

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**MINNESOTA SUPERCOMPUTER INSTITUTE FACTS**

**Configuration**      CRAY 2 (development)  
                         CRAY 2 (production)  
                         Cyber 205  
                         IBM 4381 (back-end, all three systems)  
                         VAX 11/750 (front-end, 11/750 on CRAY 2)  
                         VAX 11/750 (front-end, 11/750 on CRAY 2)  
                         Cyber 810 (11/750 on Cyber 205)  
                         Peripherals

**Software**            Language Processors  
                         Programming Utilities  
                         Mathematical Libraries  
                         Graphics Libraries/Packages  
                         Application Packages

**Communications**    Accomplished through ARPANET, GTE Telenet, REI Network, MSI  
                         Campus Internet, dial-up lines, and hardwired lines

**Access**              Access for academic researchers funded by National Science  
                         Foundation (NSF) obtained through appropriate NSF research  
                         programs or by the State of Minnesota legislative grant

                         Access for industrial researchers obtained through Research  
                         Equipment, Incorporated (REI)

                         Supercomputers available 24 hours a day, 7 days a week

                         Extensive line of CRAY, CDC, UNIX, and MSI publications  
                         available

                         Consultation available by CT, by electronic mail, and onsite

                         Training available for the CRAY 2 or Cyber 205, and for  
                         specialized needs

                         Cost is \$1,000 per CPU hour (Cyber 205) or \$3000 per CPU  
                         hour (CRAY), plus front-end, back-end, peripheral, and  
                         storage costs

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## MINNESOTA SUPERCOMPUTER INSTITUTE

The Minnesota Supercomputer Institute (MSI) is a legislatively initiated research center and is also partially funded as a National Science Foundation (NSF) supercomputing resource center. In 1983, NSF awarded the University of Minnesota a contract to function as one of three (later six) national supercomputer resource centers. MSI was created in 1984 through a cooperative effort of the State of Minnesota, the University of Minnesota, and supercomputing firms headquartered in the Minneapolis/St. Paul area. The mission of MSI is to promote the development of computational science, engineering, and related services, and to provide supercomputing services for theoretical and experimental research and public, private, educational, and governmental organizations worldwide.

### CONFIGURATION

The special features of the MSI configuration are that it offers more CRAY 1 equivalents than any other center in the Nation, its Cyber 205 is one of the three largest in the Nation, and its CRAY 2's are the only ones available to the public at this time.

Figure 2.8-1 shows the basic components of the system. Following are the features of the MSI components.

- Supercomputer: CRAY 2 (development)
    - Number of Processors: 1
    - Memory:  $16 \times 10^6$  64-bit words
    - Local Disk Storage:  $2.4 \times 10^9$  bytes
    - Peak Speed:  $250 \times 10^6$  flops
    - Operating System: UNIX
  
  - Supercomputer: CRAY 2 (production)
    - Number of Processors: 4
    - Memory:  $256 \times 10^6$  64-bit words
    - Local Disk Storage:  $7.2 \times 10^9$  bytes
    - Peak Speed:  $1000 \times 10^6$  flops
    - Operating System: UNIX
-

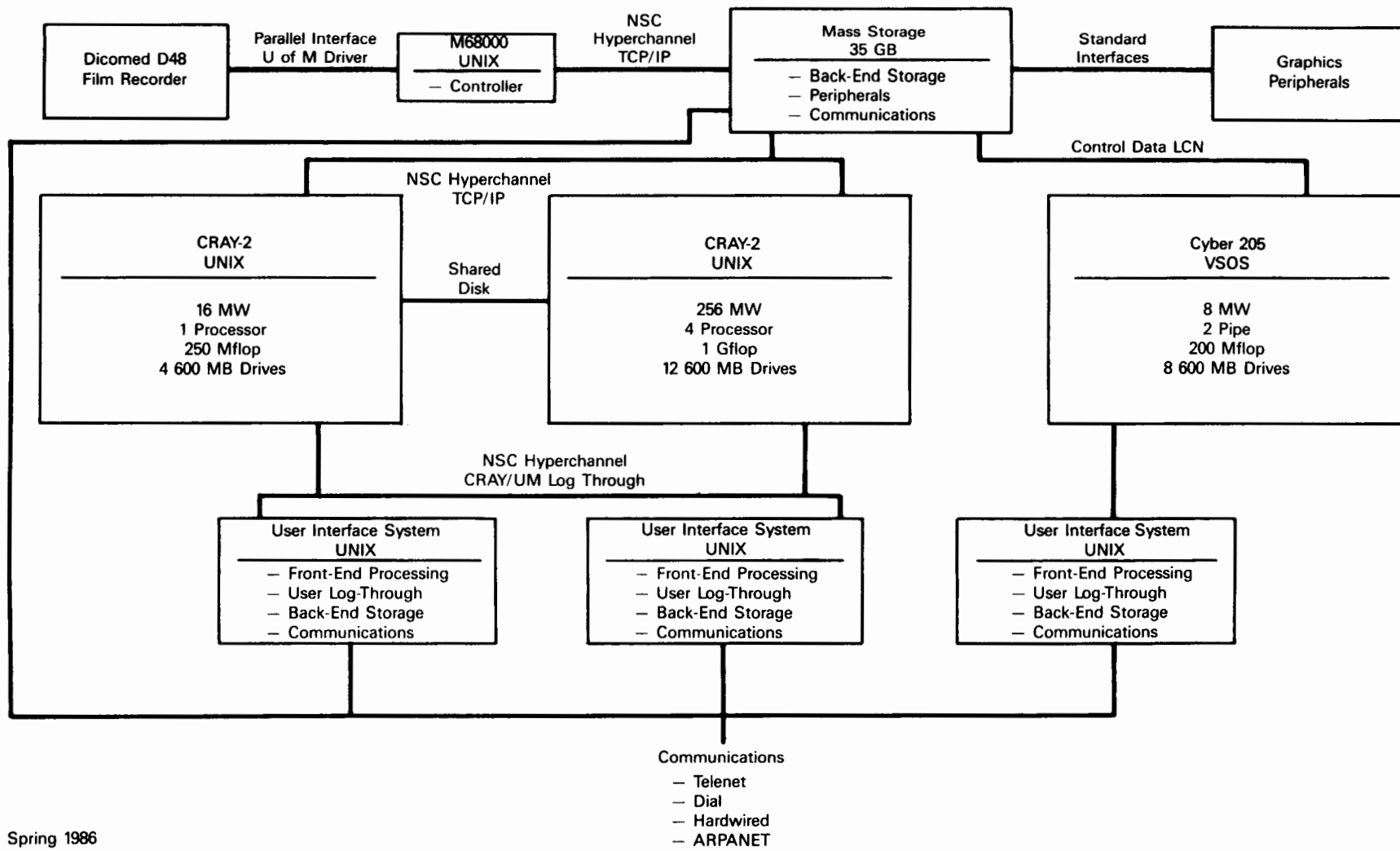


Figure 2.8-1. Minnesota Supercomputer Configuration

- 
- Supercomputer: Cyber 205 (until 1987)
    - Number of Pipelines: 2
    - Memory:  $8 \times 10^6$  64-bit words
    - Local Disk Storage:  $4.8 \times 10^9$  bytes
    - Peak Speed:  $200 \times 10^6$  flops
    - Operating System: VSOS
  
  - Other Computer: IBM 4381 (back-end)
    - Number of Processors: 1
    - Memory:  $8 \times 10^6$  bytes
    - Local Disk Storage:  $3.5 \times 10^9$  bytes
    - Operating System: MVS
  
  - Other Computer: VAX 11/750 (front-end)
    - Number of Processors: 1
    - Operating System: UNIX
  
  - Other Computer: VAX 11/750 (front-end)
    - Number of Processors: 1
    - Operating System: UNIX
  
  - Other Computer: Cyber 810
    - Number of Processors: 1
    - Operating System: NOS/VE

The system also includes the following peripherals:

- 2 7-track tape drives, 150 ips, 200, 556, and 800 bpi
  - 5 9-track tape drives, 150 ips, 1600 and 6250 bpi
  - 5 9-track tape drives, 200 ips, 800 and 1600 bpi
  - 1 card punch
  - 1 card reader
  - Printers
  - 1 Varian Statos 42 electrostatic plotter
  - 1 Calcomp 1012 four-pen plotter
  - 2 Dicomed D-48 color film recorders.
-



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**SOFTWARE**

Table 2.8-1 shows the software supported by the CRAY and Cyber machines.

**COMMUNICATIONS**

At present, six methods are available for accessing MSI supercomputers.

- ARPANET: 56 kbps connection to sites of the Defense Data Network
- GTE Telenet: public packet-switched data communication network
- REI Remote Access Network: access
- SCI Campus Iternet: campus access
- Dial-up lines:
  - Asynchronous access at 110-1200 bps
  - Synchronous access at 2400-4800 bps using HASP, UT200, or 2780/3780
- Hardwired lines:
  - Asynchronous access at 1200-9600 bps
  - Synchronous access at 4800-5600 bps using HASP, UT200, or 2780/3780

**ACCESS**

The services of MSI are available to researchers funded by NSF and to other academic and industrial researchers.

Allocation

Researchers funded by NSF who wish to access MSI should contact the appropriate NSF research program. (See "Grants for Scientific and Engineering Research," NSF 83-57.) Other researchers must obtain access through Research Equipment, Incorporated (REI), which provides computing services to organizations not involved in research subsidized by NSF:

Research Equipment, Incorporated  
2520 Broadway Drive  
Lauderdale, Minnesota 55113  
Telephone: (612) 373-7878

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**Table 2.8-1. Software Supported by the CRAY and Cyber Machines**

	CRAY-2	Cyber 205
<b>Language Processors</b>		
FORTRAN		
CPT 1.11/1.13	X	
FORTRAN 200 V.1		X
C		
Bell Labs Exportable C Compiler	X	
Pascal		
Standard Pascal	X	
<b>Programming Utilities</b>		
VAST (Vector and Syntax Translator)		X
CIA (execution time distribution analysis)		X
<b>Mathematical Libraries</b>		
BESPACK Bessel (and other) functions	X	
BSPLINE B-spline interpolation routines	X	
EISPACK eigenvalue/vector routines	X	X
EPISODE ordinary differential equation solution routines	X	
FUNPACK special nonlinear routines	X	
GRG2 constrained nonlinear routines	X	
IMSL mathematical and statistical routines	X	
LINPACK linear routines	X	X
LSODE differential equation solution routines	X	
MAGEV (Mathematical and Geophysical Vector library)		X
MINNLIB mathematical routines	X	
MINPACK unconstrained nonlinear minimization and least square routines	X	X
MO1LIB-MO8LIB mathematical routines	X	
PCGPAK iterative method matrix routines	X	
QQLIB matrix routines optimized for the CYBER 205		X
SCILIB CRAY research scientific routines	X	
YSMPLIB Yale sparse matrix functions	X	
<b>Graphics Libraries/Packages</b>		
D13000 core standard subroutine library	X	
DISSPLA sophisticated plotting subroutine library	X	
MNCORE Minnesota standard subroutine library	X	

**Table 2.8-1. Software Supported by the CRAY and Cyber Machines  
(continued)**

	CRAY-2	Cyber 205
<b>Graphics/Libraries Packages (continued)</b>		
MOVIE. BYU sophisticated graphics package	X	
PLOTAL Calcomp plotting subroutine library	X	
PLOTPAC elementary plotting subroutine library	X	
<b>Application Packages</b>		
DARE continuous system simulation	X	
FLO22, FLO57 aerodynamic flow simulation	X	
FORSIM ordinary and partial differential equation solver	X	
GAUSSIAN82 molecular orbit calculations	X	
MPOS multipurpose optimization	X	
NONSAP nonlinear structural analysis	X	
SAP linear structural analysis	X	
SPICE circuit simulation	X	
SPSS statistical analysis	X	

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System  
Availability

MSI operates 24 hours per day, 7 days a week, except during periods of scheduled maintenance.

Documentation

Packets of information are supplied to all new MSI users. In addition, an extensive line of CRAY, CDC, and UNIX manuals, as well as MSI publications, is available.

Consultation  
and Training

A full range of user services is available:

- Consultation
  - MSI Fellows provide application specific assistance. See Figure 2.8-2 for the mailing list
  - 7:00 a.m. to 7:00 p.m. (Central Time), Monday through Friday (612) 376-9628
  - By electronic mail to topic-specified mailboxes
  - In person onsite
- Education:
  - Cyber 205: as needed
  - CRAY 2: regular 3-day workshops
  - Specialized training as requested.

Cost

The cost of using MSI resources is \$1,000 per CPU hour (Cyber 205) or \$3000 per CPU hour (CRAY). Front-end, back-end, peripheral, and storage costs are also levied. Rates are determined by cost recovery on estimated annual use. Contact REI for further information.

FUTURE PLANS

The ETA-10 will replace the Cyber 205 in 1987. In addition, MSI will acquire early versions of CRAY 3 and the ETA-30.

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**ADDRESS**

MSI is situated near the campus of the University of Minnesota at the following address:

Minnesota Supercomputer Institute  
1200 Washington Avenue South  
Minneapolis, Minnesota 55415  
(612) 339-0230

Professor J.P. Moran  
Aerospace Eng. & Mech.  
107 Akerman  
University of Minnesota  
Minneapolis, MN 55455

Professor Paul Woodward  
Astronomy  
356 Physics  
University of Minnesota  
Minneapolis, MN 55455

Professor L.E. Scriven  
Chem. Eng. & Mat. Science  
151 Amundson  
University of Minnesota  
Minneapolis, MN 55455

Professor H.T. Davis  
Chem. Eng. & Mat. Science  
151 Amundson  
University of Minnesota  
Minneapolis, MN 55455

Professor Donald Truhlar  
Chemistry  
139 Smith  
University of Minnesota  
Minneapolis, MN 55455

Professor J.B. Rosen  
Computer Science  
136 Lind  
University of Minnesota  
Minneapolis, MN 55455

Professor Oscar Ibarra  
Computer Science  
136 Lind  
University of Minnesota  
Minneapolis, MN 55455

Professor Christopher Sims  
Economics  
1035 Mgmt./Econ.  
University of Minnesota  
Minneapolis, MN 55455

Professor David Yuen  
Geology  
108 Pillsbury  
University of Minnesota  
Minneapolis, MN 55455

Professor Dennis Hejhal  
Mathematics  
127 Vincent  
University of Minnesota  
Minneapolis, MN 55455

Professor George Sell  
Mathematics  
127 Vincent  
University of Minnesota  
Minneapolis, MN 55455

Professor S.V. Patankar  
Mech. Eng.  
125 Mech. Eng.  
University of Minnesota  
Minneapolis, MN 55455

Professor Aneesur Rahman  
Physics Dept.  
148 Physics  
University of Minnesota  
Minneapolis, MN 55455

Professor Richard McGehee  
Mathematics  
127 Vincent  
University of Minnesota  
Minneapolis, MN 55455

**Figure 2.8-2. Fellows Mailing List**

Professor D. Thomas  
Biochemistry  
4-225 Millard Hall  
University of Minnesota  
Minneapolis, MN 55455

Professor Mitchell Luskin  
Mathematics  
127 Vincent  
University of Minnesota  
Minneapolis, MN 55455

Professor Jan Almlöf  
Chemistry  
139 Smith  
University of Minnesota  
Minneapolis, MN 55455

Professor John Zabolitzky  
Physics  
148 Physics  
University of Minnesota  
Minneapolis, MN 55455

Professor Sartaj Sahni  
Computer Science  
136 Lind  
University of Minnesota  
Minneapolis, MN 55455

Professor David Fox  
Computer Science  
136 Lund Hall  
University of Minnesota  
Minneapolis, MN 55455

Professor Richard Kain  
Elec. Eng.  
139 Elec. Eng.  
University of Minnesota  
Minneapolis, MN 55455

Professor K.F. Jensen  
Chem. Eng. and Mat. Science  
151 Amundson  
University of Minnesota  
Minneapolis, MN 55455

**Figure 2.8-2. Fellows Mailing List (continued)**

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**PUCC FACTS**

**Configuration**

CDC Cyber 205

DEC VAX 11/780

CDC 6600

CDC 6500

Peripherals

**Software**

Language processors

Programming utilities

Mathematics/Statistics libraries

Graphics libraries/packages

Applications packages

**Communications**

ARPANET

GTE Telenet

CS Net

Indiana University Network

Dial-up lines

**Access**

Allocations by National Science Foundation and Purdue University

Center systems available 24 hours per day, 7 days per week

Documentation, consultation, and training available

Cost determined by amount of System Billing Units used

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PURDUE UNIVERSITY COMPUTING CENTER

The Purdue University Computing Center (Pucc) is one of six National Science Foundation (NSF) Supercomputer Resource Centers.

CONFIGURATION

Figure 2.9-1 illustrates the Pucc configuration, which consists of the hardware identified below.

- CDC Cyber 205 Supercomputer
  - Number of pipelines: 2
  - Memory:  $2 \times 10^6$  64-bit words
  - Local disk storage:  $4.8 \times 10^9$  bytes
  - Operating system: VSOS 2.1.6
- DEC VAX 11/780 Computer (front-end)
  - Number of processors: 1
  - Memory:  $8 \times 10^6$  bytes
  - Local disk storage:  $1.3 \times 10^9$  bytes
  - Operating system: UNIX 4.2 bsd
- CDC 6600 Computer (front-end)
  - Number of processors: 1
  - Memory:  $0.128 \times 10^6$  60-bit words
  - Local disk storage: shares  $6.5 \times 10^9$  bytes with the CDC 6500
  - Operating system: MACE
- CDC 6500 Computer (front-end)
  - Number of processors: 1
  - Memory:  $0.128 \times 10^6$  60-bit words
  - Local disk storage: shares  $6.5 \times 10^9$  bytes with the CDC 6600
  - Operating System: MACE

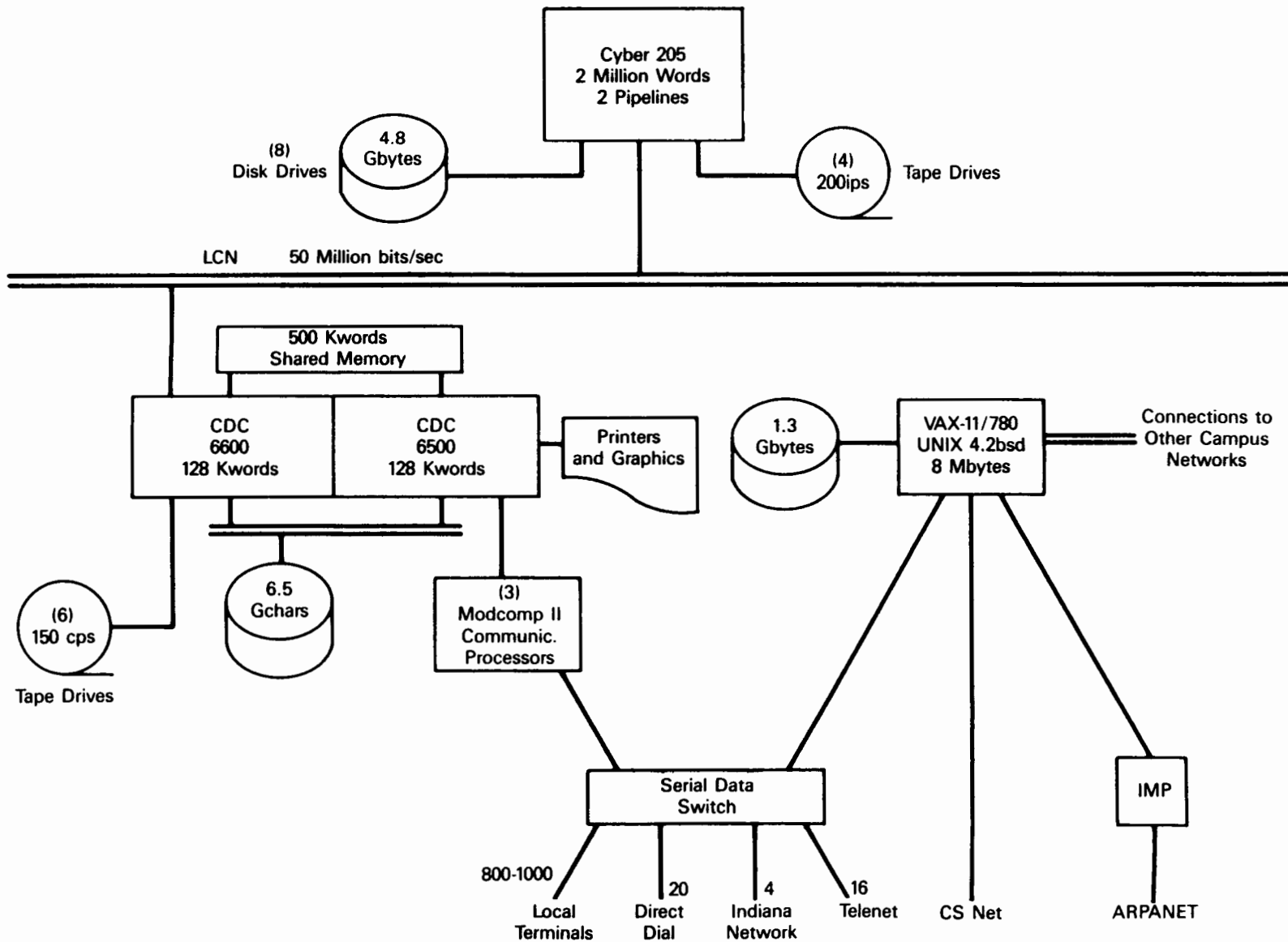


Figure 2.9-1. Purdue University Cyber 205 System

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- Peripherals

- CDC Cyber 205: 4 1600/6250 BPI tape drives
- CDC 6600/6500: 6 800/1000/6250 BPI tape drives  
CalComp plotter  
Versatec plotter

## SOFTWARE

The software and data bases are as follows:

- Language Processors

- FORTRAN-77: optimizing vectorizing compiler
- VAST: (Vector and Array Syntax Translator)  
FORTRAN pre-processor vectorizer)
- IMPL: system implementation language
- META: assembler

- Utilities

- MFLINK: file transfer to/from front-end
- UPDATE: source program librarian
- LIBEDIT: Purdue object librarian
- OLE: CDC object librarian
- DEBUG: symbolic breakpoint/dump
- PMD: Postmortem Dump Analyzer from University  
of Manchester
- PROFILE: execution-time distribution analyzer
- SRCCOM: source file comparison

- Mathematical Software

- IMSL: International Mathematical and Statistical  
Library--over 500 available routines
- MAGEV: Mathematical and Geophysical Vector  
Library--routines designed specifically  
for the 205

- 
- EISPACK: eigenvalue routines
  - FUNPACK: function generation routines
  - LINPACK: linear systems routines
  - TPTFFT: Temperton FFT package designed for the 205
  - ITPACK: large sparse linear system solvers
  - LINEQ1: linear equation solver (developed at Purdue)
  - XMP: linear programming routines
  - Graphics Libraries
    - DI-3000: CORE standard routines from Precision Visuals including GRAFMAKER, Metafile, and Contouring
    - NCAR: graphics utilities from the National Center for Atmospheric Research
    - PEPL: Purdue Extended Plotting Library (based on the CalComp routines)
    - WRITEEP: bit-mapped image processing routines for electrostatic printer output
  - Applications software and data bases
    - SPSS-X: new extended version of SPSS statistical package
    - SLAM II: Simulation Language for Alternative Methodologies
    - KYST: multidimensional scaling package
    - MINOS: linear/nonlinear programming package.

COMMUNICATIONS Center systems can be accessed by the following:

- ARPANET: 56 kbps links to sites on DDN

- 
- GTE Telenet: public packet switched data communications network
  - CS Net: X25 net access
  - Indiana University Network
  - Dial-up lines: Access at 300-1200 bps (317-494-1900).

#### ACCESS

Access specifications and services are identified below.

#### Allocation

Allocations are granted by NSF and Purdue University. Contact Ms. Irene Lombardo at the NSF Office of Advanced Scientific Computing at (202) 357-7558 or Dr. Saul Rosen at the address listed at the end of this section.

#### System Availability

Center systems are available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

#### Documentation

CDC manuals for the Cyber 205 can be purchased through Purdue or from Control Data Corporation. PUCG also publishes a number of short manuals on specific subjects that are available at no charge through PUCG. In addition, a newsletter is published eight times per year, also without charge to users.

#### Consultation

Call-in consulting is available from 8:00 a.m. to 9:30 p.m. Eastern Standard Time, Monday through Friday, at (317) 494-1787. Assistance is also available through on-line electronic mail and through the on-line suggestion facility. On-site consultation is available to persons visiting the campus.

#### Training

A 3-day seminar on the use of the CYBER 205 is offered every 2 to 3 months, as needed. In addition, short courses are offered in the evening three times per year, at the beginning of each academic session, in June, September, and January.

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Cost

Cost is determined by the amount of System Billing Units (SBU) used. One SBU is principally one Central Processing Unit (CPU) second, but it also includes Input/Output and paging. One SBU is \$0.278, which translates to \$1,000 per machine hour.

**FUTURE PLANS**

Not known

**ADDRESS**

Purdue University Computing Center  
Mathematical Sciences Building  
West Lafayette, Indiana 47907  
(317) 494-1787

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**UNIVERSITY COMPUTER CENTER FACTS**

**Configuration**      Cyber 205  
                         Cyber 830  
                         Cyber 840  
                         Peripherals

**Software**            Language processors  
                         Mathematics/Statistics libraries  
                         Graphics libraries/packages  
                         Applications packages  
                         Data base management systems  
                         Text editors

**Communications**    BITNET  
                         GTE Telenet  
                         Dial-up lines  
                         Dedicated lines  
                         Colorado network (partially operational)

**Access**              Allocations provided by NSF and CSU  
                         Systems available 24 hours per day, 7 days per week  
                         Documentation, consultation, and training available  
                         Cost determined according to Central Processing Unit,  
                         Input/Output, storage, and priority

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## UNIVERSITY COMPUTER CENTER

Most of the computers at Colorado State University (CSU), one of six National Science Foundation (NSF) Supercomputer Resource Centers, are located at Main Site in the basement of the Engineering Building. A variety of powerful work stations are at the Center for Computer Assisted Engineering (CCAЕ) in the Glover Building on the CSU campus. Interactive terminals, both CRT and hardcopy, are situated at various sites around campus.

Most scientific computing at CSU is provided by two mainframes belonging to the CDC 170/180 family and a CDC Cyber 205 supercomputer. The two 170/180-series machines, commonly called the GREEN and GOLD systems, support most normal computational activities, including student instruction. The Cyber 205 supercomputer is used for large-scale scientific computation, most of which is research oriented. Some graduate courses also use the Cyber 205.

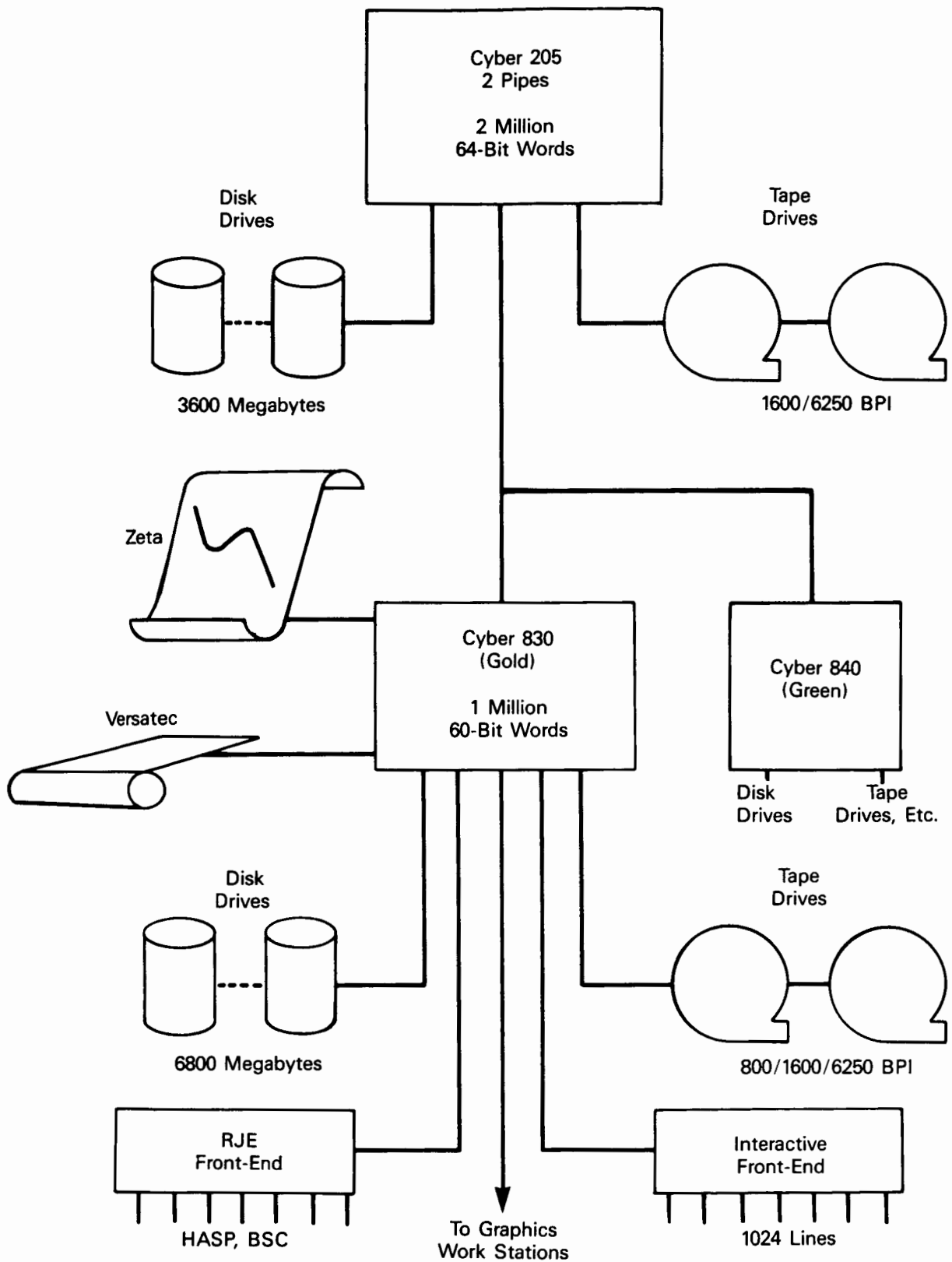
The CCAЕ is equipped with extensive state-of-the-art graphics and design tools. It supports education and research in such areas as CAD/CAM, computer-aided instruction, and artificial intelligence.

### CONFIGURATION

Figure 2.10-1 illustrates the configuration at the CSU Main Site.

- Cyber 205 Supercomputer
  - Number of pipelines: 2
  - Memory:  $2 \times 10^6$  64-bit words
  - Local disk storage:  $3.6 \times 10^9$  bytes
  - Peak speed:  $400 \times 10^6$  flops
  - Operating system: Virtual Storage Operation System (VSOS 2.2)





**Figure 2.10-1. University Computer Center at Colorado State Configuration**

- 
- Cyber 830 Computer (front end: Gold system)
    - Number of processors: 1
    - Memory:  $1 \times 10^6$  60-bit words
    - Local disk storage:  $6.8 \times 10^9$  bytes
    - Operating system: Network Operating System (NOS)
  
  - Cyber 840 Computer (Green system)
    - Number of processors: 1
    - Memory:  $1 \times 10^6$  60-bit words
    - Operating system: NOS
  
  - Peripherals
    - Magnetic tape transports: 3 CDC 679 9-track 1600/6250 bpi tape drives operational on the 205  
  
1 CDC 679 9-track 800/1600 bpi tape drive and 2 CDC 679 9-track 1600/6250 tape drives operational on the front-end 840
  
    - Printers: 1 printer at Main Site running at 1,200 lines per minute (nominal)  
  
1 printer at Main Site running at 2,000 lines per minute (nominal); 132 character positions per line; 6 and 8 vertical lines per inch  
  
A variety of printers supported by synchronous Remote Job Entry (RJE) sites at CSU locations and around the United States
  
    - Card Reader: reads 80 column keypunched cards at 1,200 cards per minute
  
    - Plotters: 1 Versatec electrostatic plotter  
1 Zeta 54-inch 4-color pen plotter

The CCAE configuration consists of the hardware identified below:

- Two Evans and Sutherland PS340 color raster work stations
  - Three Evans and Sutherland PS330 color stroke work stations
-

- 
- Ten Evans and Sutherland PS320 black and white stroke work stations
  - DEC PDP 11/34.

## SOFTWARE

The following software is available on the Cyber 840 and the Cyber 205. Products available on both systems are flagged with a (B) and those available only on the 205 are marked with a (205). All other products are available on the 825.

- Languages available on the Cyber 205
  - FORTRAN compiler compatible with FORTRAN-77; the compiler offers substantial extensions to the language, which enhance the availability of the machine's vector-processing capabilities.
- Languages available on the Cyber 840
  - BASIC
  - COBOL
  - FORTRAN-77
  - PASCAL
  - LISP
  - SIMSCRIPT
  - SNOBOL4
- Mathematics and Statistics Packages
  - BMDP: batch oriented biomedical statistics
  - BMDPFIL: conversion from SPSS to BMDP
  - CLUSTAN: cluster analysis packages
  - CMLIB: NBS general mathematical and statistical library (205)
  - EISPACK: eigenvalue problems (B)
  - GENSTAT: general statistics
  - GLIM: fitting models to data sets

- 
- IMSL: general mathematical and statistical library (B)
  - ITPACK: sparse linear systems (205)
  - LINPACKV: operations on linear systems (205)
  - MAGEV: matrix manipulations, FFT's, sorting (205)
  - MAPV3: matrix algebra manipulations
  - MINITAB: general purpose interactive statistics
  - NAG: general mathematical and statistical library (205)
  - NCARLIB: general mathematical library from NCAR (205)
  - SPSS: general statistics
  - STATLIB: regression, analysis of variance and covariance
  - TSP: time series processor
- Mathematical Optimization Packages
    - LINDO: linear, mixed integer and quadratic
    - LPSA: simplex method
    - OPTIMIZ: sensitivity analysis
    - SOL/NPSOL: nonlinear programming (205)
- Applications Packages
    - HEC: U.S. Army Corps of Engineers hydrologic models (B)
    - SAP: linear structural analysis
    - SMIS: matrix algebra manipulations for structures
    - STRESS: structural engineering
    - SWMM: EPA Stormwater Management Model (205)
-

- 
- WESTEX: Lake Water Quality Model (205)
  - SIMSCRIPT: Simulator Package
  - SLAM: Simulator Package
  - Data Base Management Systems
    - RIM: relational DBMS
    - SIR: scientific hierarchical/network DBMS
    - System 2000: generalized hierarchical DBMS
  - Graphics Packages
    - CPS-1: high-performance contour plotting system (B)
    - DISSPLA: general graphics library
    - EZGRAPH: interactive graphics package
    - IGP: interactive graphics package
    - MAPA: line printer graphics
    - TEKLIB: Tektronix graphics package
    - VERSA: Versatec plotting routines
  - Text Editors
    - XEDIT:
    - EDIT:
    - FSE: (CDC Full Screen Editor)

#### COMMUNICATIONS

Access to CSU computers is available through the following:

- BITNET: 9600 bps connection to over 1,200 hosts worldwide using IBM RSCS (Remote Spooling Communications Subsystem) protocol; gateways to ARPANET and CSNet
- GTE TELENET: general public packet switched data communications network

- 
- Dial-up lines: asynchronous interactive terminals at 300-2400 bps; synchronous batch terminals at 4800 bps using HASP, or BSC (Bisynchronous) protocols
  - Dedicated lines: synchronous batch up to 56 kbps
  - Colorado network: partially operational.

#### **ACCESS**

Access requirements and services are identified below.

#### **Allocation**

Allocations are granted by NSF and CSU. Prospective users should contact Ms. Irene Lombardo at the NSF Office of Advanced Scientific Computing at (202) 357-7558 or Mr. John Cooley at (303) 491-6017. The address for Mr. Cooley is the same as that for the University Computer Center, given at the end of this section.

#### **System Availability**

Center systems are available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

#### **Documentation**

New users can obtain a copy of the University Computer Center User's Guide from the CSU Computer Store, (303) 491-7625. This document details the facilities and available software and describes additional documentation.

#### **Consultation**

Information on all systems may be obtained at (303) 491-7276. Consultation concerning the Cyber 205 is available at (303) 491-1578, (303) 491-6293, and (303) 491-6017. Personnel are available at these telephone numbers from 8:00 a.m. to 5:00 p.m. Rocky Mountain Time.

#### **Training**

Cyber 205 workshops are conducted several times per year. Additional sessions are held according to need.

---

Cost

The Job Price (JP) formula is:  $JP = 1/3600 \times R \times SBU$ , where SBU is the number of System Billing Units shown in the last line of the day file. SBU includes Central Processing Time, disk access, I/O, priority, and storage.

The charging method for computer usage on the Cyber 830 is based upon a System Resource Unit (SRU). The SRU is a composite measure of the resources used by a job. The cost of a job is determined by multiplying the SRU's by a dollar rate of \$0.075/SRU.

**FUTURE PLANS**

Plans include the following:

- Add to the memory and storage capacity of the Cyber 205
- Implement regional network and campus network
- Migrate to a multi-processor, supercomputer, such as the ETA-10.

**ADDRESS**

University Computer Center  
University Services Center  
Colorado State University  
Fort Collins, Colorado 80523  
(303) 491-6900

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ACMC FACTS

Configuration      Cyber 205

CYBERPLUS

Cyber 170-845

Peripherals

Software            Language processors

Programming utilities

Mathematics/Statistics libraries

Graphics libraries/packages

Applications packages

Communications      USCN (University System of Georgia Computer Network)

WATS and local area lines

Access                Researchers encouraged in all areas with large computational requirements: Advanced computer architectures, artificial intelligence, mathematical and numerical algorithm development, and the computer simulation of physical processes

Allocations by the University of Georgia

Center systems available 24 hours per day, 7 days per week

Documentation, consultation, and training available

Cost determined by use of System Billing Units

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ADVANCED COMPUTATIONAL METHODS CENTER

The primary objectives of the Advanced Computational Methods Center (ACMC), established by the University of Georgia, are as follows:

- To provide a research facility, within a university setting, for development of the computational methods necessary for effective use of large-scale parallel and vector processing computer systems
- To provide an educational environment for training personnel to support application development using high performance parallel and vector processing computer systems
- To stimulate cooperative efforts between academic researchers and innovative industry leaders to promote business ventures requiring large-scale computer simulations and analysis
- To provide a State and regional computing facility for support of educational, Governmental, and industrial applied research activities requiring large-scale computing resources.

The ACMC has a mandate to provide advanced computational services to the State of Georgia. It has accordingly developed several outreach programs designed to make the benefits of the supercomputer available to a broad range of disciplines. Among these outreach programs are the two listed below:

- MEDCOMP Southeast: a consortium of Southeastern medical schools
- PANCOMP U.S.A.: a consortium of historically black colleges and universities.

---

CONFIGURATION

The ACMC configuration consists of the hardware identified below.

- Cyber 205 Supercomputer
  - Number of pipelines:
  - Memory:  $2 \times 10^6$  64-bit words
  - Local disk storage:  $64 \times 10^9$  bytes
  - Peak speed:  $400 \times 10^6$  flops
  - Operating system: Virtual Storage Operating System (VSOS 2.1.6)
- CYBERPLUS Supercomputer
  - Number of processors: 3
- Cyber 170-845 Computer (front-end)
  - Number of processors: 1
  - Operating system: Network Operating System (NOS 2.2)
- Peripherals

SOFTWARE

The software supported by the Cyber 205 is as follows.

- Languages
  - CDC FORTRAN 200
  - CDC Cyber 200 META Assembler
  - CDC Cyber 200 IMPL
- Utility Aids
  - COMBINE
  - COMPARE
  - C2SORT
  - DUMP
  - LOOK
  - OLE
  - VAST
  - PADCOM
  - REQTEMP
  - RHF
  - CIA
  - UPDATE

---

- **Mathematical and Service Libraries**

- EISPACK
- IMSL
- LINPACK
- MINPACK
- MSSLIB
- QQLIB
- MATHPACK
- B-SPLINE
- EDA
- LLSQ
- ROSEPACK
- TOEPLITZ
- ELEFUNT
- ALLMAT
- PAP
- BFGS
- CONMIN
- NMLE3
- NUMING
- SCT
- RKSETP
- RFT1
- Various other packages

- **Graphics Support**

- PLOTLIB
- HIDDEN LINE
- GRAPHPAK
- BLOCKS
- Various other graphics packages

- **Application Packages**

- UAI/NASTRAN
- Piping Flexibility Analysis (MEL-40)

The following services programs and languages are available with the CYBERPLUS system:

- CYBERPLUS
- CYBERPLUS Micro-Code Cross Assembler (MICA)
- CYBERPLUS NOS Simulator (ECHOS)
- CYBERPLUS Debug
- NOS CYBERPLUS Support.

---

The Cyber 170-845 supports software suitable to its identified functions as front-end for the following:

- Cyber 205
- CYBERPLUS.

#### COMMUNICATIONS

Interactive and batch telecommunications access to computer services is available through the University System of Georgia Computer Network (USCN) and through WATS lines:

- USCN
  - Services 33 State-supported institutions in the University System of Georgia
  - Makes access available to remote locations in the Southeast through a leased line to the nearest node
  - Supports synchronous connections up to 9.6 kbps using HASP, UT200, or 3780 protocols
  - Supports asynchronous connections up to 1200 bps
- WATS lines
  - Provides remote access via dial-up lines that supports both synchronous and asynchronous connections.

#### ACCESS

The ACMC will consider prospective users from any non-classified research area, but encourages work in the areas of advanced computer architectures, artificial intelligence, and the computer simulation of physical processes. Access requirements and services are specified below.

#### Allocation

Allocations are made by the ACMC at the University of Georgia. Long-range plans may limit vector processing access to educators and scientists in the Southeast, although the parallel processing supercomputing effort will remain available to all qualified outside users.

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System  
Availability

Center systems are available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

Documentation

Both on-line and off-line documentation is available, as are tutorials. Cyber and CDC literature are available at the University of Georgia bookstore. In addition, an ACMC newsletter is published regularly.

Consultation

All ACMC staff members are available for consultation. Each user is assigned a specific technical support specialist when he or she establishes an account. Two levels of support are available:

- o Level 1 is technical assistance, which is provided without charge
- o Level 2 is consulting assistance, provided on a fee or service contract basis.

The standard rate for consulting services is \$50.00 per hour, plus travel (if required).

Staff members can be reached at (404) 542-5110.

Training

New Cyber users are required to take a 2-day course, offered four times per year, on Cyber 205 or CYBERPLUS. The introductory courses can also be offered at a remote site, at user expense.

Cost

Cost is determined according to the use of System Billing Units (SBU) for the Cyber 205, System Resource Units (SRU) for the Cyber 845, and Physical Resource Units, Input/Output, peripheral use, and priority.

---

**FUTURE PLANS**

ACMC plans include the following:

- Replace the WATS access with a public value-added packet switched data communications network
- Replace the Cyber 205 with an ETA-10
- Expand the CYBERPLUS parallel processor to a configuration of 10 central processing units.

**ADDRESS**

Advanced Computational Methods Center  
University of Georgia  
Computer Services Annex Building  
Athens, Georgia 30602  
(404) 542-5110

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**BOEING COMPUTER SERVICES DATA CENTER FACTS**

**Configuration**      **CRAY X-MP/24**

2 Cyber 760s

Cyber 875

2 IBM 3031s

Cyber 730

Cyber 825

Peripherals

**Software**            **Language processors**

Programming utilities

Mathematics/Statistics libraries

Graphics libraries/packages

Applications packages

**Communications**    **Boeing Network**

**Access**              **Computer time may be purchased through Boeing Computer Services**

Systems available 24 hours per day, 7 days per week

Extensive documentation, consultation, and training available to users

Cost dependent on number of System Resource Units or Computer Charging Units used

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## BOEING COMPUTER SERVICES DATA CENTER

The Boeing Computer Services (BCS) Data Center is one of six National Science Foundation (NSF) Supercomputer Resource Centers. It consists of MAINSTREAM-EKS, which is a CDC Cyber-based mainframe service, and MAINSTREAM-VSP, a CRAY-based supercomputer service.

### CONFIGURATION

Figure 2.12-1 delineates the current configuration, which consists of the following hardware.

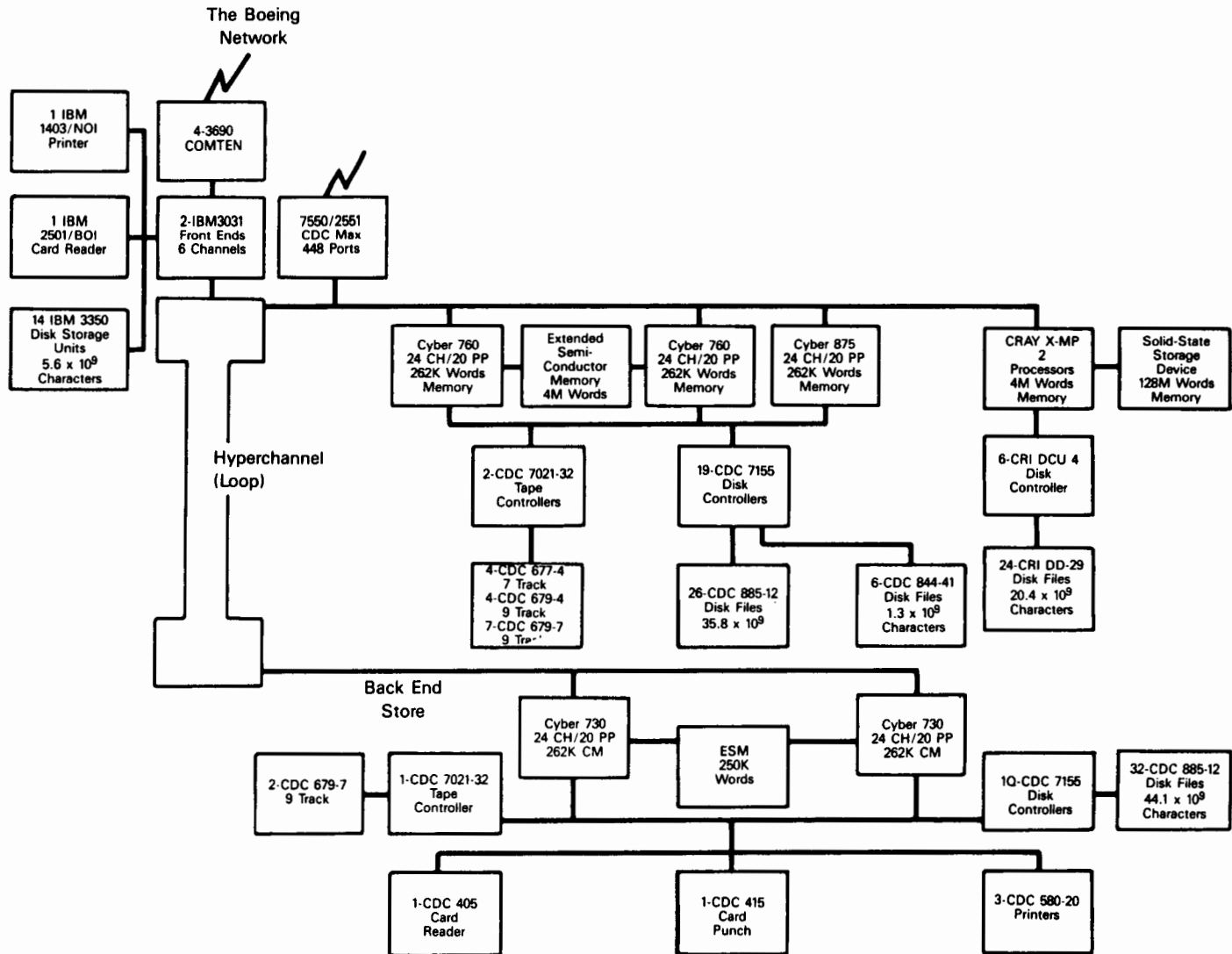
- CRAY X-MP/24 Supercomputer (MAINSTREAM-VSP)
  - Number of processors: 2
  - Memory:  $4 \times 10^6$  64-bit words plus  $128 \times 10^6$  64-bit words
  - Local disk storage:  $20.4 \times 10^9$  bytes
  - Peak speed:  $200 \times 10^6$  per processor
  - Operating system: COS 1.12 (BCS Enhanced CRAY Operation System)
  
- Cyber 760 Computer
  - Number of processors: 1
  - Memory:  $0.262 \times 10^6$  60-bit words\*
  - Local disk storage: see \*\*
  - Operating system: NOS 2.3 (BCS Enhanced Network Operating System)
  
- Cyber 760 Computer
  - Number of processors: 1
  - Memory:  $0.262 \times 10^6$  60-bit words\*
  - Local disk storage: see \*\*
  - Operating system: NOS 2.3

---

\*B and C share  $4 \times 10^6$  60-bit words of extended memory.  
\*\*B, C, and D share  $37.1 \times 10^9$  bytes local disk storage.

---





**Figure 2.12-1. Boeing Computer Services Data Center Mainstream-EKS/VSP Configuration**

- 
- Cyber 875 Computer
    - Number of processors: 1
    - Memory:  $0.262 \times 10^6$  60-bit words
    - Local disk storage: \*see \*\*
    - Operating system: NOS 2.3
  - 2 IBM 3031 Computers (front-end)
    - Number of processors: 1 each
    - Local disk storage:  $5.6 \times 10^9$  bytes shared
  - Cyber 730 Computer
    - Number of Processors: 1
    - Memory:  $0.262 \times 10^6$  60-bit words\*\*\*
    - Local disk storage: see \*\*\*\*
    - Operating system: NOS 2.3
  - Cyber 825
    - Number of processors: 1
    - Memory:  $0.262 \times 10^6$  60-bit words\*\*\*
    - Local disk storage: see \*\*\*\*
    - Operating system: NOS 2.3
  - Peripherals
    - 4 CDC 677/4, 7-track, 556/800 bpi 200 ips tape drives
    - 4 CDC 679/4, 9-track, 1600/6250 bpi, 200 ips tape drives
    - 9 CDC 679/7, 9-track, 1600/6250 bpi, 200 ips tape drives
    - Printers: 3 CDC 580-20; IBM 2501-801
    - Card readers: CDC 405; IBM 2501-801
    - Card Punch: CDC 415
    - CALCOMP 1051 plotter
    - COMP 80 Microfilm

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\*\*\*F and G share  $0.250 \times 10^6$  60-bit words extended memory.  
\*\*\*\*F and G share  $44.1 \times 10^9$  bytes.

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## SOFTWARE

Identified below is the software supported by MAINSTREAM EKS and MAINSTREAM VSP. Table 2.12-1 lists the applications by service area.

	MAINSTREAM EKS	MAINSTREAM VSP
<u>Languages</u>		
APL	X	
BASIC	X	
CAL		X
CFT		X
COBOL (ANS VERSION 4)	X	
COBOL (ANS VERSION 5)	X	
COMPASS	X	
FORTRAN (FTN)	X	
FORTRAN (FTN 5)	X	
PASCAL	X	X
<u>Utilities</u>		
CMEDIT	X	
CYBER INTERACTIVE DEBUG	X	
CYBERLOADER	X	
DATASET MANAGEMENT-VSP		X
DMS170	X	
EDIT	X	
EQUIPMENT OR FILE ASSIGN	X	X
FILE MANAGEMENT	X	
GLOBAL DATASET MANAGEMENT-VSP		X
INITIALIZE AND DUMP CENTRAL MEMORY	X	
DUMP CENTRAL MEMORY-VSP		X
GENUPD	X	
MODIFY	X	
PERMANENT FILE MANAGEMENT	X	
PERMANENT DATASET MANAGEMENT		X
PFM	X	
PFORT	X	
PLOT BCS	X	X
PROGRAM LIBRARY MAINTENANCE-VSP		X
PROGRAM LIBRARY MAINTENANCE	X	
QUE PASA		X
RECORD MANAGER	X	
SORT/MERGE	X	
XEDIT	X	
<u>Mathematics/Statistics</u>		
BCSLIB		X
VECTOR PAK		X

Table 2.12-1. List of Applications by Service Area

Civil Engineering Services

... Improving Use of Land and Water Resources Through Advanced Civil Design Techniques

FLUVIAL-11	GGWP	TTSURGE
SLOPE-II	STONER	
TSLOPE	TSTAB	

Decision Services

... Using Quantitative Tools To Improve Productivity

APEX III	BCSLIB	BMDP	EISPACK
FUNPACK	IOPNET	LEVELTWO	LINPACK
MATLAB	MINOS	MINPACK	MPLIB
PDELIB	PDS-MAGEN	SAS	SCSS
SIGLIB-SIGPRF	SIR	SOL-NPSOL	SPARSPK
SPSS	STATPK		

Energy Services

... Conserving Energy with Analysis and Conservation Productivity Aids

AESOP3	AGDOPP	ANISN	ARMP
ATHOS	CASMO-2	BLAZER	BOSIM
CASEE	COPHIN	CHEC	CLGTWR
COMMEND	DRIVE	CREAS	ERS 1
DOTIV	GATL	DRIVER	FRACANAL
FAST	GIP	FORCE	HEATING6
GASFLOW	LOADSIM	GO-2	MULTIFLOOD
KENO	NITAWL	MMS	OVER-UNDER 2
NAPS	POLEDA-80	ORIGEN	PRAM-HISRAM
PDQ7	RELAP4-MOD5	POWRSYM	RETRAN-02
PROCESS	SIMULATE-E	QUIKEE	STREALTH-GEN
RELAPN	SPEAR-BETA	RELAP5-MOD 1	
SETS		SPLICER	
SPDS-DATA LIB			

**Table 2.12-1. List of Applications by Service Area (continued)**

Energy Services (continued)

STEALTH-PIPING	STEAMFLOOD	TCM	TERRALOG
VIP	TRADE	WHAMSE	VERA-2D
	VIPRE.01		

Mechanical Design Services

... Designing in Reliability and Safety Using Nuclear/Mechanical Productivity Tools

ADLPIPE	AIRBEAR	BEASY	BSPLIB
CIRCUS-2	CSPICE	FIDAP	MITAS-2
NUPIPE	OSCAR	PANAIR	PHOENICS
PIPANL	PIPLIN	SHIPDEF	SHIPHUL
SHIPWGT	SPICE2	TPIPE	VSAERO
		VISFLOW	

Simulation Services

... Enhancing Productivity by Exploring Alternatives in a Timely and Cost-Effective Manner

ACSL	EASY5	GAUSSIAN82	SIMSCRIPT II.5
SLAM II			

Structural Design Services

... Supporting the Engineering Design Process

ANSYS	ATLAS	BIP	
DESCUS I	DESCUS II	EASE2	E3SAP
FLUSH	GTSTRUDL	KPFF	MARC
NASTRAN	PAFEC	POSTEN	SABOR-DRASTIC
SACS	SASSI	SHAKE	SMIS
SPACE V	STAAD III	STARDYNE	STRUBASE
SUPERTAB	TRAP	XTABS	

Table 2.12-1. List of Applications by Service Area (continued)

Support Services

... Increasing Productivity Through Improved Access and Display Techniques

AGII	AUGMENT	BIGS	CALCOMP
COMPARE	CPS-1	CREATABASE	CUECHART
DATACONN	DISSPLA	DI-3000	DMS-170
EZPERT	GENSTAR	GENUPD	GPCP2
INFOFETCH	MAGTAPE	NCAR	OMNILOT
PASCAL	PFM	PFORT	PLOTBCS
PLOTLIB	RIM	SACM	SAS
SCSS	SIR	SYSTEM 2000	S2KDE
S2KUI	TCS	TELLAGRAF	TIMETABLE
UNCLE			

---

**COMMUNICATIONS**

Access is provided by Boeing Network, which does the following:

- Provides local dial-up access to 160 U.S. cities; toll-free 800 access is available elsewhere
- Supports 110, 300, and 1200 baud asynchronous interactive terminals
- Supports 2400, 4800, and 9600 baud synchronous remote batch terminals using HASP Bisync 2.0/Multileave with transparency mode, 2780, 3780
- Supports Network Job Entry (NJE) for host-to-host communications with IBM, DEC, and others.

**ACCESS**

Access requirements and services are identified below.

Allocation

Requests for purchasing computer time can be made at any BCS sales office.

System  
Availability

Systems are available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

Documentation

Documentation is available on supercomputing, CRAY and Cyber manuals, BCS user and application memos, a Mathematics/Statistics newsletter identifying advances in mathematics and statistics, and extensive on-line documentation including a HELP command.

Consultation

Consultation and problem resolution on technical and operational subjects is available via a toll-free 800 number, provided to approved users.

Training

The following training is available:

- Free EKS/VSP orientation

- 
- CRAY vectorization workshops (times per year)
  - Courses on CRAY FORTRAN and CRAY JCL
  - Customized courses for a fee.

Cost

Cost depends on the number of System Resource Units or Computer Charging Units used. Details are available from BCS.

**FUTURE PLANS**

Plans for the next 2 years involve migration to UNIX. Long-range plans include keeping up with advances in parallel processing architecture and offering use of the largest and fastest commercial hardware available.

**ADDRESS**

BCS Data Center  
2800 160th Avenue, S.E.  
Boeing Computer Services  
Bellevue, Washington 98008



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**FSUCC FACTS**

**Configuration**

Cyber 205-642  
Cyber 180-835  
Cyber 170-730 (2 mainframes)  
Cyber 760  
DEC VAX 11/780  
Harris H800

**Software**

Language processors  
Programming utilities  
Mathematical/Statistical libraries  
Graphics libraries/packages  
Applications packages

**Communications**

FIRN (Florida Information Resources Network)  
Tymnet  
MFENET  
BITNET  
DECNET

**Access**

Allocations to Cyber 205 through Department of Energy or the Florida State University Policy Board Allocations Subcommittee  
  
Systems available 24 hours per day, 7 days per week  
  
Documentation and consultation available  
  
Cost on the low-end Cyber's determined by amount of System Billing Units used

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FLORIDA STATE UNIVERSITY COMPUTING CENTER

The Florida State University Computing Center (FSUCC) is an academic service unit whose purpose is to support the University's instructional and research programs. Also served are State and Federal agencies, as well as private industry participants in research activities. Additional users are encouraged to apply for access to the available resources.

Florida State University (FSU) is the first university to collaborate with the U.S. Department of Energy (DOE) to supply supercomputer services to the DOE at a non-Government laboratory facility. A separate entity at FSU, the Supercomputer Computations Research Institute is the Nation's first university-based industrial/ Government partnership in basic research and training in supercomputer computational science and technology. The Research Institute and the Computing Center, with support from the University, have worked with the Florida Legislature, the U.S. DOE, and the Control Data Corporation to obtain a supercomputer. In doing so, FSU became the fifth university in the United States to receive a supercomputer. Continuing in the tradition of being a leader in the computing field, FSUCC will receive the first ETA<sup>10</sup> (serial number one) class 7 supercomputer to be manufactured.

CONFIGURATION

Figure 2.13-1 shows the current configuration, which consists of the following hardware.

- Cyber 205
  - Number of pipelines: 2
  - Memory:  $4 \times 10^6$  64-bit words
  - Local disk storage:  $27.2 \times 10^9$  bytes
  - Peak speed:  $800 \times 10^6$  flops
  - Operating system: VSOS 2.2
- Cyber 835: Network Operating System (NOS) Version 2.4.3

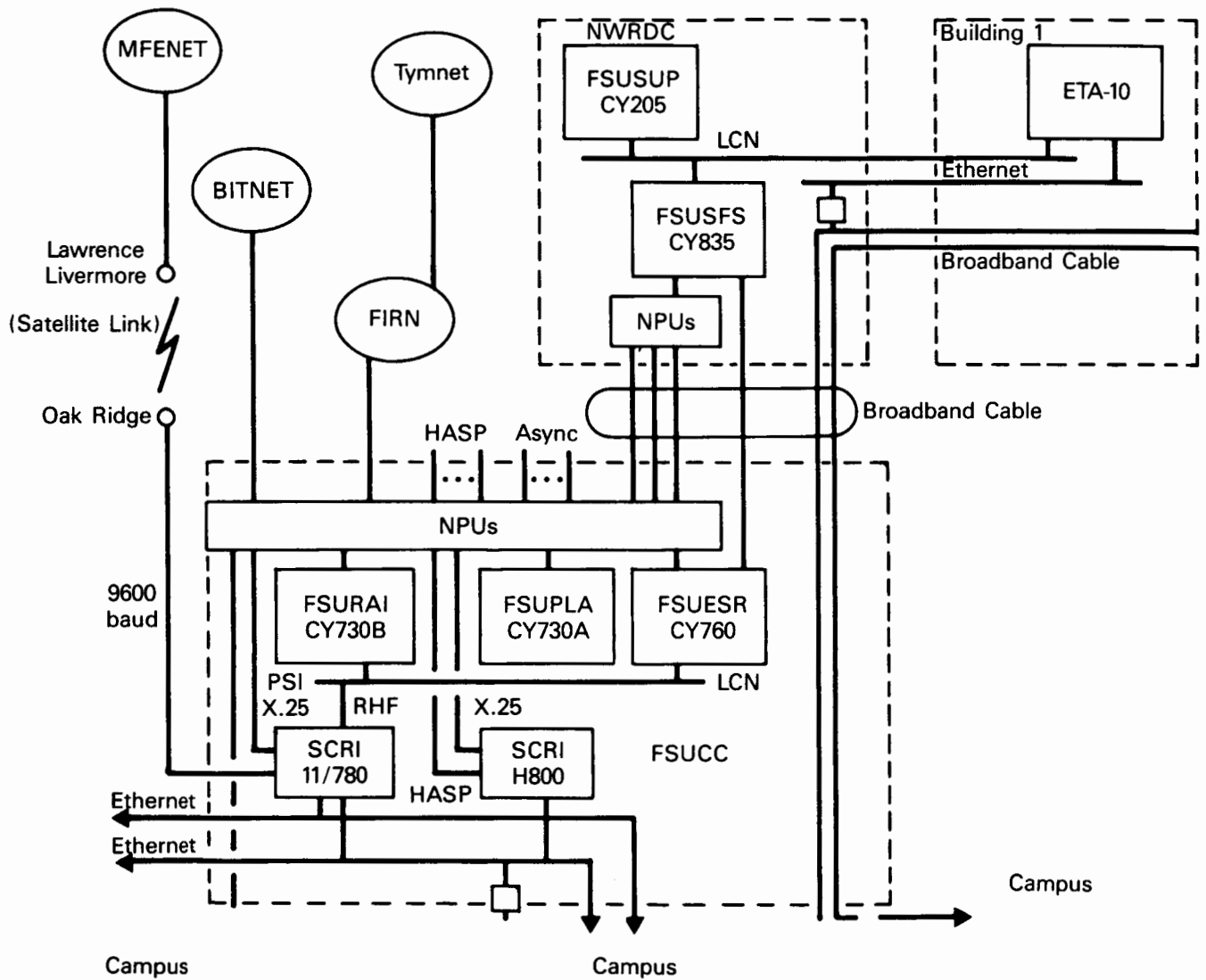


Figure 2.13-1. Florida State University

- 
- Cyber 760: Network Operating System (NOS) Version 2.4.3
  - Cyber 730: Network Operating System (NOS) Version 2.4.3
  - VAX 11/780: Virtual Memory System (VMS) Version 4.1
  - Harris H800: Virtual Storage Operating System (VSOS) Version 4.1.1

## SOFTWARE

A summary of FSUCC timesharing software available for research and instruction is presented. In addition, the pool of software compilers, libraries, and utilities identified below has been established on the Cyber 205.

### Compilers

- FORTRAN 200 (ANSI Standard 77)
- IMPL: System Implementation Language
- META: Cyber 205 Assembler
- VAST: Cyber 205 conversion aid package
- Vector C
- Pascal V: Vector Pascal

### Libraries and Utilities

- CERNLIB: library of mathematical, statistical, and utility programs
- CIA (Cyber INSTRUCTION ANALYZER): analysis of resources use by programs running on the Cyber 205
- CONVERT: utility for the conversion of unformatted WRITE data files between the Cyber 205 and front-end Cyber's
- DSS2: library of routines for the numerical integration of initial-value ordinary/partial differential equations
- DI-3000: an integrated system of graphics software tools, which can produce two- or three-dimensional graphics images
- EISPACK: collection of FORTRAN routines designed to compute eigen-values and eigenvectors for a variety of matrix problems

- 
- **FTNUTIL:**
    - **COMBINE:** utility to concatenate several files into one file
    - **LOADSTAT & VERSION:** utilities to give a FORTRAN 77 program access to information specified by the VR parameter on the LOAD statement
    - **MSSLIB:** library containing set of simulated I/O routines
    - **PADCOM:** utility to pad the length of each common block in a module to its maximum length occurring in the binary file
    - **REDUCE:** utility to reduce lengths of several files to their written lengths
    - **REQTEMP:** utility to allocate file space on scratch packs
    - **SPYLIB:** library containing "SPY," a FORTRAN-callable routine that measures the distribution of execution time in a program
  - **GRD1:** library of implicit integration routines for the numerical solution of PDEs on either fixed or adaptive spatial grids
  - **IMSL:** library containing FORTRAN mathematical, statistical, and utility routines
    - **IMSLV:** library containing some routines optimized for the Cyber 205
    - **IMSLIB77:** unoptimized, FORTRAN 77 version
    - **IMSLIB:** FORTRAN 66 version
  - **LINPACK:** collection of linear algebra routines; contains both real and complex versions
  - **MAGEV:** library of mathematical and geophysical vector routines written and optimized expressly for the Cyber 205
  - **MATHPACK:** image analysis library with linear algebra, optimization, density and distribution, and several statistical packages
-

- 
- **MINPACK:** collection of FORTRAN subroutines for the numerical solution of systems of nonlinear equations and nonlinear least squares problems
  - **NAGLIB:** FTN200 library containing algorithms for solution of numerical problems
  - **NCAR:** library of graphics and mathematics routines (pending)
  - **PORT3:** general-purpose mathematical library, with constrained and unconstrained minimizers, sparse matrix system solvers, etc.
  - **QQLIB:** library containing set of optimized FORTRAN-callable utility routines and mathematical algorithms
  - **SYMDUMP:** utility to provide structured postmortem dump for jobs running on the Cyber 205

The following summarizes the software available on the low-end Cyber's.

Compilers and  
Language  
Processors

- **BASIC (Beginner's All-purpose Symbolic Instruction Code):** language designed specifically for the novice or inexperienced programmer
- **COBOL (Common Business Oriented Language):** language was designed for business-oriented applications and problems (COBOL5, 1974 ANSI standard)
- **COMPASS (Comprehensive Assembler System):** assembly language for the CDC 6000 series, Cyber 70 series, and Cyber 170 series computers
- **FORTTRAN (Formula Translation Language):** language designed for scientific-oriented problem solving (FTN5, 1977 ANSI standard with extensions on Cyber 170's; FORTRAN 200 on Cyber 205)
- **PASCAL:** recursive, ALGOL-like language with powerful data-structuring facilities used throughout Computer Science courses
- **SPITBOL:** version of the SNOBOL 4 (Speedy Implementation of SNOBOL) language; applications range from text file manipulation to complex symbolic logic

- 
- UTLISP: list processing language

### Statistical Packages

- BMDP: set of programs which performs various statistical analyses
- LISREL: analysis of linear structural relationships by the maximum likelihood, instrumental, variable, and least squares methods
- MINITAB: interactive statistical package
- SORITEC (Sorites Econometric Package): performs broad range of statistical calculations commonly required during economic research
- SPSS (Statistical Package for the Social Sciences): system of statistical analysis functions such as regression, cross-tabulation, and analysis of variance
- SPSS/Online: interactive version of SPSS
- STATLIB: collection of FORTRAN-callable (FTN4) subroutines which performs statistical functions and matrix manipulations

### Mathematical Packages

- EISPACK: package of FORTRAN (FTN4) subroutines which performs eigen-system functions
- IMSL (International Mathematical and Statistical Library): collection of FORTRAN (FTN5) subroutines which performs various mathematical and statistical functions
- LINPACK: collection of FORTRAN (FTN4) subroutines which performs linear programming functions
- NYBLPC: linear programming package developed at the State University of New York at Buffalo

### Modeling Packages

- DYNAMO: computer program which interprets and runs continuous simulation models
- GOAL: computer program which gives the user the ability to analyze linear programming models
- IFPS (Interactive Financial Planning System): package which performs spreadsheet analysis and financial modeling

- 
- INM (Integrated Noise Model): modeling package for Airport Planners and Managers
  - SIMSCRIPT II.5: computer program which performs simulation modeling
  - WORLD2: introductory world energy model developed at Lehigh University

Graphics Packages and Mapping Programs

- AUTOMAP: set of computer mapping programs which produces line printer maps
- AUTO PLOT: computer mapping program which produces conformant maps on a graphics terminal or the electrostatic plotter
- ESGRAF (Tektronix PLOT-10 Easygraphing Program): interactive, easy-to-learn program which produces line graphs, bar charts, and pie charts
- FSU Plotting Package: set of FORTRAN (FTN5) subroutines used to produce plots
- GEOSYS: computer graphics system for the description and analysis of spatial data
- NCAR Plotting Package: set of FORTRAN (FTN4) subroutines used to produce plots, developed at the National Center for Atmospheric Research
- SURFACE II: computer software system for creation of displays of spatially distributed data
- SYMAP: computer mapping program which analyzes spatial data and produces line printer maps

Computer Based Education

- PLATO: Computer-based educational delivery system

Data Base Management Systems

- CENSPAC: Census Bureau software package
- INFOFETCH™: supports relational databases, generates transportable COBOL code, and allows for full screen data entry and editing; concurrent version allows multiple users to access and edit information at the same time
- RIM (Relations Information Management): relational data base system which can be menu or command driven



- 
- SIR/DBMS (Scientific Information Retrieval System): data base management system based on SPSS designed specifically for large or hierarchical data structures
  - SIR/FORMS: major extension to SIR/DBMS which is an integrated system for interactive, screen-oriented data entry
  - SIR/HOST: set of FORTRAN 77 (FTN5) functions which enables a SIR user to directly access a SIR Version 2 data base and which provide all the capabilities of a SIR/DBMS retrieval or retrieval update
  - SQL (Structured Query Language): developed for relational data base queries, designed to be used with SIR Version 2 data bases or with tables created from them
  - SYSTEM 2000/80: powerful and sophisticated hierarchical data base management system which features an English-like ad hoc retrieval language

Demographic  
and Economic  
Data Bases

- CENSYS: interactive data base, which produces reports maps on population and housing characteristics from the 1980 U.S. Census data; also contains Equal Employment Opportunity data
- Department of Commerce Data Bases: The Florida Department of Commerce has several data bases that are available to FSU Computing Center users
  - Trade Leads: contains international exporting opportunities, updated weekly
  - Trade Data Base: contains imports to and exports from Florida ports, the State of Florida, the eastern, western, and the entire United States; updated annually
  - State Data Bases: contains annual data for States and Florida counties with over 500 different types of yearly data, some available for 20 or more years
  - Economic Indicator Series: contains current and historical monthly economic data by Florida counties for over 30 different types of data
  - Community Profile: contains data to help companies decide where to locate facilities within Florida

- 
- Buildings, Parks, and Sites Systems: contains data on vacant industrial buildings in Florida
  - Tourism: contains current and historical data on subjects related to tourism in Florida

#### Educational Data Bases

- FIRN Science Test Item Bank: has 5,000 test questions for all areas of science, grades 9-12 (by the beginning of academic year 1985-1986, an elementary set of approximately 3,000 questions will be available, and by end December, the Junior High/Middle School set of 2,500 questions will be ready)

#### Text Editors

- EDIT: standard CDC text-editor
- FSE: text editor which allows full-screen editing
- REVISE: text editor which is more powerful and sophisticated than EDIT
- XEDIT: text editor developed at the University of Minnesota which has the ability to edit multirecord, multifile files

#### Tape Handling Utilities

- BACKPF/RESTPF: tape utilities which write the contents of a user's permanent file catalog to tape (BACKPF) and restore files from such a tape to disk (RESTPF)
- TPBLOCK/UNBLOCK: tape utilities which create a blocked tape for interchange with another computing installation (TPBLOCK), and read a blocked tape created at another computing installation (UNBLOCK)
- STAGEI/STAGEO: tape utilities which copy a local disk file to tape (STAGEO) and copy a file from tape to a local disk file (STAGEI)

#### Miscellaneous Programs and Utilities

- AMORT: amortization program producing amortization tables
- CLEAN: program which checks the validity of a fixed-field data file
- COST: calculates cost of current job
- EXPLAIN: CDC online manuals documentation system

- 
- LIBAIDS: set of library management procedures which allows a user to easily maintain program libraries through MODIFY, UPDATE, or LIBEDIT
  - MAIL: user communication program allowing users to send and receive messages
  - MLABELS: generalized label printing program
  - PFUSAGE: reports permanent file usage and costs
  - PROSE: text formatting program
  - SORT/MERGE: CDC file sorting package
  - TAB: program which reformats a text file based on "tab characters" imbedded in the file
  - UNPACK/PACKIT: UNPACK--a file utility program which converts files with EOR and EOF directives to multi-record, multifile files; PACKIT reverses the process performed by UNPACK
  - USAGE: reports computer resource usage
  - PASCAL Software Tools
    - AUGMENT/ANALYZE: produces a performance measurement report on a Pascal program
    - COMPARE: compares two text files and reports the differences
    - PASCODE: decompiles a relocatable-binary file produced by the Pascal compiler
    - PASCREF: cross-references identifiers in a Pascal program and produces a procedure map
    - PASVERT: converts a text file from (to) the CDC scientific character set to (from) the CDC ASCII subset character set
    - PRETTY: a Pascal prettyprinting program
    - SPRUCE: a more flexible Pascal prettyprinting program
-

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Microcomputer  
Software

- HASTE (HASP Station Emulator): transforms a micro-computer system into a powerful yet inexpensive HASP station using the IBM HASP protocol to provide high-speed bisynchronous communication between mainframes and remote HASP stations
- KERMIT: file transfer utility that transfers files between micro and mainframe computers over ordinary asynchronous telecommunication lines using packets, checksums, and retransmission to promote data integrity

Screen  
Management  
System

- NOS Screen Formatting Facility: provides full-screen input and output capabilities for NOS procedures and for FORTRAN 5, COBOL 5, or Pascal 1.1 application programs

**COMMUNICATIONS**

Access to the FSU Cyber front-end can be categorized into interactive and file transfer. Interactive access is usually a relatively slow speed link between a terminal (or a microcomputer emulating a terminal) and the front-end. File transfer access is usually a higher speed link that provides some form of error detection/correction mechanism to ensure data integrity.

- Interactive Access
  - Direct dial, asynchronous terminals: available baud rates of 300 and 1200
  - Direct dial, synchronous HASP terminals: available baud rates of 2000, 2400, and 4800
  - FIRN (Florida Information Resources Network): interface via an X.25 host
  - Tymnet: access via a Tymnet-FIRN gateway
  - MFENET (Magnetic Fusion Energy Network): network of approximately 100 computer sites across the United States.
- File Transfer
  - MFENET: capability for transferring files between sites
  - BITNET: provision for sending mail and jobs to the Cyber front-end through a 9600 baud synchronous link

- 
- DECNET: restricted for those with access to local FSU LAW.

**ACCESS**

Access requirements and services are identified below.

Allocation

Users may acquire Cyber 205 time through the Office of Energy Research of the U.S. DOE or the Florida State University Computing Center Policy Board Allocations Subcommittee (PBASC). DOE research grant recipients have access to 65 percent of the supercomputer resources, with the balance available for research and instructional use (PBASC). Time is allocated in System Billing Units (SBU).

Users in need of mainframe services for research and development applications may contact the Supercomputer Support Group of the FSUCC to establish a user account. Users with specialized needs suited to the supercomputer may submit proposals to the FSU Policy Board Allocations Subcommittee and/or the U.S. Department of Energy. Users may contact Client Relations at (904) 644-4836 to request the Supercomputer Access Packet.

System Availability

Systems are available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

Documentation

CDC manuals for the Cyber 205 may be purchased through FSUCC directly from the Control Data Corporation. FSUCC also publishes a number of short manuals on specific subjects.

Consultation

Call-in consulting is available from 8:00 a.m. to 5:00 p.m. Eastern Standard Time, Monday through Friday. Lower-end Cyber users should call User Services at (904) 644-3224 for assistance, and supercomputer users should call the Supercomputer Support Group at (904) 644-4836. Consulting services may also be reached through on-line electronic mail and through the on-line suggestion facility. Walk-in consulting is available to those who work on or visit the FSU campus.

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Cost

The FSUCC charging algorithm is based on a weighted Systems Resource Unit (SRU) formula. The rates are cost recovery. The Cyber 205 billing algorithm will be for Central Processing Unit (CPU) (User CPU and System CPU) time alone. The number of 205 System Billing Units per hour will be set to 3600, and cost per SBU will be \$0.322, for an effective hourly rate of approximately \$1,160.

**FUTURE PLANS**

Following are plans for upgrade in the next 2 years:

- 4th quarter 1986
  - Installation of ETA<sup>10</sup> supercomputer system, including 14.4 gigabytes of on-line disk storage
- 2nd quarter 1987
  - Installation of IBM 3090-150 system with 60 gigabytes of on-line disk storage
- 3rd quarter 1987
  - Installation of CDC Cyber 180-850
- 1st quarter 1988
  - Installation of 40 gigabytes of disk storage on IBM 3090.

Long-range plans involve systems yet to be developed: ETA 30 and mini-sized supercomputer.

**ADDRESS**

Dr. Robert Braswell  
Florida State University  
Computing Center  
Tallahassee, Florida 32306-3042  
(904) 644-2764

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**MHCC FACTS**

**Configuration**

CRAY X-MP/24

VAX 11/750 (front end for NSF users)

Peripherals

**Software**

Language processors

Programming utilities

Mathematics/Statistics libraries

Graphics libraries/packages

Applications packages

**Communications**

ARPANET

WATS lines

**Access**

Available 24 hours per day, 7 days per week

Documentation, consultation, and training available

Costs determined by Central Processing Unit (CPU), peripheral usage, storage, and priority

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## MURRAY HILL COMPUTATION CENTER

The Murray Hill Computation Center (MHCC) is a private research computing center owned and operated by AT&T Bell Laboratories. MHCC offers public computing services only under special agreement.

**CONFIGURATION**      The system comprises the following hardware:

- CRAY X-MP/24
  - Number of processors: 2
  - Memory:  $4 \times 10^6$  64-bit words
  - 64 MWord Solid Stage Device
  - Local disk storage:  $1.2 \times 10^9$  bytes
  - Operating system: Until 12/86: COS. After 12/86: UNIX 5.2 (MHCC enhanced)
- VAX 11/750 (front end for NSF or other outside users)
  - Number of processors: 1
  - Operating system: UNIX 5.2 (MHCC enhanced)
- Peripherals
  - Autologic APS-5 phototypesetter
  - Imagen Imprint-10 and Imagen 8/300 laser printers
  - STARE hardcopy graphics output device
  - PRISM hardcopy color graphics output device
  - Xerox 9700 laser printer.

MHCC also has, for internal use, the following:

- Two IBM 3081K's
- One Amdahl 5860



- 
- Approximately 12 VAX 11/780 and 3820 front-ends
  - Operating System: UNIX 5.2.

## SOFTWARE

The software available on the CRAY X-MP is itemized below. (The following applies to COS; much of this will be ported to UNIX, but no final list is available).

- Languages

- ALTRAN: Algebra Translator Language
- C:
- CAL: CRAY X-MP Assembly Language
- CFT: CRAY Fortran -- Extended version of FORTRAN-77
- EFL: Exportable Fortran Language
- FORTRAN-77:
- PASCAL:
- RATFOR: Rational Fortran Preprocessor

- Numerical Support

- PORT3: General purpose mathematical library including constrained and unconstrained minimizers, sparse matrix system solvers, splines, etc.
- NAG11LIB: General purpose mathematical library; e.g., differential and integral equations, sorting and statistics, etc.
- \$SCILIB: Cray Research, Inc., numerical procedures library optimized for CRAY X-MP
- EISPACK: Eigenvalue-eigenvector library
- LINPACK: Solutions to general linear equation systems, eigenvalues, singular values, condition estimates
- MINPACK: Solutions to systems of nonlinear systems of algebraic equations, least squares, etc.

- 
- GAUSS82: Chemical modeling
  - CALIB: Assembly language kernels highly optimized for CRAY X-MP
  - FNLIB: Library of special functions; e.g. Airy, Bessel, Gamma, etc.
  - HEMP: Linear algebra library
  - POST: Program to solve partial and ordinary differential equations in one space variable and time
  - QUADPACK: Package for Automatic Integration in one dimension, including singular or oscillating integrands, infinite intervals, etc.
- Graphics Support
    - DI3000: Graphics package--color, 3-d rotations, and perspective
    - DISSPLA: Library of Fortran plotting routines
    - NCAR-SCD: General purpose plotting, includes contouring facilities; sits over DI-3000
- Program Preparation and Text Processing (on 11/750)
    - ed, vi, and emacs: Editors available on UNIX for program presentation, with vi and emacs functioning as full-screen editors
    - UNIX DOCUMENTER'S WORKBENCH: Available for editing and formatting documents
- Commands and Packages in addition to Standard UNIX SVR2 Commands and Libraries (on 11/750)
    - S: Statistical analysis package
    - archive: Archive and retrieve to and from a free secondary storage medium
    - finger: Obtain information about other users
    - ksh: Korn shell--upward compatible with Bourne shell, but faster with more capabilities
-

- 
- opr: Off-line print command
  - wwb: Writer's Workbench--a set of programs that analyze English text for correctness and clarity.

**COMMUNICATIONS** Center systems can be accessed through ARPANET and toll-free WATS lines (300-2400 bps).

**ACCESS** Access specifications and services are identified below.

Allocation MHCC is a private scientific research laboratory. It does not offer public computing service, except under special agreement (e.g., the National Science Foundation). Requests for NSF allocation should be made to the appropriate NSF research program. A potential user should contact H.B. Fischer at (201) 582-6184 for further information. (Note: this program terminated August 1, 1986.)

System Availability MHCC systems operate 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

Documentation CRAY and UNIX manuals and references are available, as is on-line documentation through the UNIX "man" command.

Consultation The computer center Help Desk directs callers to counselors specializing in CRAY, UNIX, and Text Processing. The services of a Cray Research analyst and a full-time UNIX system administrator will be available.

Training CRAY courses, developed and instructed by Cray Research, Inc., and live or video tape instruction in the use of UNIX System V will be sponsored by AT&T-BL.

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Cost

Cost is determined by Central Processing Unit (CPU), storage, peripheral usage, and priority. Several grades of service are offered; jobs in each grade preempt jobs in lower grades. The cost of premium service is higher than that of standard service; the cost of economy is less, but these jobs are run only during nonprime hours. Specific rates can be obtained at (201) 582-6078.

FUTURE PLANS

Not known

ADDRESS

Murray Hill Computation Center  
600 Mountain Avenue  
Murray Hill, New Jersey 07974

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NASA SPACE AND EARTH SCIENCES COMPUTING CENTER FACTS

**Configuration**      CYBER 205

                         IBM 3081

**Software**            Language processors

                         Mathematics/Statistics libraries

                         Graphics libraries

**Communication**      GTE Telenet

                         BITNET (ARPANET gateway)

                         SPAN

                         Dedicated lines

**Access**                Allocations by NASA

                         Center available 24 hours per day, 7 days per week

                         Documentation, consultation, and training services available

                         Funding from NASA Headquarters and NSESCC

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## NASA SPACE AND EARTH SCIENCES COMPUTING CENTERS

NASA'S Office of Space Sciences and Applications provides access to large-scale computational resources through the NASA Space Earth Sciences Computing Center (NSESICC) as part of its support for scientific research efforts.

The NSESICC is located at the Goddard Space Flight Center in Greenbelt, Maryland, and is available locally to Goddard researchers and remotely to other NASA centers and to the general university community. Remote users currently represent approximately 15 percent of the overall allocation of computing resources and, through increased awareness of the opportunity to use the facility and improved network access, the allocation to remote users is expected to increase to 25 percent of the total for FY 87.

### CONFIGURATION

The NSESICC, illustrated in Figure 2.15-1, consists of a Cyber 205, IBM 3081, plus various peripherals. Some hardware specifications follow.

- Cyber 205
  - Number of pipelines: 2
  - Memory:  $4 \times 10^6$  64-bit words
  - Local disk storage:  $10.8 \times 10^9$  bytes
  - Peak speed:
  - Operating system: Virtual Storage Operating System (VSOS)
  
- IBM 3081 (Front-end to outside users)
  - Memory:  $48 \times 10^6$  bytes
  - Local disk storage:  $37 \times 10^9$  bytes
  - Operating system: Virtual Machine/Conversational Monitor System (VM/CMS) and Multiple Virtual Storage/Time Sharing Option (MVS/TSO)

# System Configuration

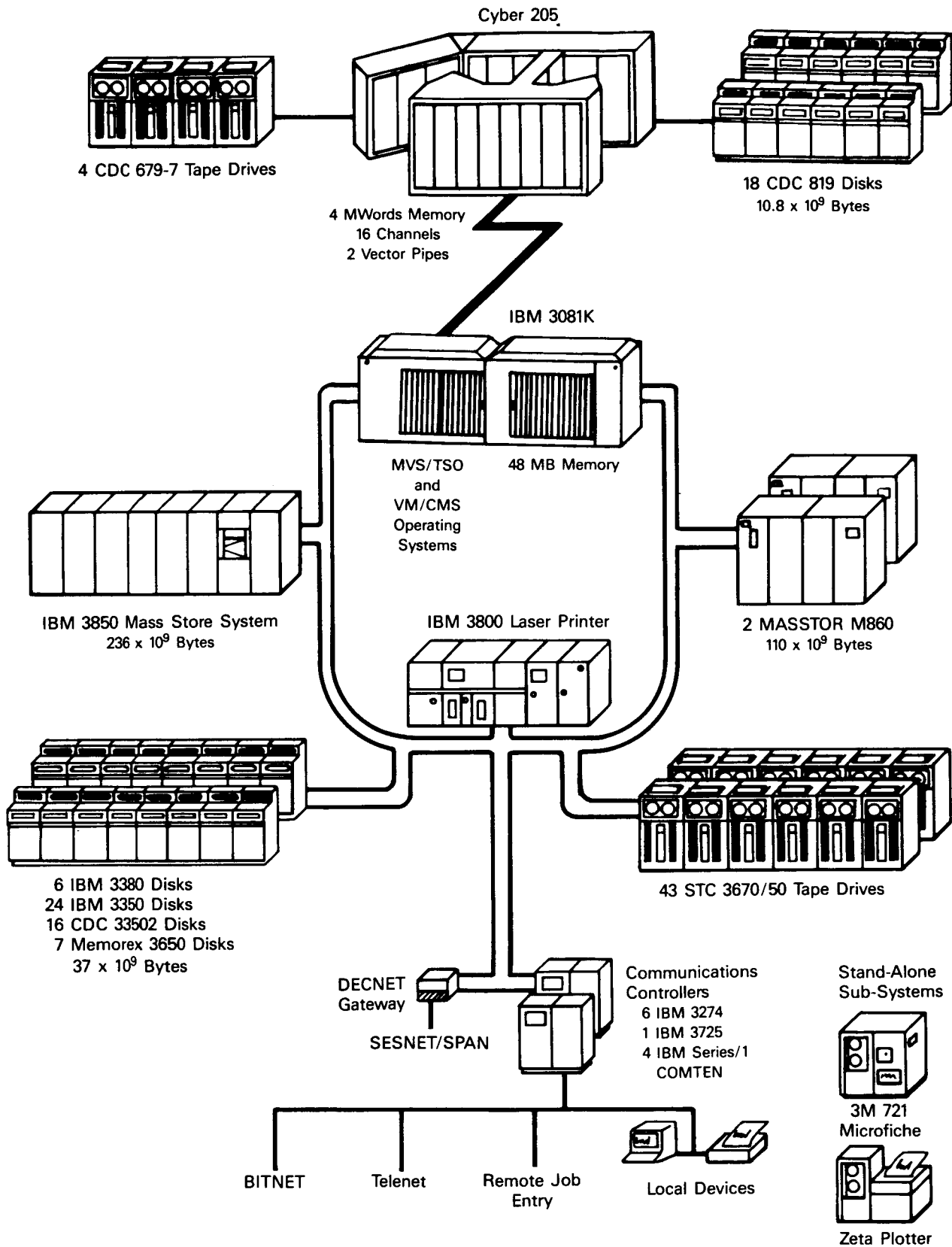


Figure 2.15-1. NASA Space and Earth Sciences Computing Center

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- Peripherals

- 4 CDC 679-7 tape drives (Cyber 205)
- 43 STC 3670/50 tape drives (IBM 3081)
- 1 IBM 3850 mass store system (236 x 10<sup>9</sup> bytes)
- 2 MASSTOR M860 (10 x 10<sup>9</sup> bytes)
- 1 IBM 3800 laser printer
- 1 3M 721 microfiche system
- 1 Zeta plotter
- Dot matrix printers
- Plotters

#### SOFTWARE

The following software is available on the NSESCC:

- Languages: FORTRAN PL/1, PASCAL, SCRIPT, APL, SNOBOL, C
- Mathematics/Statistics libraries: IMSL, EISPACK
- Graphics Libraries Packages: DI-3000, TEMPLATE, NCARGRAF.

#### COMMUNICATIONS

Access to NSESCC is provided to outside users by:

- GTE Telenet
- BITNET (including a gateway to ARPANET and others)
- SPAN
- Dedicated lines.

#### ACCESS

Access requirements and services are identified below.

#### Allocation

Requests for allocation should be directed to the NSESCC (GSFC Code 630.1). The requirements will be forwarded to the appropriate discipline office at NASA Headquarters for allocation coordination.



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System  
Availability

NSESCC is available 24 hours per day, 7 days per week except during periods of scheduled maintenance.

Documentation

User guides, primers, and a bimonthly newsletter are available to NSESCC users.

Consultation

Walk in and telephone consultation are available at (301) 286-9120 (Technical Assistance Group).

Training

The NSESCC conducts a variety of training courses, workshops, and symposia to assist users and to help promote the exchange of information about useful computational methods and techniques. This effort will be extended by providing training sessions at remote user sites, and will initiate these this year as key areas of interest are identified.

Cost

Costs are handled through NASA Headquarters scientific discipline programs.

**FUTURE PLANS**

The following upgrades for the NSESCC are planned for fiscal years 1987 and 1988.

- FY 87
  - Integrated data storage
  - Magnetic tape cartridge
  - Advanced disk storage and intelligent controllers
  - Ultra-high performance disk for Cyber
  - Support for ST205 (to check job status) on IBM 3081
- FY 88
  - Next generation processor system(s)

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**ADDRESS**

NASA Space and Earth Sciences Computing Center  
Code 630.1  
Goddard Space Flight Center  
Greenbelt, Maryland 20771  
(301) 286-8541

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**NMFECC FACTS**

**Configuration**

CRAY I  
CRAY IS  
CRAY X-MP/22  
CRAY 2  
Peripherals

**Software**

Language processors  
Programming utilities  
Mathematics/Statistics libraries  
Graphics libraries/packages  
Applications packages

**Communications**

MFENET  
ARPANET  
Tymnet  
Dial-up lines  
Dedicated lines

**Access**

Allocations by the Department of Energy Office of Energy Research (DOE ER)  
Center systems available 24 hours per day, 7 days per week  
Documentation and consultation available  
No cost for DOE ER researchers

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## NATIONAL MAGNETIC FUSION ENERGY COMPUTER CENTER

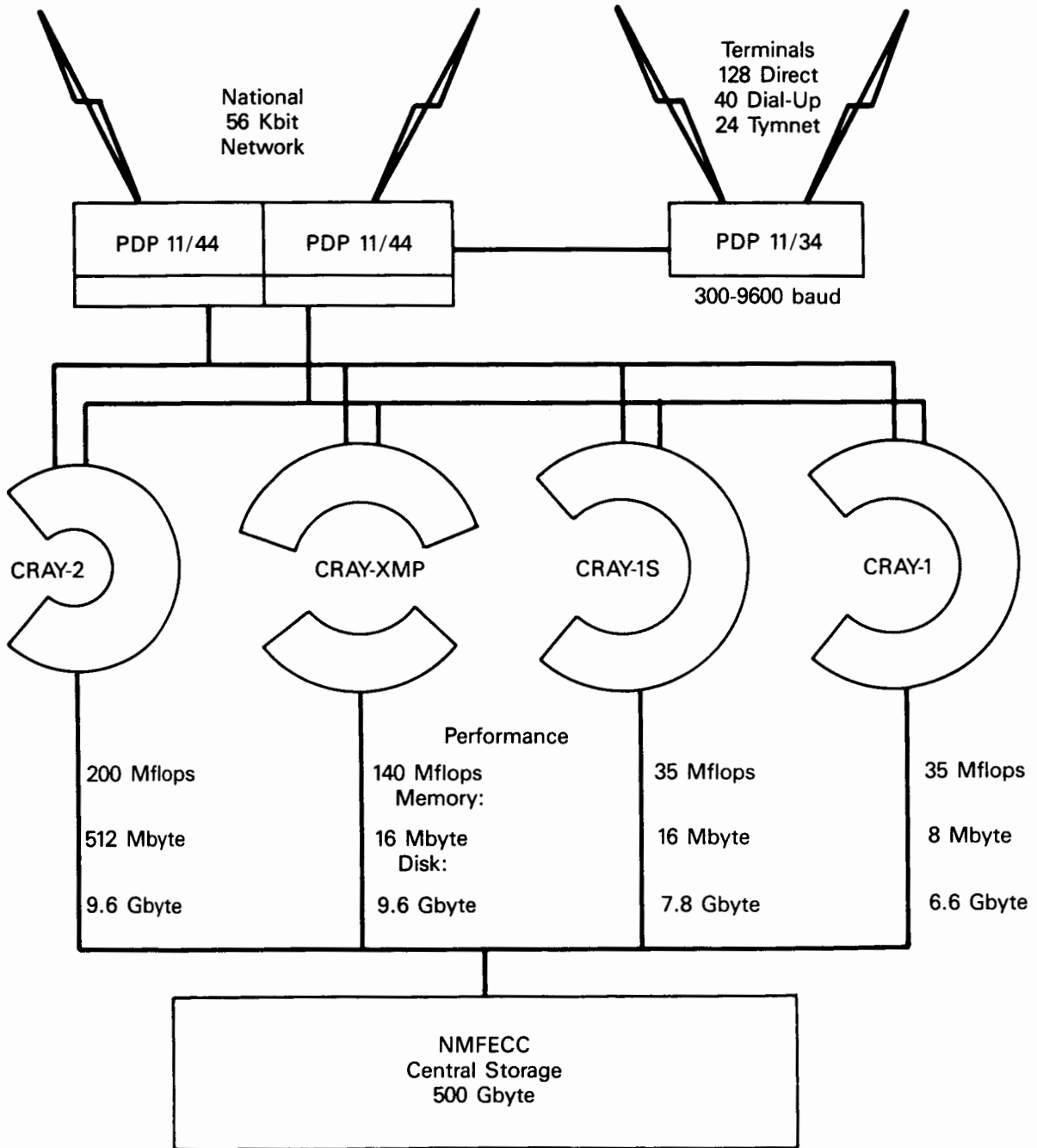
The National Magnetic Fusion Energy Computer Center (NMFEEC) operates a CRAY 1A computer system (1 megaword), a CRAY 1S computer system (2 megaword), a CRAY X-MP/22 computer system (2 processor, 2 megaword), and a CRAY 2 computer system (4 processors, 64 megaword) at the Lawrence Livermore National Laboratory (LLNL) in Livermore, California. The NMFEEC provides supercomputer computational support for research programs supported by the Department of Energy (DOE) Office of Energy Research (ER). These ER programs include High Energy Physics, Nuclear Physics, Materials Sciences, Chemical Sciences, Carbon Dioxide Research, Engineering and Geosciences, Heavy Ion Fusion, Applied Plasma Physics, and Health and Environmental Research.

The NMFEEC has developed a CRAY Timesharing system (CTSS) to provide fast debugging and more effective interactive use of these computers by the ER research community. The NMFEEC has also developed a multilevel file storage system, a distributed PC work station software system, and other valuable tools for use on the computer systems.

### CONFIGURATION

Figure 2.16-1 illustrates the NMFEEC configuration, which consists of the following hardware:

- CRAY 1
  - Number of processors: 1
  - Memory:  $1 \times 10^6$  64-bit words
  - Local disk storage:  $6.6 \times 10^9$  bytes
  - Peak speed:  $35 \times 10^6$  flops
  - Operating system: CTSS
  
- CRAY 1S
  - Number of processors: 1
  - Memory:  $2 \times 10^6$  64-bit words



**Figure 2.16-1. NMFECC Hardware Configuration**

- 
- Local disk storage:  $7.8 \times 10^9$  bytes
  - Peak speed:  $35 \times 10^6$  flops
  - Operating system: CTSS
  - CRAY X-MP/22
    - Number of processors: 2
    - Memory:  $2 \times 10^6$  64-bit words
    - Local disk storage:  $9.6 \times 10^9$  bytes
    - Peak speed:  $140 \times 10^6$  flops
    - Operating system: CTSS
  - CRAY 2
    - Number of processors: 4
    - Memory:  $64 \times 10^6$  64-bit words
    - Local disk storage:  $9.6 \times 10^9$  bytes
    - Peak speed:  $200 \times 10^6$  flops
    - Operating system: CTSS
  - Peripherals
    - CDC 38500 Mass Storage,  $62.5 \times 10^9$  bytes
    - A&L 7110 Automated Tape Library,  $250 \times 10^9$  bytes
    - DICOMED D48 Film Recorder
    - FILEM, multilevel file storage system; allows users to store and retrieve programs and data files for an indefinite period of time; controlled by the CRAY 1.

#### SOFTWARE

- Language processor including FORTRAN
- MATH/GRAPHIC LIBRARIES
- SYMBOLIC/DYNAMIC DEBUGGING
- TEXT/REPORT EDITORS

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COMMUNICATIONS

Center systems can be accessed by the following:

- MFENET: 56 kbps access for User Service Centers (USC), dedicated 9.6 kbps access for Remote User Service Stations (RUSS)
- ARPANET: 56 kbps access for DDN sites
- Tymnet: public packet switched data communications networks
- Dial-up lines
- Dedicated lines.

ACCESS

Access requirements and services are identified below.

Allocation

Allocations are restricted to DOE Office of Energy Research (ER) researchers. Proposals must be submitted to the ER program office at DOE Headquarters in Washington, D.C.

System  
Availability

Center systems are available 24 hours per day, 7 days per week.

Documentation

Up-to-date documentation is available on-line with the data base DOCUMENT. Users can refer, at their own terminals, to any of approximately 175 documents, the equivalent of 10,000 pages of instructions covering virtually all aspects of system services. With LIBRIS, a user can obtain descriptions of codes or search for codes pertinent to a given research problem.

Consultation

NMFECC has experienced hardware and software people available to assist users having difficulties using center capabilities. These consultants can be contacted in person, by telephone, or by sending a message through the computer network's mail system.

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Cost

DOE ER researchers pay no cost for use of center systems.

FUTURE PLANS

The NMFECC plans the following:

- Continue with vector and multiprocessor upgrades
- Upgrade storage system using optical technology
- Upgrade remote site peripherals.

ADDRESS

National Magnetic Fusion Energy Computer Center  
Lawrence Livermore National Laboratory  
Livermore, California 94550  
(415) 422-1544



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**NCAR FACTS**

**Configuration**

CRAY X-MP/48

CRAY 1A

2 IBM 4341s

TBM Mass Storage System

Peripherals

**Software**

Language processors

Programming utilities

Mathematics/Statistics packages

Graphics libraries/packages

Applications packages

**Communications**

UNINET

Dial-up lines

Leased lines

**Access**

NCAR systems available 24 hours per day, 7 days per week

Documentation and consultation available

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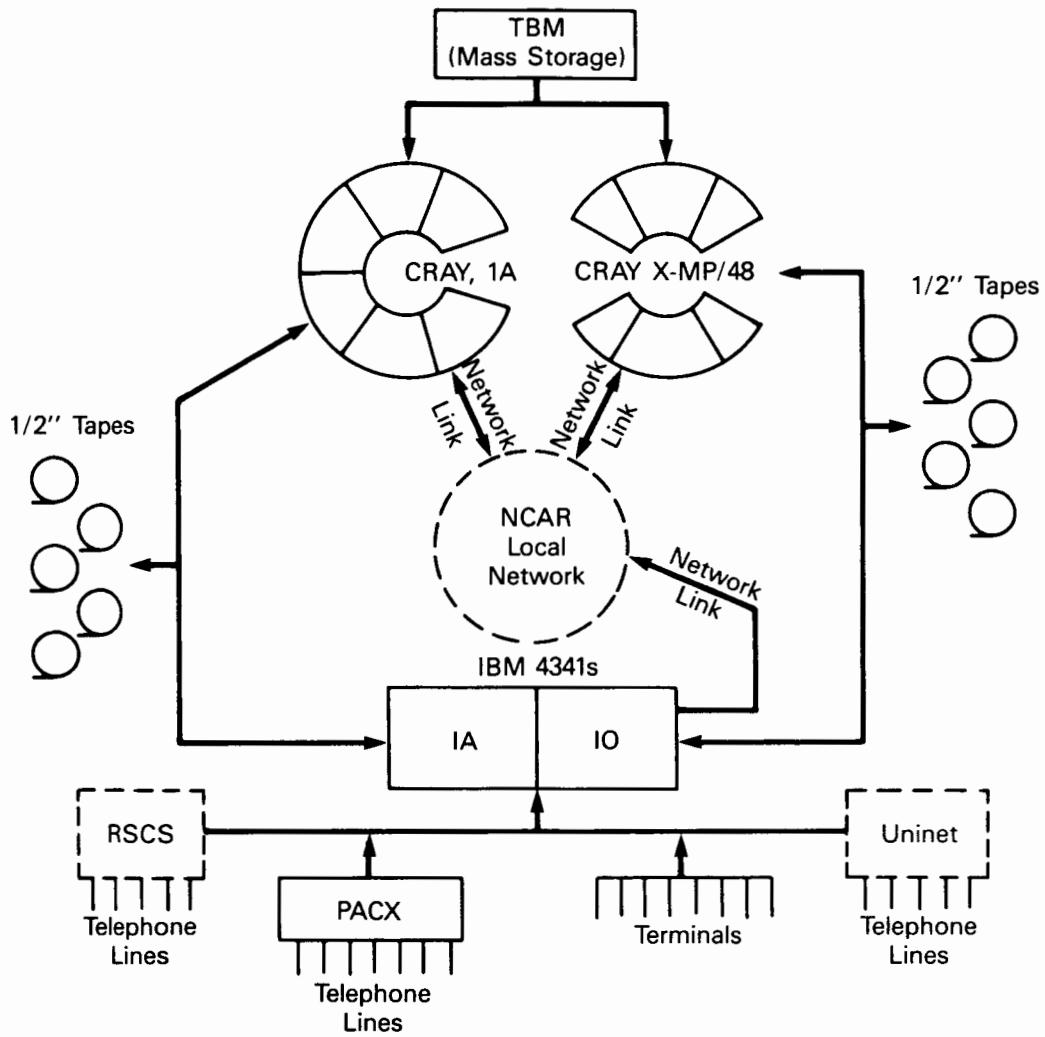
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

The National Center for Atmospheric Research (NCAR) is operated by the University Corporation for Atmospheric Research and is sponsored by the National Science Foundation (NSF). It provides remote users of the Scientific Computing Division (SCD) computing systems with several methods of access to batch and interactive computing through both the dial-up telephone system and through leased telephone lines.

CONFIGURATION

The current configuration (see Figure 2.17-1) comprises the following hardware:

- CRAY X-MP/48
  - Number of processors: 4
  - Memory:  $8 \times 10^6$  64-bit words
  - Peak speed:  $210 \times 10^6$  flops (per processor)
  - Operating system: COS 1.15
- CRAY 1A
  - Number of processors: 1
  - Peak speed:  $160 \times 10^6$  flops
  - Operating system: COS 1.15
- IBM 4341 (IO)
  - Number of processors: 1
  - Operating system: CMS
- IBM 4341 (IA)
  - Number of processors: 1
  - Operating system: CMS
- IBM Storage System
- Peripherals.



**Figure 2.17-1. NCAR**

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**SOFTWARE**

The NCAR's software includes:

- Language processor
- Programming utilities
- Mathematics/Statistics packages
- Graphics libraries/packages
- Application packages.

**COMMUNICATIONS**

Center systems can be accessed by the following:

- UNINET
  - Asynchronous interactive connection up to 4800 bps
- Dial-up lines
  - Asynchronous connection at 300-1200 bps
  - Synchronous (RSCS) connection up to 4800 bps using HASP, UT200, or 2780/3780 protocols
- Leased lines
  - Asynchronous connection at 300-1200 bps
  - Synchronous (RSCS) connection up to 56 kbps using HASP, UT200, or 2780/3780 protocols.

**ACCESS**

The material itemized below presents available information on access requirements and services.

System  
Availability

NCAR systems are available 24 hours per day, 7 days per week, except during periods of scheduled maintenance.

Documentation

Various user's guides are available, including NCAR Data Communications, updated in April 1985.

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Consultation

The Scientific Computing Division maintains regular telephone consultation service to assist users with problems they might encounter. Users may dial (303) 497-1278 to request this help. They may also contact The Record, SCD's monthly newsletter, for the most recent listing of people to contact and their telephone numbers.

**FUTURE PLANS**

The following features are being planned for future implementation:

- UNIX operating system support on the IBM 4341 computers with user access through UNINET
- An error-correcting protocol system for UNINET users at certain locations
- Expanded file transfer support for mini- and micro-computers
- Internetwork electronic mail facilities.

**ADDRESS**

National Center for Atmospheric Research  
Scientific Computing Division  
Boulder, Colorado 80307  
(303) 497-1278

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NUMERICAL AERODYNAMICS SIMULATION FACTS

Configuration      CRAY 2  
                      2 AMDAHL 5840  
                      5 VAX 11/780  
                      Peripherals

Software            Not known

Communications     AT&T Account  
                      PSCN

Access              Allocations made by NASA  
                      Center available 24 hours per day, 7 days per week  
                      User services available  
                      Funding through NASA program office or other arrangements

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## NUMERICAL AERODYNAMICS SIMULATION

The Numerical Aerodynamics Simulation (NAS) program is intended for use in pioneering work in basic physics research, the development of new advanced application programs, and large-scale simulations in support of advanced research and development. It is a national resource for use by NASA, the Department of Defense (DOD), other Government agencies, industry, and universities. Although the NAS is to be used primarily for fluid dynamics and aeronautical applications, other applications, such as computational chemistry, structures, space sciences, stratospheric modeling, etc., will also be accommodated. Initial guidelines for the usage split between these classifications will be approximately 90 percent and 10 percent, respectively.

Within both these classifications there are three types of endeavors: (1) basic research, (2) developmental research, and (3) advanced applications. Project selection will be accomplished to ensure a reasonable balance between these classifications.

NAS will not compete with commercially available computer services.

### CONFIGURATION

The NAS consists of a CRAY 2 plus various subsystems. Some hardware specifications follow:

- CRAY 2
  - Number of processors: 4
  - Memory:  $256 \times 10^6$  64-bit words
  - Local disk storage:  $43 \times 10^9$  bytes
  - Peak speed:
  - Operating system: UNIX System V
- 2 Amdahl 5840 (Support Processing Subsystem) memory:  
 $16 \times 10^6$  64 bits words
- 5 VAX 11/780s

- 
- IRIS work station (work station subsystem)
  - Amdahl 6380 disks plus IBM<sub>9</sub> 3480 cartridge tapes (mass storage subsystem) (300 x 10<sup>9</sup> bytes)
  - High speed data network between subsystems
  - Long Hand Communications Subsystem for outside access (TCP/IP based).

**SOFTWARE**                      Not known

**COMMUNICATIONS**            Access to NAS is provided by:

- AT&T Accunet: 56 kbps links to remote sets
- PSCN: 9.6 kbps dial-up access for direct terminal access.

T1 access is under consideration to some sites.

**ACCESS**                        Access requirements and services are identified below.

Allocation

Project selection is based on the submitted proposal. Each project proposed should present a well-defined scientific or engineering study, which will make a distinct contribution to the field of interest and which require the capabilities of the NAS. Proposals should address the following selection criteria:

- NAS uniqueness and suitability
- Technical quality
- National need
- Timeliness.



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Proposals should demonstrate a justifiable computational need for use of the NAS to carry out scientific work. Time available on the CRAY-2 is limited and NASA will accept only those investigations which can be reasonably accommodated and accomplished using the current configuration. NAS will not compete with commercially available resources. The Principal Investigator for each project must submit a written technical brief on the project accomplishments during each NAS usage period.

Each proposal will be reviewed by a group of disciplinary peers; review of system utilization as a whole will be conducted by the Access and Utilization Board, a high level review committee, which is chaired by the Director of the Aerophysics Directorate, NASA Ames Research Center. The evaluation and review of proposals for NAS usage is scheduled to begin in August 1986 with applicants being notified by November. Although proposals may be submitted at any time, proposals should reach the NAS Projects Office by August 15, 1986 to be considered in the initial review.

Final decisions on acceptance of proposals will take into consideration the balance between different scientific disciplines, project origin (i.e., NASA, OAST, NASA non-OAST, DOD, university, industry, and other Government), and the availability of NAS computing resource. After the notification of project selection, NASA will provide time on the NAS CRAY-2, associated support processors and storage media, documentation and limited user assistance and training for investigators.

The initial guidelines for the distribution of NAS resources to each of the user organizations are:

- 55 percent NASA
- 20 percent DOD
- 15 percent commercial (proprietary and nonproprietary/nonsponsored)
- 5 percent university
- 5 percent other Government agencies.

Allocations to the Government categories includes both in-house and sponsored research.

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These guidelines only apply to the operational NAS computers. When a new high speed processor is initially brought on-line, this new HSP will be devoted to system test, integration, and development. Limited access for fluid dynamics and aerodynamics computations may be allowed during this time, but on a second priority basis, conducted by expert users, at the discretion of the NAS Projects Office.

The partitions within the NASA allocation will be updated regularly to maintain an accurate distribution of NPSN time between the OAST/non-OAST partition and among the OAST center distribution according to current NASA computational needs. Updates will be based on previous time grants, utilization, and applications. The NASA discretionary time pool will be reallocated to support special contingency or high priority NASA projects to ensure effective utilization of NAS resources.

Initial guidelines for the OAST/non-OAST partition of the NASA allocation are:

- OAST centers - 45 percent
- Non-OAST centers - 10 percent
- Total = NASA allocation = 55 percent.

The DOD allocation (20 percent) will not support DOD in-house work and projects sponsored by DOD agencies. Joint DOD/NASA in-house and sponsored projects are supported by the DOD partition. These projects will be selected on a competitive basis through a peer review process. Final review will be made by the AUB.

Project selection for other Government agencies will be made on a competitive basis through the peer review process. The "90 percent aeronautics, 10 percent other applications" guidelines will not be applied to this usage group.

The commercial allocation of 15 percent includes both commercial proprietary work and work that is nonsponsored. Projects will be selected by a peer review process and according to the selection criteria. Insofar as access to the NAS may provide a competitive advantage to a commercial interest, the NPO will ensure that no single commercial organization will utilize the NAS resources to the exclusion of other commercial organizations.

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Responsibility for granting non-sponsored university access to the NAS is delegated to the National Science Foundation (NSF) as stated in a Memorandum of Agreement between NASA and the NSF. This assignment by the NSF will follow the same schedule for proposals and NAS resource assignment as the other user groups to ensure that resources are allocated uniformly every allocation cycle. The 90 percent aeronautics/10 percent other guidelines will not be applied to this usage group.

System  
Availability

NAS is available 24 hours per day, 7 days per week except during periods of scheduled maintenance.

Documentation

Documentation for the NAS is available upon request.

Cost

It is expected that each NAS user will provide all expenses required for his/her use of the system, including expenses for personnel required for programming, program execution and display of results, travel, salaries, remote communications, user equipment, and related expenses. It is also expected that prospective investigators will obtain funding for their research activities through other program offices at NASA or from other agencies or institutions.

**FUTURE PLANS**

Not known

**ADDRESS**

NASA Ames Research Center  
Moffett Field, California 94035  
(415) 694-6535

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## NETWORKS

This section of the document focuses on networks, which are divided into three subcategories based on access parameters. The first subgroup consists of public data and telecommunications networks, which provide open access to the public. The second subgroup comprises networks that are used for research and/or science pursuits and may have restrictions on access. The last subgroup involves vendor or operating system-specific networks, which require members to have specific hardware or software for access.

Table 3.1-1 identifies the networks discussed in this section according to the order in which they are considered. Table 3.1-2 summarizes the information collected on the networks. The questionnaire used to collect the data is given in Appendix B.

This section has been designed to highlight key information and to facilitate cross referencing of capabilities. For these reasons, the same format is used to discuss each network.

## Table 3.1-1. Networks Surveyed

### Public Networks

- ADP Autonet
- CompuServe
- GRAPHNET
- GTE Telenet
- RCA Cylix
- Tymnet
- Uninet

### Research and Scientific Networks

- ARPANET
- BITNET/EARN/NetNorth
- CITNET
- Computer Science Network (CSNET)
- MAILNET
- Magnetic Fusion Energy Network (MFENET)
- Michigan Terminal System Network (MTSNet)
- NSFNET
- National Radio Observatory Network (NRAO)
- Space Physics Analysis Network (SPAN)

### Vendor Networks

- EASYNET
- GRAPEVINE
- Unix to Unix CoPy (UUCP)

Table 3.1-2. Networks

Network	Coverage			Protocols Supported		Subsystems	Accessibility		Means of Access				
	Regional	United States	International	Synchronous	Asynchronous		Open	Restricted	Dial-Up Lines	Leased Lines	WATS Lines	Dedicated Lines	Other
<b>Public</b>													
ADP Autonet		•		X.25	•	1	•		•	•		•	•
CompuServe		•		X.25, 3270	•	2	•		•	•	•	•	•
GRAPHNET		•		•	•	3	•		•	•		•	•
Telenet		•		X.25, 3270, 2780/3780, SNA/SDLC	•	6	•		•	•		•	•
RCA Cylix		•		X.25, 3270, SNA/SDLC	•	0	•		•	•		•	•
Tymnet		•		X.25, BISYNC, SNA/SDLC, RJE/MASP	•	2	•		•	•	•	•	•
Uninet		•		X.25, SNA/SDLC, BISYNC	•	4	•		•	•		•	•
<b>Research/Scientific</b>													
ARPANET			•	DDN Suite		0		•					•
BITNET/EARN/NetNorth			•	IBM RSCS		3		•		•			•
CITNET	•			RFC 822		0		•				•	•
CSNET			•	MMDF, X.25, DDN Suite		2		•	•	•			•
MAILNET		•		MMDF, SMTD		0	•		•	•			•
MFENET		•		NSP		1		•					•
MTSnet			•	X.25		0		•		•			•
NRAO		•		DECNET		0		•		•			•
NSFnet		•		DDN Suite		0	•		•	•		•	•
SPAN			•	DECNET		0		•	•	•		•	•
<b>Vendor</b>													
EASYNET			•	DECNET		0		•		•			•
GRAPEVINE			•	PUP, XNS		0		•		•			•
UUCP			•	UUCP		0		•		•			•

/ FOLDDOUT FRAME

2 FOLDDOUT FRAME

Access							
Bandwidths			Gateways	User Service			Cost
<1200	1200-9600	>9600		Documentation	Consultation	Training	
•	•	•	?		•		Type of Connection, Volume
•	•		4		•		Type of Connection, Volume
?	?	?	1+	•	•		Type of Connection, Volume
•	•	•	?		•		Type of Connection, Volume
?	?	?	?		•		Single Fee
•	•		?		•		Type of Connection, Volume
•	•	•	?		•		Type of Connection, Volume
	•	•	110+	•	•		Shared Cost
			30+	•	•		Installation Charges—No Cost for Use
?	?	?	4				?
•	•	•	9	•	•		Annual Fee
?	?	?	5		?		Service and Usage Fee
		•	1		•		No Cost for Use
?	?	?	5		•		?
	•		1+		?		?
	•	•		•			No Cost for Use
•	•		3	•			No Cost for Use
?	?	?	1		?		?
?	?	?	2		?		?
?	?	?	5		?		?

3.1-3

3 FOLDBOUT FRAME

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**ADP AUTONET FACTS**

**Network Configuration**            Consists of multiply-connected nodes providing access to host computers and terminals

**Protocols and Systems**            Asynchronous

   X.25

   AutoMail

**Access**                            Available to public

   Access provided by dial-up lines or dedicated communications hardware

   Gateways to international networks provided by International Record Carriers

   Cost based on type of connection and volume of data transmitted



---

## ADP AUTONET

ADP Autonet is a value-added, packet switched data communications network. It links over 150 cities in the United States, providing direct toll-free access from more than 350 domestic locations. It also serves 60 foreign countries. ADP Autonet is owned and operated by Automatic Data Processing, Inc. (ADP).

### NETWORK CONFIGURATION

ADP Autonet consists of over 250 multiply-connected nodes, which provide terminal or host interfaces to the network. Figure 3.2-1 illustrates the ADP Autonet network.

### PROTOCOLS AND SUBSYSTEMS

Protocols supported by the ADP Autonet network include:

- Asynchronous
- X.25.

Subsystems capabilities include the communications management system and electronic mail facility:

- AutoMail.

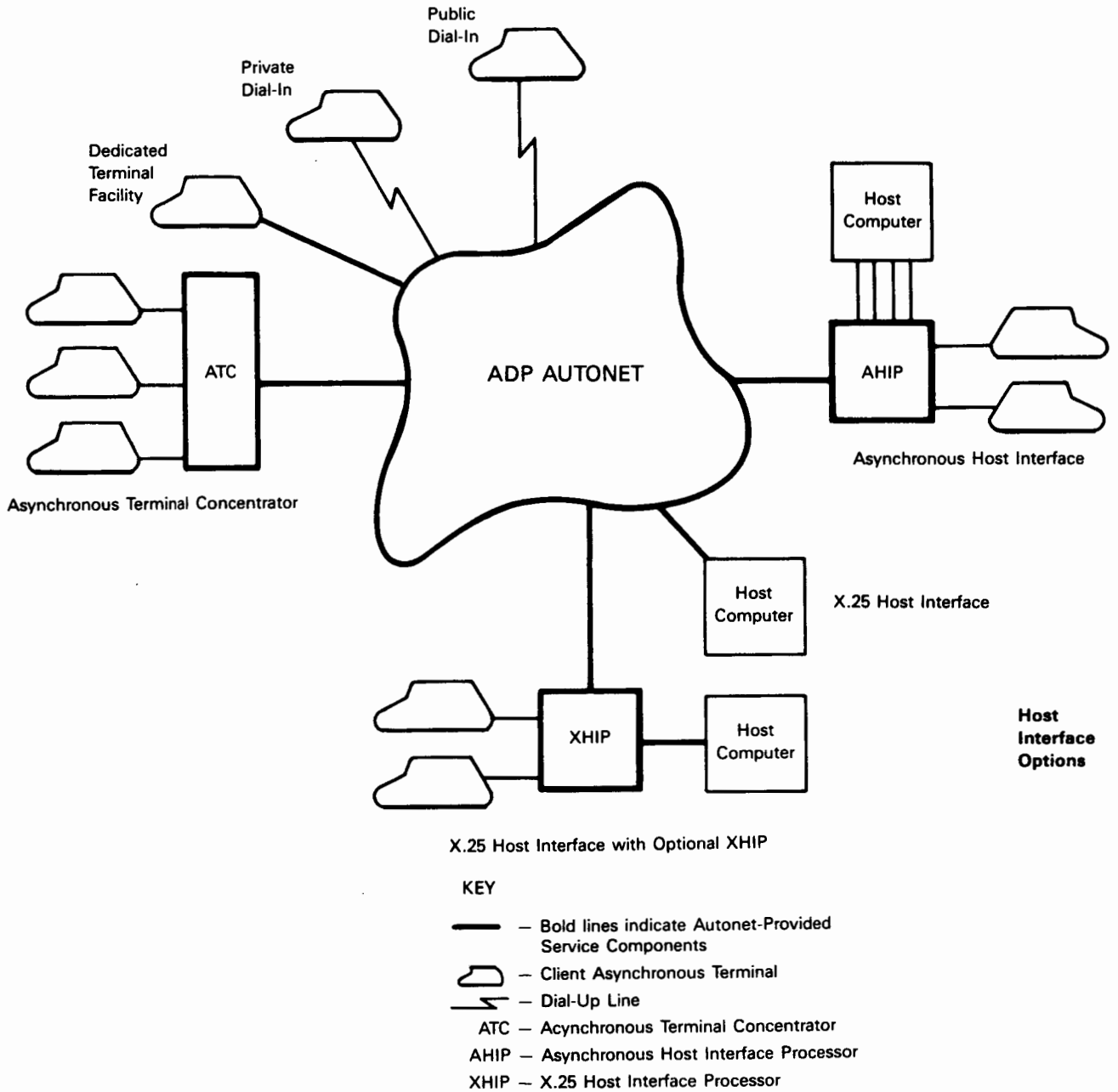
### ACCESS

ADP Autonet, which is available to the public, has the following specifications for access.

### ADP Autonet Account

Users wishing to connect a host or terminal to ADP Autonet should contact the closest ADP Autonet marketing office. Locations include Ann Arbor, Michigan; Cleveland, Ohio; and Princeton, New Jersey. Users may not require an account to access a particular system.

**Network  
Access  
Options**



**Figure 3.2-1. ADP Autonet**

---

Means of Access

- An Asynchronous Terminal Concentrator (ATC) provides single point access to multiple terminal connections.
- The X.25 hosts can connect directly to the network, or can utilize an X.25 Host Interface Processor (XHIP), which also provides terminal access.
- Asynchronous hosts utilize an Asynchronous Host Interface Processor (AHIP) to access the network. Terminal connections are also provided.
- Dedicated terminals require a leased line.

There are five ways to access ADP Autonet:

- Public Dial-up Lines
- Private Dial-up Lines
- Leased Lines
- Terminal Communication Facility (ATC)
- Host Communication Facility (XHIP, AHIP, or X.25).

The following communications bandwidths are supported by ADP Autonet:

- 110 bps-2400 bps (Dial-up lines)
- 110 bps-4800 bps (Leased Lines)
- 2400 bps-14,400 bps (Leased Lines).

Gateways

The International Record Carriers (IRC) provides access to international networks.

Cost

The cost of using ADP Autonet depends upon:

- Type of connection made
  - Amount of data transmitted
-

- 
- Number of ports desired
  - Overhead charges.

**FUTURE PLANS**

Not known

**ADDRESS**

ADP Autonet  
175 Jackson Plaza  
Ann Arbor, Michigan 48106  
(313) 769-6800  
Contact: Valerie Hawksley  
Manager, Marketing Services

---

**COMPUSERVE FACTS**

**Network Configuration** Consists of micronodes, distributed throughout the country in a modified ring architecture

**Protocols and Systems** X.25  
3270

Most asynchronous

Infoplex

Interchange

**Access** Available to the public

Access provided by dial-up and dedicated lines

Gateways exist to international networks, GTE Telenet, and Tymnet

On-line assistance file available with phone numbers and additional information for consultation

Cost is based on type of connection and volume of data

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## COMPUSERVE

One of the larger, value-added networks, CompuServe is a virtual circuit switched data communications network. CompuServe, a subsidiary of H&R Block, serves over 250 U.S. cities and 42 foreign countries.

### NETWORK CONFIGURATION

CompuServe consists of multiply-connected processors called "micronodes," which are distributed throughout the country in a modified ring architecture. The ring design provides alternate routing in the event that a line becomes temporarily inoperative. Links are leased lines, satellite, and microwave.

- Hosts connect via a Synchronous Network Link (SNL)
- Asynchronous hosts require a dedicated micronode to serve as a front-end processor
- BYSYN hosts must utilize 3270 emulation hardware.

Figure 3.3-1 illustrates this geographical ring design that the CompuServe configuration is based upon.

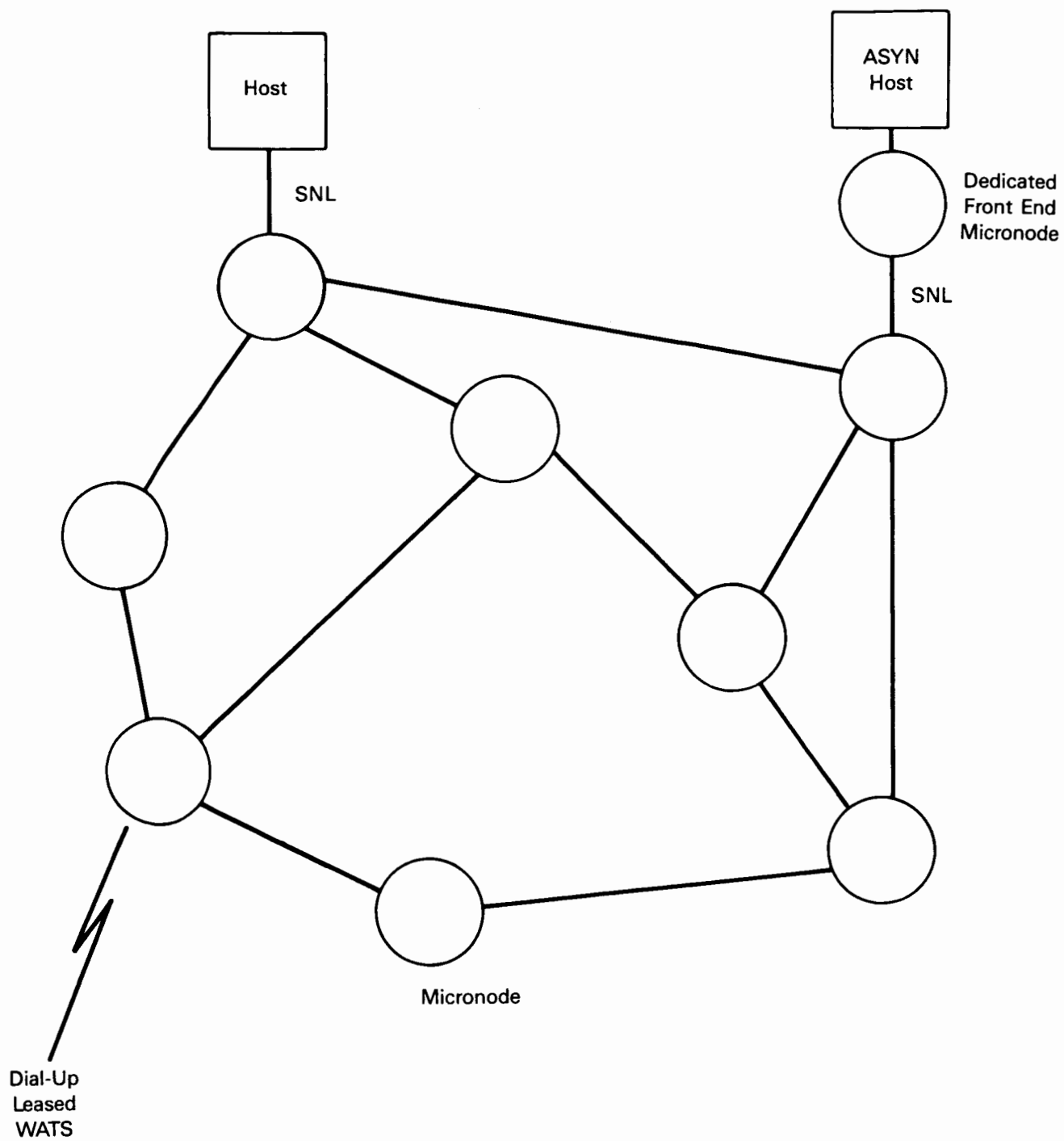
### PROTOCOLS AND SUBSYSTEMS

The following protocols are supported by CompuServe:

- Most standard asynchronous
- X.25
- 3270.

CompuServe also supports the following systems:

- Infoplex: Electronic mail facility
- Interchange: Videotex facility.



**Figure 3.3-1. CompuServe Network Configuration**

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## ACCESS

CompuServe is a public data communications network. The specifications detailed below should be followed for accessing CompuServe.

## CompuServe Account

Users wishing to connect a terminal or host to the network should contact CompuServe Network Services. Users wishing to access a system or host already connected to the network need only dial the local access number.

## Means of Access

There are four ways to access CompuServe:

- Dial-up lines
- Leased lines
- WATS lines
- Dedicated lines.

The following communications bandwidths are supported:

- 110 bps-2400 bps (dial-up)
- 110 bps-9600 bps (dedicated).

## Gateways

Gateways supported by CompuServe are available to Tymnet and GTE Telenet. Access to international networks is provided by:

- Canadian DATAPAC
- ITT Telecom.

## Consultation

An on-line assistance file with CompuServe phone numbers and backup numbers for its gateway services is provided by the CompuServe Network. These numbers can be searched by State or area code. CompuServe also provides instructions for access, announcements of new phone numbers in the network, service bulletins, and a feedback section in which any user can send a message to report a problem or ask a question.



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There are no additional charges associated with this service.

Cost

The cost of using CompuServe is dependent upon the following factors:

- Type of connection made
- Amount of data transmitted
- Number of ports desired.

**FUTURE PLANS**

Not known

**ADDRESS**

CompuServe Network Services  
5000 Arlington Centre Boulevard  
Columbus, Ohio 43220  
(614) 457-8600

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**GRAPHNET FACTS**

**Network  
Configuration**

110-1200 baud BISYNC interfaces

**Protocols and  
Systems**

BISYNC

Most asynchronous

Freedom Network

Freedom Forward

Freedom Express

**Access**

Access provided through a direct dial-up telephone line on a subscription basis

Documentation and consultation available

Cost based on type of connection and volume of data transmitted

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## GRAPHNET

GRAPHNET, which is owned and operated by Graphic Scanning Corporation, was established in 1974. It now has over 200 local access points in the United States with connections to more than 200 countries.

### NETWORK CONFIGURATION

GRAPHNET consists of multiply connected BISYNC interfaces at 110-1200 bps.

### PROTOCOLS AND SYSTEMS

GRAPHNET supports the following protocols:

- BISYNC
- Most asynchronous.

GRAPHNET supports the following subsystems:

- **Freedom Network:** a packet-switched public network that recognizes and adjusts for differences in speed, code, protocol, or format, thereby increasing compatibility and connectivity with many other networks
- **Freedom Forward:** a store and forward network with the following features:
  - Mnemonic codes for frequently called sites
  - Flexible retries
  - Message sequencing
  - Off-line storage up to 7 years
  - Message repair functions
- **Freedom Express:** an electronic mail service providing:
  - Courier delivery (2.5 hour)
  - First call mail delivery
  - Telephone delivery.

---

**ACCESS**

The access specifications for GRAPHNET include the requirements and services identified below.

**Means of Access**

Access is provided through a telephone line on a subscription basis.

**Gateways**

Access to other networks is provided by International Record Carriers (IRC).

**Documentation**

Subscribers to GRAPHNET receive copies of the user's manual. An IRC Directory is also available.

**Consultation**

Trained personnel provide customer service 24 hours per day, 7 days per week, at the following telephone numbers: 1-800-631-1581; 1-800-932-0848. They are prepared to answer questions about formatting, addressing, and message verifying, and they troubleshoot general network and terminal problems.

**Cost**

Cost depends on the type of connection and amount of data transmitted over the network. Volume discounts are available. There is a monthly access charge but no startup fees or deposit.

**ADDRESS**

GRAPHNET, Inc.  
8230 Boone Boulevard  
Suite 330  
Vienna, Virginia 22180  
(703) 556-9397

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GTE TELENET FACTS

**Network Configuration** Comprised of four integrated functional components:

- Backbone
- Tributary
- Access
- Network management

**Protocols and Systems** Protocols supported:

X.25	2780/3780
3270 BSC	SNA/SDLC
Asynchronous	ASYNC-to-3270 and 3270-to-ASYNC conversion

Subsystems:

PC Pursuit	Micro-Fone II
X.25 Dial Service	Finet
3270 BSC/SDLC DAF Service	Minet and Med/Mail

**Access** A public network

Access provided by dial-up and leased lines

Gateways to other international networks provided by International Record Carriers

Cost determined by duration of connection, volume of data, and type of access; volume, non-prime time, and extended term discounts available

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## GTE TELENET

GTE Telenet is a value-added, packet switched data communication network serving the United States and nearly 70 foreign countries. Recently, the U.S. Telecom and GTE merged resulting in the merger of GTE Telenet and Uninet. The new Telenet Communications Corporation is a U.S. Sprint Company. The new network is properly referenced as "Telenet."

### NETWORK CONFIGURATION

Telenet is comprised of four integrated functional components:

- **Backbone:** The top layer consists of the backbone made up of high throughput switching. Hubs are located in 10 major U.S. cities and are interconnected by 56 kbps links.
- **Tributory:** The tributary layer provides access for asynchronous and synchronous traffic. This layer consists of second level switching strategically placed to minimize cost and enhance parameters such as network delay, reliability, and throughput. The tributary switches are located in an additional 94 cities throughout the continental United States and are connected to the backbone with redundant net lines varying in speed between 9.6 kbps and 56 kbps.
- **Access:** The third layer provides local access. This extremely important layer provides local dial coverage from nearly 18,000 calling areas. Access nodes are located to minimize a user's total cost in terms of Telenet access charges as well as the customers measured usage charges on the local loop. Access is supported via a Telenet PAD, which is connected to either a hub or a tributary switching site. Currently, all links are terrestrial.
- **Network Management:** The integrated network structured is managed and monitored by the Telenet Network Control Center. This facility consists of a network control processor (NCC) running network control application

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programs. From the network control center, certain functions are performed like remote diagnostics, alarm, and event reporting. In addition, the NCC creates the routing tables used throughout the network, and maintains and provides all network software loads.

**PROTOCOLS AND  
SUBSYSTEMS**

The following protocols are supported by Telenet:

- X.25
- 3270
- ASYNC-to-3270 and  
3270-to-ASYNC conversion
- 2780/3780
- SNA/SDLC
- Asynchronous.

The following subsystems were supported by GTE Telenet:

- PC PURSUIT allows PC users a reduced rate for evening and weekend access. This service is designed to expand the use of many on-line services available to PC users.
- X.25 DIAL SERVICE allows direct dial-up access at 4800 bps.
- 3270 BSC/SDLC DAF SERVICE provides PC's a dedicated access facility to the 3270 full-screen applications available from IBM hosts. Through the use of SNA or similar networks, PC users may access multiple IBM hosts.
- FINET is a financial information service available to various PC users. Included are realtime quotes on stocks, bonds, commodities, and options, as well as an interactive portfolio management service.
- MINET and MED/MAIL are medical information/mail facilities that are offered to GTE Telenet users in conjunction with the American Medical Association (AMA). Medical professionals can access up-to-date information on medically related topics.

**ACCESS**

Telenet is a public data communications network. The following specifications outline how to access the network.

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GTE Telenet  
Account

Users wishing to connect a host or terminal to Telenet should contact the GTE Telenet main office in Reston, Virginia. Users wishing to access a particular system already connected to GTE Telenet must simply dial the local access number.

Means of Access

There are two ways to access Telenet:

- Dial-up lines
- Leased lines.

The following communications bandwidths are available:

- 110 bps-4800 bps (asynchronous and synchronous)
- Some leased lines are 14.4K bps (synchronous only).

Gateways

International Record Carriers (IRC) provides access to other international networks.

Cost

Costs associated with using Telenet are determined by the following factors:

- Type and duration of connection made
- Volume of data transmitted
- Number of ports desired.

Volume, nonprime time, and extended use discounts are available to users.

FUTURE PLANS

Telenet will continue to provide full-range, end-to-end data communications service.



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**ADDRESS**

Telenet Communications Corporation  
12490 Sunrise Valley Drive  
Reston, Virginia 22096  
(703) 689-6000

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**RCA CYLIX FACTS**

**Network  
Configuration**

Network comprised of a group of satellite ground stations distributed throughout the United States, a communications satellite, a central site, and access hardware, including modem and controllers.

**Protocols and  
Systems**

Burroughs Poll/Select  
IBM 3270 Bisync  
Synchronous Data Link Control

**Access**

RCA Cylix available to public  
Access information available through network marketing specialists at (901) 761-1177  
Access provided by dial-up, leased terrestrial lines  
Consultation services available  
A single fee for all network services

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## RCA CYLIX COMMUNICATIONS NETWORK

The RCA Cylix Communications Network is a satellite-based, value-added, public communications network. Routing data by RCA Satcom satellites, the network can link any two or more locations in the United States and Canada.

### NETWORK CONFIGURATION

RCA Cylix is a satellite-based, value-added public data communications network. Any two locations in the U.S. and Canada can be linked by RCA Cylix. Data are transmitted from the ground station, to a communications satellite, and to the central site. The information is routed by the satellite from the central site to the ground station closest to the destination. It is then sent along terrestrial lines to its destination. Figure 3.6-1 illustrates the network configuration.

### PROTOCOLS AND SYSTEMS

RCA Cylix supports the following protocols:

- Burroughs Poll/Select
- IBM 3270 Bisync
- Synchronous Data Link Control (SDLC).

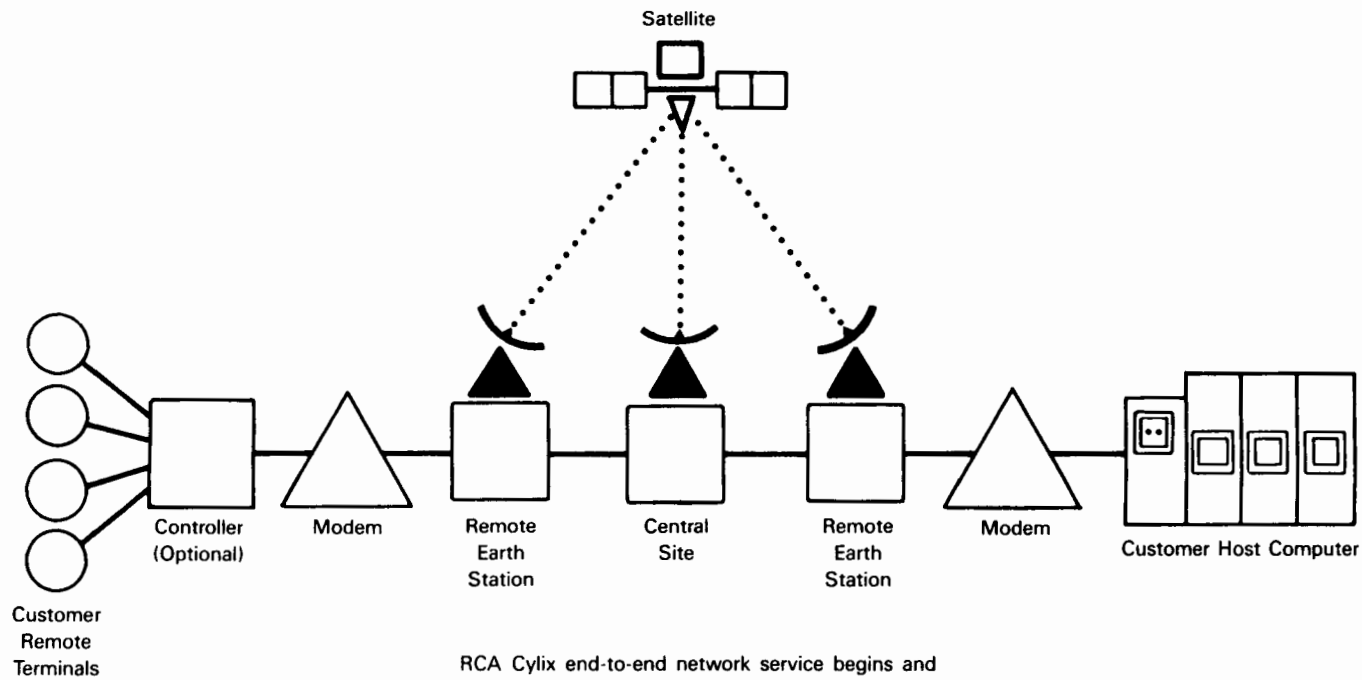
An onsite modem provided by the network converts the local protocol into the system protocol for transmission. The modem at the other end reverses the process.

### ACCESS

Access to the network is provided as indicated below.

### RCA Cylix Account

Users wishing to connect a terminal or host to the network should contact an RCA Cylix marketing representative at (901) 761-1177.



RCA Cylix end-to-end network service begins and ends with specially designed modems located at a customer's remote and host facilities. Data flows from customer terminals by multi-point terrestrial lines to Remote Earth Stations. It is beamed by satellite, via Memphis, to receiving Earth stations, and then travels by point-to-point line to the customer host site.

**Figure 3.6-1. RCA Cylix**

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Means of Access

On-line, leased terrestrial lines provide access to the nearest ground station. The following are the ground stations across the Nation:

Birmingham, AL	St. Louis, MO
Phoenix, AZ	Winston-Salem, NC
Los Angeles, CA	Piscataway, NJ
San Francisco, CA	Buffalo, NY
Denver, CO	New York, NY
Hartford, CT	Cincinnati, OH
Washington, DC	Cleveland, OH
Miami, FL	Oklahoma City, OK
Orlando, FL	Philadelphia, PA
Atlanta, GA	Columbia, SC
Chicago, IL	Nashville, TN
Indianapolis, IN	Dallas, TX
Kansas City, KS	Houston, TX
Boston, MA	San Antonio, TX
Germantown, MD	Seattle, WA
Detroit, MI	Milwaukee, WI
Minneapolis, MN	

Gateways

Gateways are provided to other RCA networks.

Consultation

RCA Cylix regional specialists work to identify customer needs and solve network problems in their areas. They can be reached at 1-800-821-5295.

Cost

Users pay a single fee for all network services, however, the MicroSTAR network systems are offered at a guaranteed fixed monthly fee.

---

**FUTURE PLANS**

The RCA MicroSTAR service combines new Ku-band technology and RCA expertise to put the cost of data networking well within reach of many small and medium-sized companies. MicroSTAR data networks consist of small Earth stations (dishes only 4 to 6 feet wide) connected to a larger hub via RCA's own high power Ku-band satellite. High frequency Ku-band signals bypass the problem of electronic interference from terrestrial microwave transmissions. Installing a MicroSTAR Earth Station only takes a few hours. The small dishes can be mounted on a roof, in a parking lot, or on the side of a building.

**ADDRESS**

RCA Cylix Communications Network  
800 Ridge Lake Boulevard  
Memphis, Tennessee 38119-9409  
(901) 761-1177

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**TYMNET FACTS**

**Network Configuration** Consists of multiply-connected, dedicated processors called Engines, which are interconnected by leased lines and microwave or satellite links, with hosts and terminals directly connected to Engines

**Protocols and Systems**

Most standard asynchronous	SDLC/SNA
X.25	BISYNC
X.75	RJE/HASP
X.PC	Outdial
Xpedite	

**Access** Available to the public

Access provided through local dial-up lines, public WATS lines, leased lines, and permanent hardwire connections.

Gateways to international networks accessed through International Record Carriers

Costs based on type of connection made and volume of data transmitted

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## **TYMNET**

Tymnet is a value-added, packet switched data communications network serving over 600 U.S. cities and 68 foreign countries. Tymnet was established in 1969 and is owned and operated by McDonnell Douglas Corporation.

### **NETWORK CONFIGURATION**

The Tymnet network consists of multiply-connected, dedicated processors called "Engines" that are linked at 4800 bps to 56000 bps. The network is centrally controlled by a software package called the Supervisor, which monitors the path routing, accounting, and error diagnostics for the entire system. The Engines that provide access to the terminals are called TYMSAT's, and Engines providing access to the hosts are called TYMCOM's. An Asynchronous Terminal Concentrator (ATC) can be used to provide single point access to sites with many terminals. Figure 3.7-1 illustrates the Tymnet configuration.

### **PROTOCOLS AND SUBSYSTEMS**

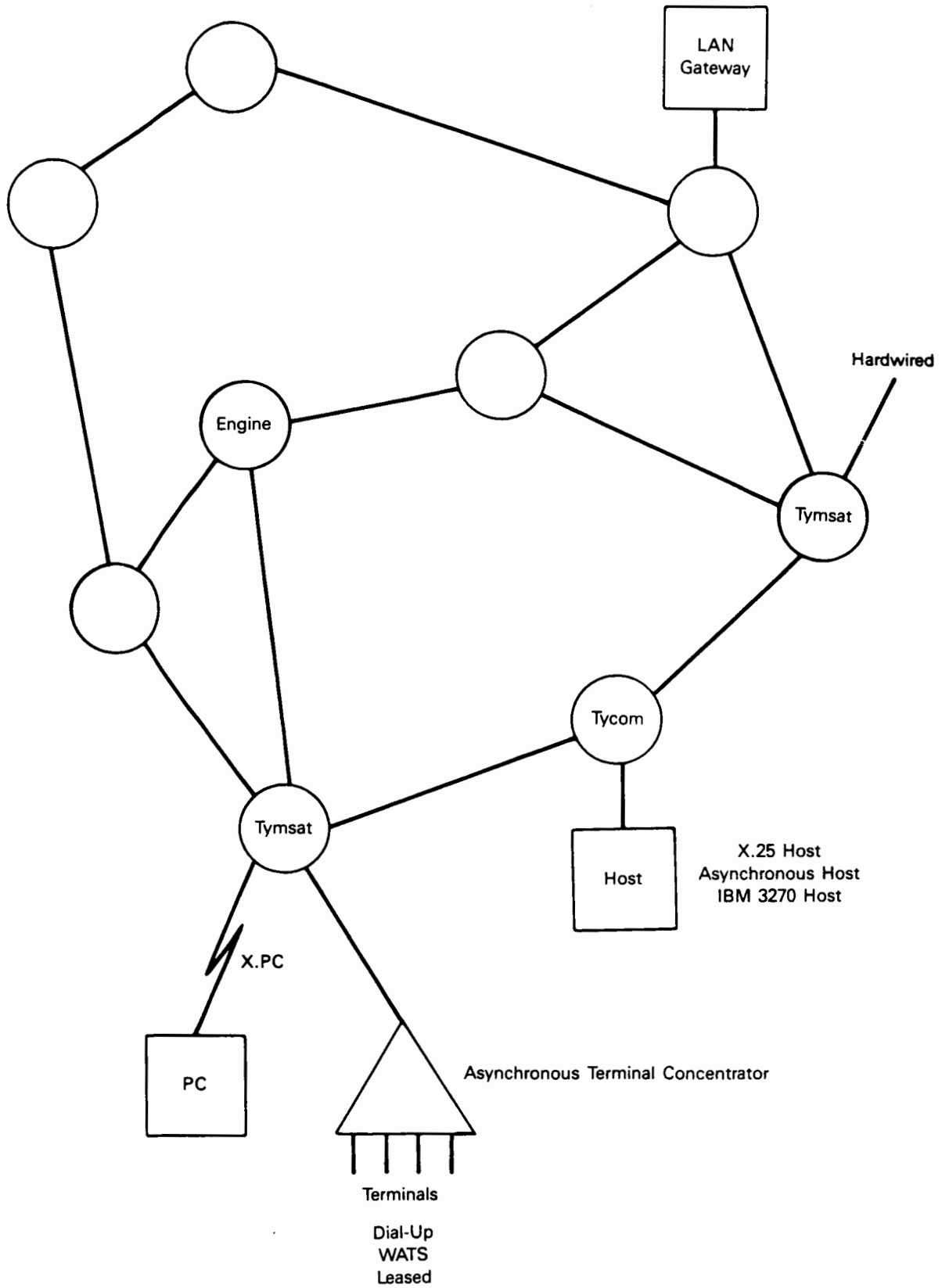
The following protocols are supported by Tymnet:

- Most standard asynchronous
- X.25
- X.75
- X.PC
- SDLC/SNA
- BISYNC
- RJE/HASP.

Tymnet also provides the following subsystems:

- **Outdial:** This service allows PC's and terminals the capability to distribute and collect data to/from attended or unattended terminals. Outdial also provides an interface to the "OnTyme" mail facility of McDonnell Douglas.
- **X.PC:** X.PC is an advanced asynchronous protocol, which enables PC's to handle as many as 15 separate channels over a single dial-up telephone line. This capability is





**Figure 3.7-1. Tymnet**

---

designed to take advantage of multiwindow sessions that can be generated by various off-the-shelf software packages.

- Xpedite: This service allows document exchange between compatible and incompatible PC's and word processors.

#### **ACCESS**

The Tymnet network is available to the public and may be accessed by following the specifications below.

#### **Tymnet Account**

Users wishing to connect a terminal or host to Tymnet should contact Tymnet headquarters in San Jose, California, by calling (408) 946-4900. Users accessing a particular system via Tymnet may not require an account.

#### **Means of Access**

There are four ways to access Tymnet:

- Dial-up lines
- Leased lines
- Permanent hardwire connections
- WATS lines.

Interactive asynchronous communications at 110 bps-2400 bps are supported by Tymnet.

#### **Gateways**

Gateways to various international networks are provided via International Record Carriers (IRC).

#### **Cost**

The cost of using Tymnet depends upon:

- Type of connection made
- Amount of data transmitted
- Overhead expenses
- Installation and rental fees.

---

Nonprime time and volume discounts are available.

**FUTURE PLANS**

Presently, Tymnet is dependent on narrow bandwidth telephone lines, but is working to end this dependency by replacing terrestrial links with high bandwidth satellite or microwave links. Tymnet is also looking to expand its international operations.

**ADDRESS**

Tymnet, McDonnell Douglas Network  
Systems Company  
2710 Orchard Parkway  
San Jose, California 95134

---

UNINET FACTS

**Network Configuration**            A shared, packet switched network composed of a four-level regionalized grid system

**Protocols and Systems**            X.25  
SDLC/SNA  
BISYNC  
Most standard asynchronous

Special features include:

Microcom Networking Protocol

WORLDBLINK

LOCK-OUT

DIAL BACKUP

**Access**                            Uninet is a public network

Access provided by dial-up (public and private) or dedicated lines

Customer service support available 24 hours per day, 7 days per week

Cost is a function of the type of connection and the volume of data transmitted

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---

## UNINET

Uninet is a value-added, packet-switched data public communications network serving over 500 U.S. cities and 48 foreign countries. The network is operated by US Telecom, a part of United Telecommunication, Inc.

NOTE: US Telecom and GTE recently merged. Uninet no longer exists as a separate network. Rather, it has become part of GTE Telenet.

### NETWORK CONFIGURATION

Uninet is comprised of a four-level regionalized grid. The four levels are as follows:

- First level: Interregional Switches (RSW). Completely interconnected regionalized set of dedicated computers linked at 56kbps
- Second level: Intraregional Switches (ISW). Connected to multiple RSW and every ISW in same region at 19.2kbps - 56kbps
- Third level: Interconnect Nodes (ICN). Connected to ISW at 16kbps - 56kbps
- Fourth level: Packet Assembler/Disassembler. Terminal PADs (TPAD) provide access to synchronous and asynchronous terminals. Host PADs (HPADS) provide access to non-X.25 hosts. X.25 hosts can connect directly to an ICN.

Figure 3.8-1 illustrates the Uninet configuration.

### PROTOCOLS AND SUBSYSTEMS

The protocols supported by this network include:

- X.25
- SDLC/SNA

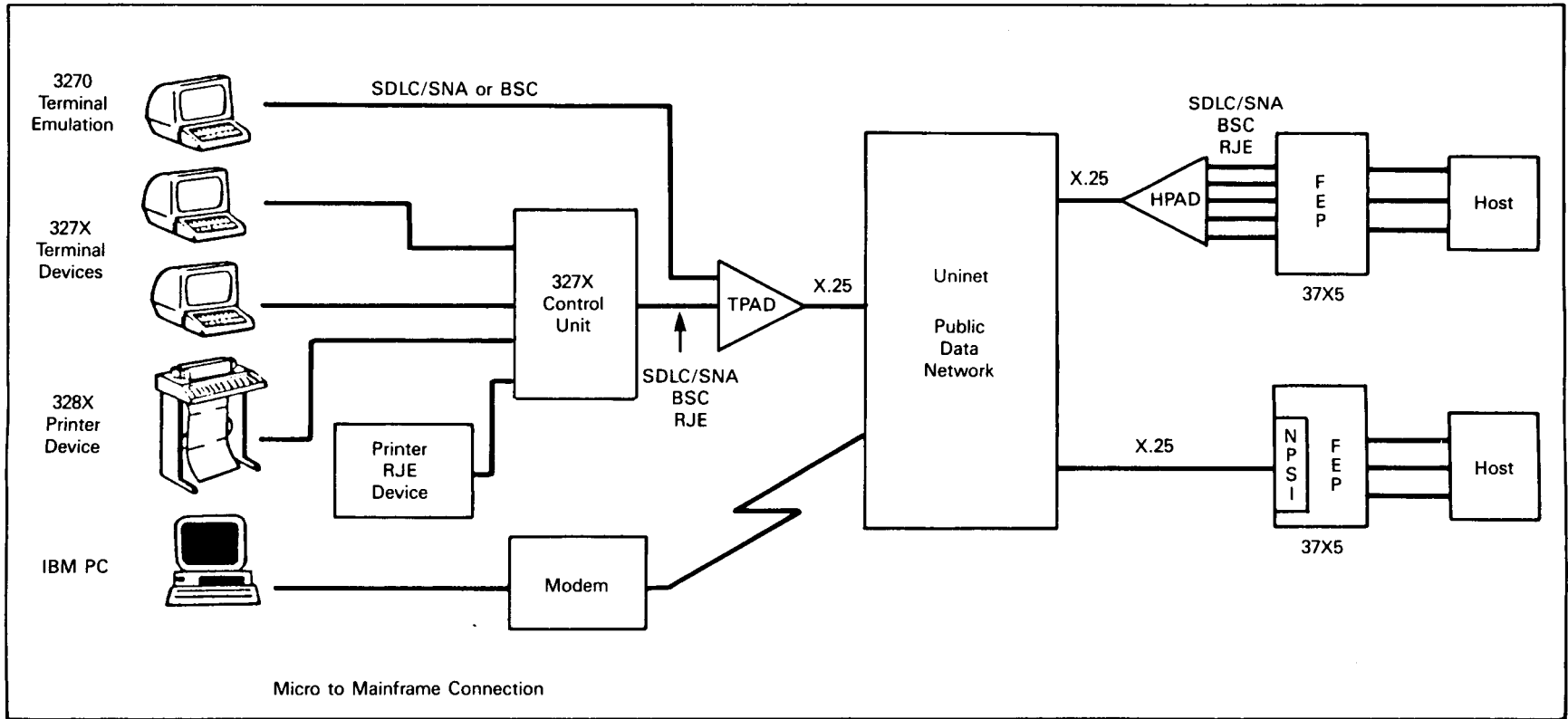


Figure 3.8-1. Uninet

- 
- BISYNC
  - Most standard asynchronous.

Special features of Uninet include the following:

- Microcom Networking Protocol (MNP) provides PC owners the capability for users to communicate with other personal computers, other terminals, and various microcomputers and mainframes. MNP is available in the following cities: Atlanta, Boston, Chicago, Dallas, Houston, Kansas City, Newport Beach, New York, San Francisco, and Washington.
- WORLDLINK is Uninet's electronic telex service.
- LOCK-OUT service allows customers to restrict Uninet access to specified lines.
- DIAL BACKUP provides a back-up communication line in case the primary link is not available.

#### ACCESS

In 1981, Uninet became available commercially. In order to access the network, the below specifications should be followed.

#### Uninet Account

The nearest Uninet Account Representative should be contacted. An account with Uninet is not required of users and many systems using Uninet for access.

Customer assistance is available 7 days a week, 24 hours a day by calling 1-800-821-5340.

#### Means of Access

There are three ways to access Uninet:

- Public dial-up access ports (call 800-821-5340 to get the phone number of the nearest public access port)
- Private access ports (dial-up or leased)
- Dedicated TPAD.

---

The following communication bandwidths are available:

- 110 bps-2400 bps (asynchronous dial-up)
- 110 bps-19.2kbps (asynchronous leased)
- 2400 bps-9.6kbps (synchronous dial-up)
- 2400 bps-56kbps (synchronous leased).

Cost

The charge for host or terminal connection to Uninet depends on:

- The type of connection (synchronous or asynchronous)
- The number of ports desired
- The distance from the host to the nearest ICN.

Nonprime time and volume discounts are available. Contact Uninet for specific information on pricing procedures.

**FUTURE PLANS**

Plans for the future include speeding up slower links up to 4800 bps, and implementing WORLDLINK support of X.400.

**ADDRESS**

Uninet, Inc.  
10951 Lakeview Avenue  
Lenexa, Kansas 66219  
(913) 541-4400



---

## ARPANET FACTS

### Network Configuration

Backbone network consisting of multiply connected processors linked via digital-leased lines at 50 kbps

Access network consisting of hardware used to connect hosts/terminals to the backbone

### Protocols and Subsystems

Network-access protocols providing interface between a host and the network: X.25 and ARPANET access protocols

Data transport services protocols providing host-to-host communications: Internet Protocol (IP) and Transmission Control Protocol (TCP)

Protocols necessary to implement user-specific application requirements: TELNET, File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP), and Native Mode Protocols

### Access

Access restricted to those involved in U.S. Government business or research and those directly involved with Government owned or operated computer communications equipment

Specific hosts connected to the network is either a full-service or limited-service interface

Terminals connected through a host, through a Terminal Access Controller (TAC), or through use of commercially available devices

Gateways to over 110 networks

Groups using ARPANET share the costs

---

---

## ARPANET

ARPANET is an unclassified packet-switched research network used by the Department of Defense and other organizations conducting Government-sponsored research. The network is managed by the Defense Communication Agency's (DCA) Defense Data Network Project Management Office (DDN PMO) and is administered by the Defense Advanced Research Projects Agency's (DARPA) Information Processing Techniques Office.

DARPA developed ARPANET in 1969 as an experimental network designed to provide an efficient and reliable method of intercommunication between heterogeneous hosts so that software and data could be shared by a wide variety of users. Expansion of the system continued, and in 1975, control of the network was given to DCA. In 1983, DCA split ARPANET into two components, ARPANET and MILNET, with the latter becoming the primary unclassified backbone of the DDN, and the former restricted to research.

ARPANET supports a full range of connectivity between hosts, terminals (synchronous and asynchronous), and other networks. In addition, ARPANET supports specific application protocols for file management and mail capabilities.

### NETWORK CONFIGURATION

The ARPANET configuration shown in Figure 3.9-1, consists of the two elements identified below:

- The backbone network consists of multiply connected processors called Interface Message Processors (IMP) linked via digital-leased lines at 50 kbps.
  - The access network consists of the hardware identified below to connect hosts/terminals to the backbone:
    - Host Front End Processor (HFEP): access for full-service hosts
    - Terminal Emulator Processor (TEP): access for limited-service hosts
    - Terminal Access Controller (TAC): access for direct terminal interface
    - Packet Assembler/Disassembler: access for subscriber-supplied terminal interface
-

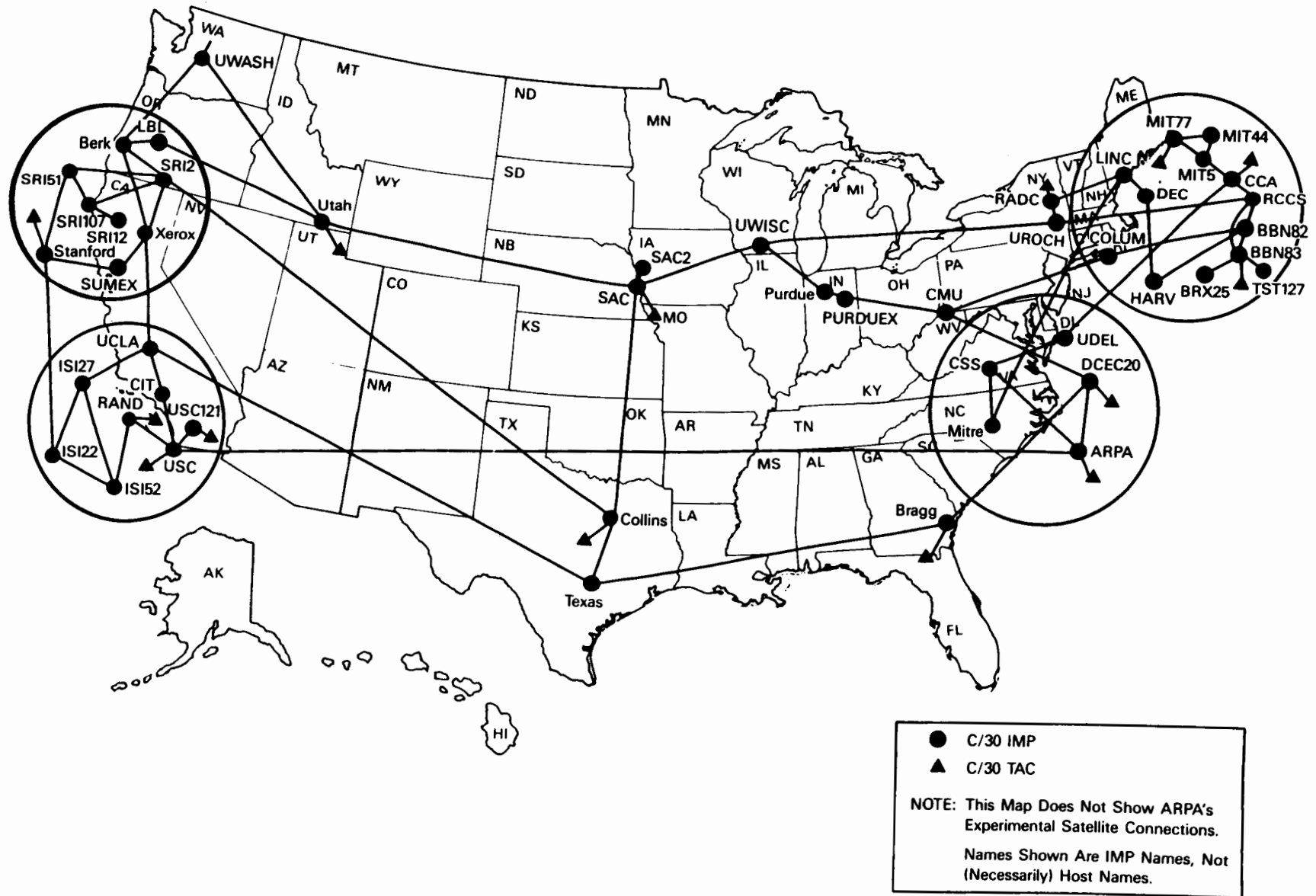


Figure 3.9-1. ARPANET Geographic Map, December 31, 1985

**PROTOCOLS AND  
SUBSYSTEMS**

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An entire suite of protocols has been implemented on ARPANET. The suite is organized into a hierarchical structure comprising three levels, with the lowest level first identified below. The protocols on a particular level utilize the services of those on a lower level and provide services to those on a level higher than their own.

- Network-access protocols (level 1) providing interface between a host and the network. ARPANET currently supports two network-interface protocols:
  - X.25 access protocol
  - ARPANET access protocol.
- Data transport service protocols (level 2) providing host-to-host communications:
  - Internet Protocol (IP), which provides a means of communication between non-homogenous hosts
  - Transmission Control Protocol (TCP), which maintains connectivity between two hosts and ensures the reliability of data flow
- Protocols necessary to implement user-specific requirements (level 3):
  - TELNET, which handles terminal-to-host communications
  - File Transfer Protocol (FTP), which provides file management services
  - Simple Mail Transfer Protocol (SMTP), which manages electronic mail functions
  - Native Mode protocols, which are terminal-specific protocols

**ACCESS**

ARPANET is restricted to those involved in U.S. Government business or research and those directly involved with Government owned or operated computer communications equipment.

---

ARPANET  
Account

The first step in establishing an ARPANET account is to contact Code B641 of the DDN PMO, Washington, D.C. 20305. The process of obtaining access can be lengthy, sometimes requiring 1 year for completion.

Means of Access

Several methods are available for accessing ARPANET:

- Hosts
  - Full-service interfaces providing support for the entire DDN protocol suite. Hosts can be connected directly to an IMP, through an HFEP.
  - Limited-service interface does not support the entire DDN protocol suite. Host-to-terminal connections can be established through a TEP.
- Terminals
  - Host Pass-Through Interface via connected host (TELNET)
  - Direct Interface through TAC
  - Subscriber Supplied Interface, such as a PAD (Packet Assembler/Disassembler) or a X.25 Adaptor
- Networks
  - Gateways from over 110 networks.

Gateways

ARPANET has gateways to over 110 other networks including:

- BITNET
- CS Net
- SPAN
- UUCP.

Cost

The various groups using ARPANET share the cost. A plan to implement cost recovery is being considered.

---

**FUTURE PLANS**

ARPANET and MILNET will evolve further into a dual backbone Defense Data Network. MILNET will comprise the unclassified portion. ARPANET, the classified backbone, will be used for network research only and will have several segments, including secret and top secret components.

**ADDRESS**

ARPANET  
Defense Communications Agency  
Defense Data Network  
Program Management Office  
Code B610  
Washington, D.C. 20305

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**BITNET/EARN/NETNORTH FACTS**

**Network  
Configuration**

Consists of three separate networks connected together:

BITNET -- USA

EARN -- WESTERN EUROPE

NetNorth -- CANADA

**Protocols and  
Systems**

Protocols:

IBM RSCS

Systems:

General Request Mailbox

On-line user directory

File servers

**Access**

Restricted to institutions conducting noncommercial research  
and education

Approximately 30 gateways

No costs for use

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## BITNET/EARN/NETNORTH

BITNET is a store-and-forward network of over 350 university computers in the United States. The European counterpart to BITNET is the European Academic Research Network (EARN). The Canadian counterpart to BITNET is NetNorth.

In early 1981, a small network using IBM RSCS protocols and leased telephone lines was set up on the City University New York. This network, BITNET, may be translated as "Because IT's time NET." The participants agreed, as a consequence of membership, to allow other sites to connect to the network via theirs. Beginning with IBM computers, there are now many manufacturers including VAX/VMS, VAX/UNIX, and CDC machines connected to the network.

IBM agreed to support the international links for a similar network in Europe, including a link between Rome and City University New York. EARN links over 150 computers and 100 institutions in 18 countries including a direct link to BITNET and NetNorth.

NetNorth is a Remote Spooling Communications Subsystem (RSCS) based network of 40 computers at 20 Canadian academic and research sites with direct links to BITNET and EARN.

BITNET/EARN/NetNorth permit real-time terminal messaging, electronic mail, file transfer, remote log in, and access to information and help files.

### NETWORK CONFIGURATION

BITNET/EARN/NetNorth utilize 9600 bps leased lines between adjacent sites. Each site is responsible for the installation of the leased line to its site, and must make available at least one synchronous port for future expansion. Figure 3.10-1 diagrams the BITNET/EARN/NetNorth sites.



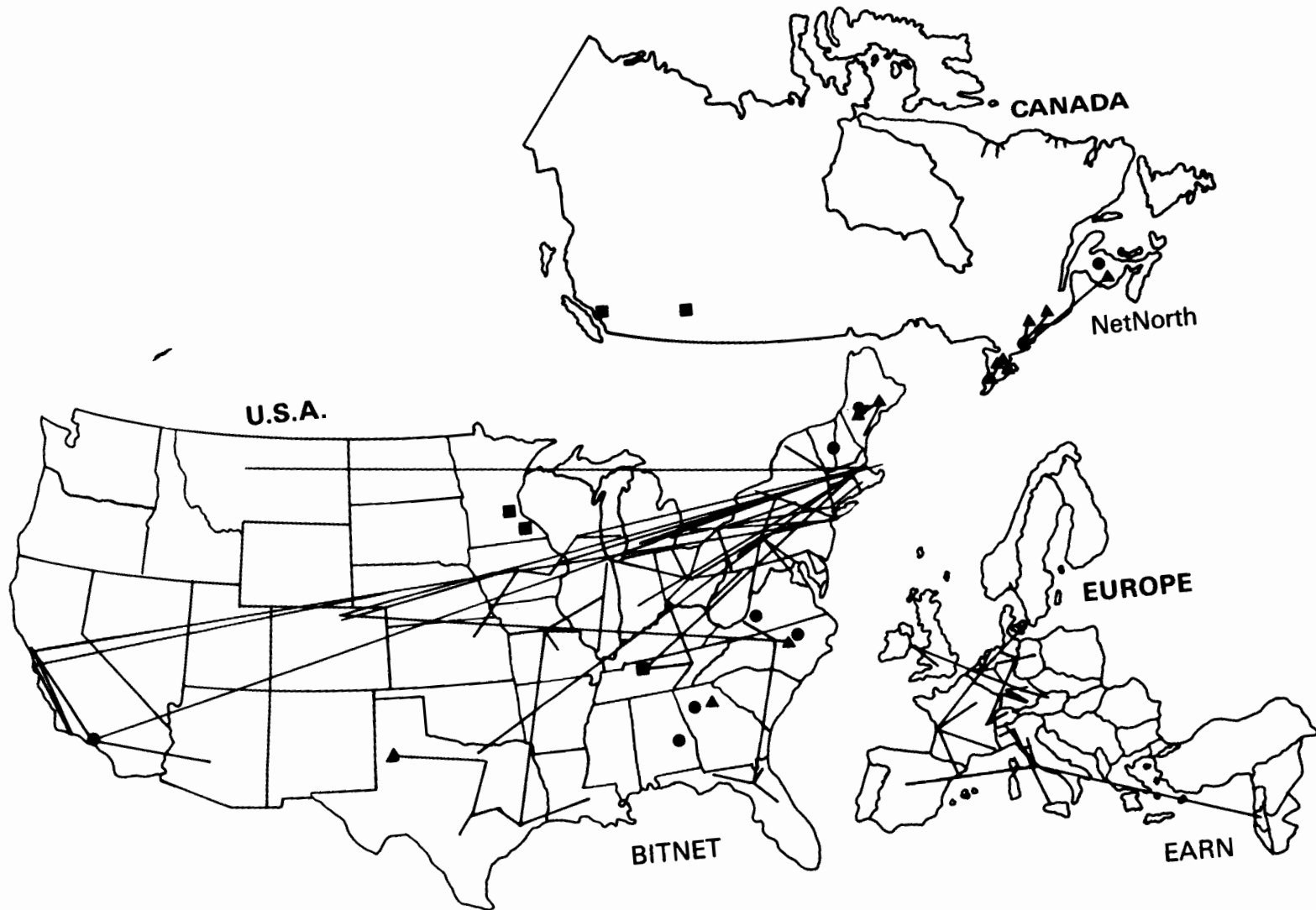


Figure 3.10-1. BITNET/EARN/NetNorth Topology

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**PROTOCOLS AND  
SUBSYSTEMS**

The protocols supported by BITNET/EARN/NetNorth include the IBM RSCS or an RSCS emulation. Subsystems include:

- General Request Mailbox
- On-line user directory
- File servers
- BITNET/EARN/NetNorth users can access various help or information files by accessing one of several on-line file servers. Contents include network information, node lists, topology maps, gateway information, details on software, and listings of meetings and conferences of interest to BITNET/EARN/NetNorth users.

**ACCESS**

There are no restrictions to a BITNET/EARN/NetNorth membership except for the exclusion of commercial users. Users do need a host capable of supporting an IBM RSCS connection or its emulation. The specifications that follow outline information regarding accessing BITNET/EARN/NetNorth.

**BITNET/EARN/  
NetNorth Account**

U.S. institutions interested in connecting to BITNET should contact the BITNET Network Information Center at (609) 734-1878 for a request form.

Telephone numbers for information on EARN and NetNorth are unknown.

**Gateways**

BITNET/EARN/NetNorth supports gateways to other academic and research networks including:

- |                   |                |                   |
|-------------------|----------------|-------------------|
| ● JANET           | ● CMU NET      | ● MLNET           |
| ● UK Aluez        | ● Columbia Net | ● RILE NET        |
| ● ARPANET         | ● CSNET        | ● UNINETT         |
| ● UC Berkeley Net | ● DFN          | ● UNCP            |
| ● CITNET          | ● MAILNET      | ● U. WESTONT. NET |
| ● CDN             | ● MFENET       | ● WESLYN          |
| ● CERN            | ● MILNET       | ● U. WISC NET     |

- 
- CHUNET
  - MIT NET
  - WASH UNIV NET
  - ASTNET
  - IL
  - EASYNET
  - GRAPEVINE
  - MTSNET
  - VNET.

Cost

There is no cost for using BITNET/EARN/NetNorth, although users are responsible for maintaining their leased line.

**FUTURE PLANS**

The BITNET Network Information Center (BITNIC) is promoting growth and use of the network, and exploring additional services. EARN is planning to add gateways to several national academic networks in Europe. Plans are also underway to provide connections between NetNorth and other Canadian networks.

**ADDRESS**

BITNET  
EDUCOM  
P.O. Box 364  
Carter and Rosedale Roads  
Princeton, New Jersey 08540  
(609) 734-1915

Addresses for EARN in Europe and NetNorth in Canada are not known.

---

**CITNET FACTS**

**Network  
Configuration**

Twenty-three hosts at CalTech

**Protocols and  
Systems**

Mail Standard: RFC 822

**Access**

Limited to host on CalTech campus

Gateways to ARPANET, UUCP, BITNET, and NRAO

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**CITNET**

CITNET is the CalTech mail network. It links 23 hosts distributed throughout the CalTech campus.

**NETWORK  
CONFIGURATION**

The precise topology of the CITNET configuration is unknown.

**PROTOCOLS AND  
SUBSYSTEMS**

RFC 822 Mail

**ACCESS**

Access is limited to the host on the CalTech campus. Access specifications are identified below.

CITNET Account

Not known

Means of Access

Not known

Gateways

The internetwork gateways are ARPANET, UUCP, BITNET, and NRAO.

Cost

Not known

**FUTURE PLANS**

Not known

**ADDRESS**

Not known

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**CSNET FACTS**

**Network  
Configuration**

Consists of hosts computers on three separate physical networks:

PhoneNet, X25Net, and selected nodes of ARPANET and NSFnet

**Protocols and  
Systems**

CSNET hosts an PhoneNet use MMDF PhoneNet protocols over the switched voice network

CSNET hosts on X25Net use X.25 protocols at ISO levels 1,2, and 3 over X.25 public data networks (Telenet, Uninet, and AT&T Accunet Packet Service)

CSNET hosts on the ARPANET and NSFnet use DOD TCP/IP protocols

Subsystems include the Name Server (an on-line user directory) and Info Server (an on-line document retrieval system)

**Access**

Available to computer science research or related organizations

Accessed by telephone lines (PhoneNet) or existing X.25 networks and ARPANET (X25Net)

Gateways exist to six foreign networks

Member organizations pay an annual fee based on classification and usage charges based on actual traffic

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## CSNET

CSNET, the Computer Science Network, is a data communications network linking computer scientists and engineers throughout the United States and abroad. CSNET, developed in the early 1980's, is a project sponsored by the National Science Foundation (NSF).

### NETWORK CONFIGURATION

CSNET is a logical network that spans several physical networks.

- PhoneNet: A star topology store-and-forward communications network, PhoneNet nodes use dial-up lines to access the central relay located in Cambridge, Massachusetts. PhoneNet provides low cost electronic mail to hosts on PhoneNet, ARPANET, X25Net, and BITNET. Currently, PhoneNet consists of over 120 nodes.
- X25Net: Using the ARPANET protocol suite, X25Net links hosts on X.25 public networks (Uninet and GTE Telenet). X25Net supports electronic mail, remote log in and file transfer to other X.25 and ARPANET hosts (with permission). X25Net consists of approximately 20 nodes.
- ARPANET: Nearly 30 ARPANET nodes are also nodes on CSNET. These nodes support the ARPANET protocol suite and are compatible with X25Net nodes.

Figure 3.12-1 illustrates the sites connected by CSNET.

### PROTOCOLS AND SUBSYSTEMS

CSNET uses the following protocols for PhoneNet, X25Net, and ARPANET.

- PhoneNet supports MMDF protocols over the switched voice networks.
  - X25Net supports:
    - X.25 protocols at ISO levels 1, 2, and 3 over X.25 public data networks (Telenet, Uninet, and AT&T Accunet Packet Service)
-

3.12-2

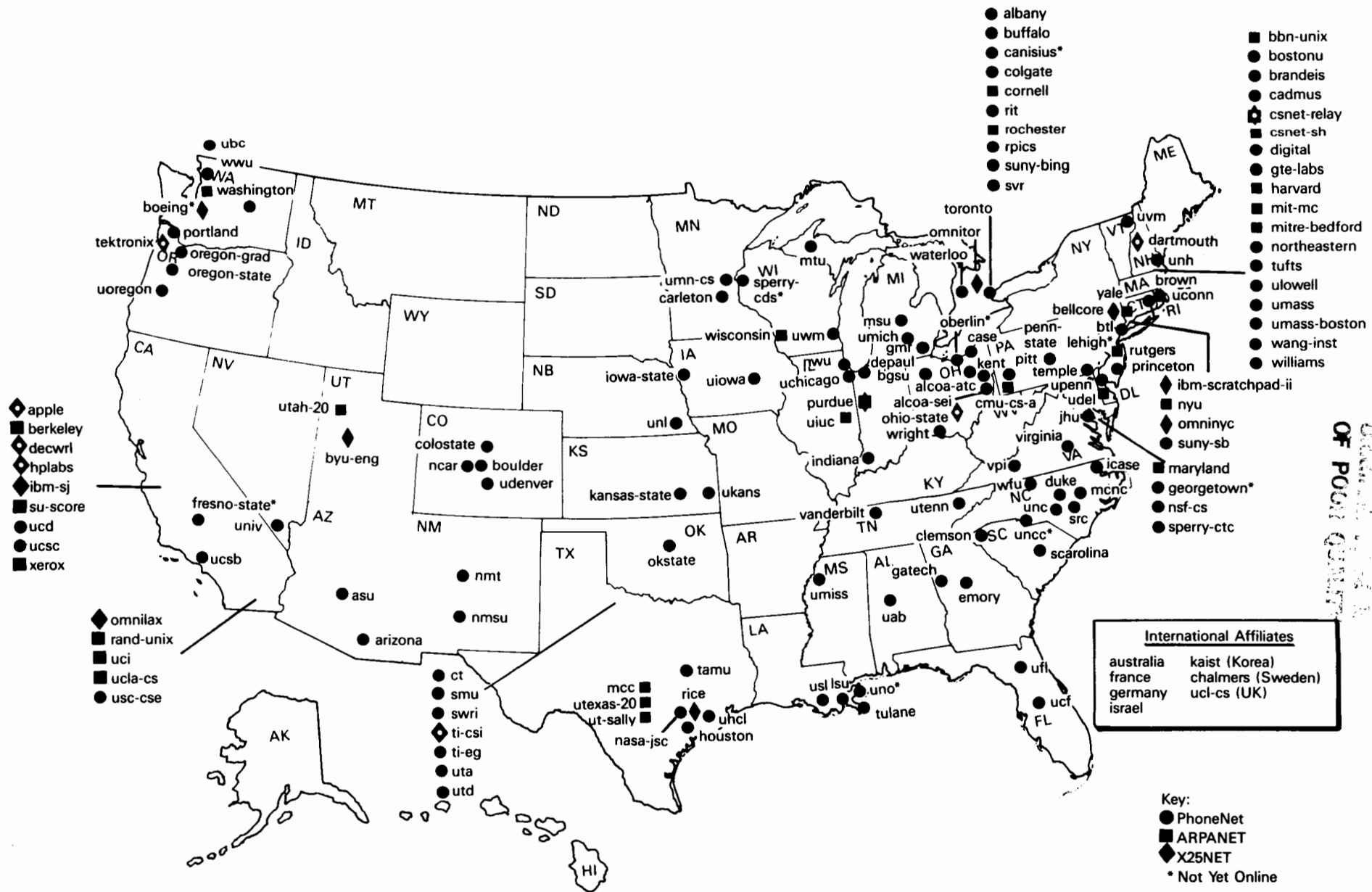


Figure 3.12-1. CSNET Geographic Map, October 1, 1985



- 
- DOD TCP/IP protocols
  - CCITT X3/X26/X29 protocols.
  - ARPANET and NSFnet support DOD TCP/IP protocols.
  - Name Server is a directory of all CSNET users and sites.
  - Info Server accepts user requests for information and automatically forwards the appropriate documents.

#### **ACCESS**

Membership in CSNET is open to any organization engaged in research or advanced development in computer science or a related field. Access to Computer Information Center (CSNET) is provided by following the below specifications.

#### **CSNET Account**

An organization wishing to join CSNET should request an application form from the CSNET Computer Information Center (CIC). The form requires evidence of computer-related research and/or development activity. CSNET does not offer membership for individuals.

#### **Means of Access**

CSNET may be accessed as follows:

- PhoneNet: dial-up lines
- X25Net: dial-up and leased lines via X.25 packet switched networks or through ARPANET.

#### **Gateways**

The following gateways exist between CSNET and other networks:

- BITNET
  - ARPANET
  - DFN (West Germany)
  - HUIJINET (Hebrew University)
  - JANET (United Kingdom)
  - SDN (South Korea)
  - ACSNET (Australia)
-

- 
- SUNET (Sweden)
  - COSAC (France).

Documentation

User documentation on network addressing, network gateways, mailing lists, and technical information on software design implementation, and installation is available in electronic or paper form and obtainable upon request from the CIC.

Cost

The cost of using CSNET includes annual dues and service fees. Annual fees depend on the classification of membership:

- University -- \$5,000
- Government -- \$10,000
- Nonprofit -- \$10,000
- Industrial -- \$30,000
- ARPANET -- \$5,000.

Service fees include connect charges for PhoneNet and monthly usage charges for X25Net.

FUTURE PLANS

Not known

ADDRESS

Computer Science Network (CSNET)  
Coordination and Information Center (CIC)  
BBN Laboratories, Inc.  
10 Moulton Street  
Cambridge, Massachusetts 02238  
(617) 497-2777

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**MAILNET FACTS**

**Network  
Configuration**

A star network with its hub at the Massachusetts Institute of Technology connecting remote sites by direct-dial telephone calls at least twice daily

**Protocols and  
Systems**

M MDF

S MTP

**Access**

Open to any university

Internetwork gateways provide access to other academic and research networks

Cost includes one-time implementation fee, monthly service fee, and usage charges

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## MAILNET

MAILNET is a star-type electronic mail network with its hub at the Massachusetts Institute of Technology (MIT). Users create MAILNET messages using their local electronic mail system. Twice daily, MAILNET places a direct-dial call to member sites, logs on, and delivers/picks up any outstanding mail. Currently, MAILNET is supported at 29 colleges and universities in the United States, Canada, and Europe. It provides a cost-effective means for smaller schools to participate in research networks as 90 percent of all messages cost less than \$1.00, while half cost under \$.20.

### NETWORK CONFIGURATION

MIT is the hub for this star network where remote sites are polled at least twice a day over direct-dial telephone lines, or if applicable, via a GTE Telenet or Tymnet connection.

### PROTOCOLS AND SUBSYSTEMS

The mail protocols supported by MAILNET are:

- MMDF
- SMTP.

### ACCESS

This electronic mail network may be accessed as indicated below.

### MAILNET Account

To include a mail system in MAILNET, users must establish an account with the MAILNET POSTMASTER.

### Means of Access

Local mail systems are polled by direct-dial telephone calls, GTE Telenet, or Tymnet, twice daily at 1:00 p.m. and 3:00 a.m. Eastern Standard Time.

---

Gateways

Internetwork gateways provide users access to other remote sites on academic and research networks. These include:

- ARPANET
- BITNET
- CCNET
- CSNET
- JANET.

Consultation

New subscribers to MAILNET receive advice on implementation strategy, assistance in finding and sharing interface code and sample source code, testing time and assistance on the MIT computer, and may participate in an implementors group.

Cost

New subscribers must pay a one-time implementation fee. All users pay a monthly service fee plus usage charges.

**FUTURE PLANS**

Information services will be expanded in conjunction with the BITNET Network Information Center. The feasibility of moving the MAILNET hub to the BITNIC computer at the City University of New York will also be investigated in an attempt to keep costs low and to continue to provide reliable services.

**ADDRESS**

MAILNET  
Massachusetts Institute of Technology  
Cambridge, Massachusetts 02238

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**MFENET FACTS**

**Network  
Configuration**

A modified star network consisting of User Service Centers connected by satellite links and Remote User Service Stations connected to each main node

**Protocols and  
Systems**

NSP protocols and electronic mail supported by MFENET

**Access**

Access limited to researchers for the Department of Energy's Office of Energy Research

Interactive access provided to the National Magnetic Fusion Energy Computer Center

Gateway provided through ARPANET

No charges associated with use of MFENET

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## MAGNETIC FUSION ENERGY NETWORK

The Magnetic Fusion Energy Network (MFENET) gives the MFE community throughout the United States access to a large, central computational research center.

The National Magnetic Fusion Energy Computer Center provided dial-up access as early as 1975. The network began operation in 1976, and the first Remote User Service Station (RUSS) was online in 1978. There are currently 55 RUSSes, and the network carries over 550 million characters per day.

### NETWORK CONFIGURATION

The network consists of dual 56 kbps satellite links connected to six RUSSes distributed throughout the country. Medium speed terrestrial lines link the RUSSes to the User Service Centers. Figure 3.14-1 shows the configuration.

### PROTOCOLS AND SUBSYSTEMS

MFENET supports NSP protocols, an early version of DECNET. An electronic mail system with the features identified below is available to all MFENET users:

- WHO directory
- Return receipts
- Attached files
- Announced arrival.

### ACCESS

The National Magnetic Fusion Energy Computer Center provides access to MFENET according to the specifications identified below.

### MFENET Account

Users must be funded by the Department of Energy's Office of Energy Research.

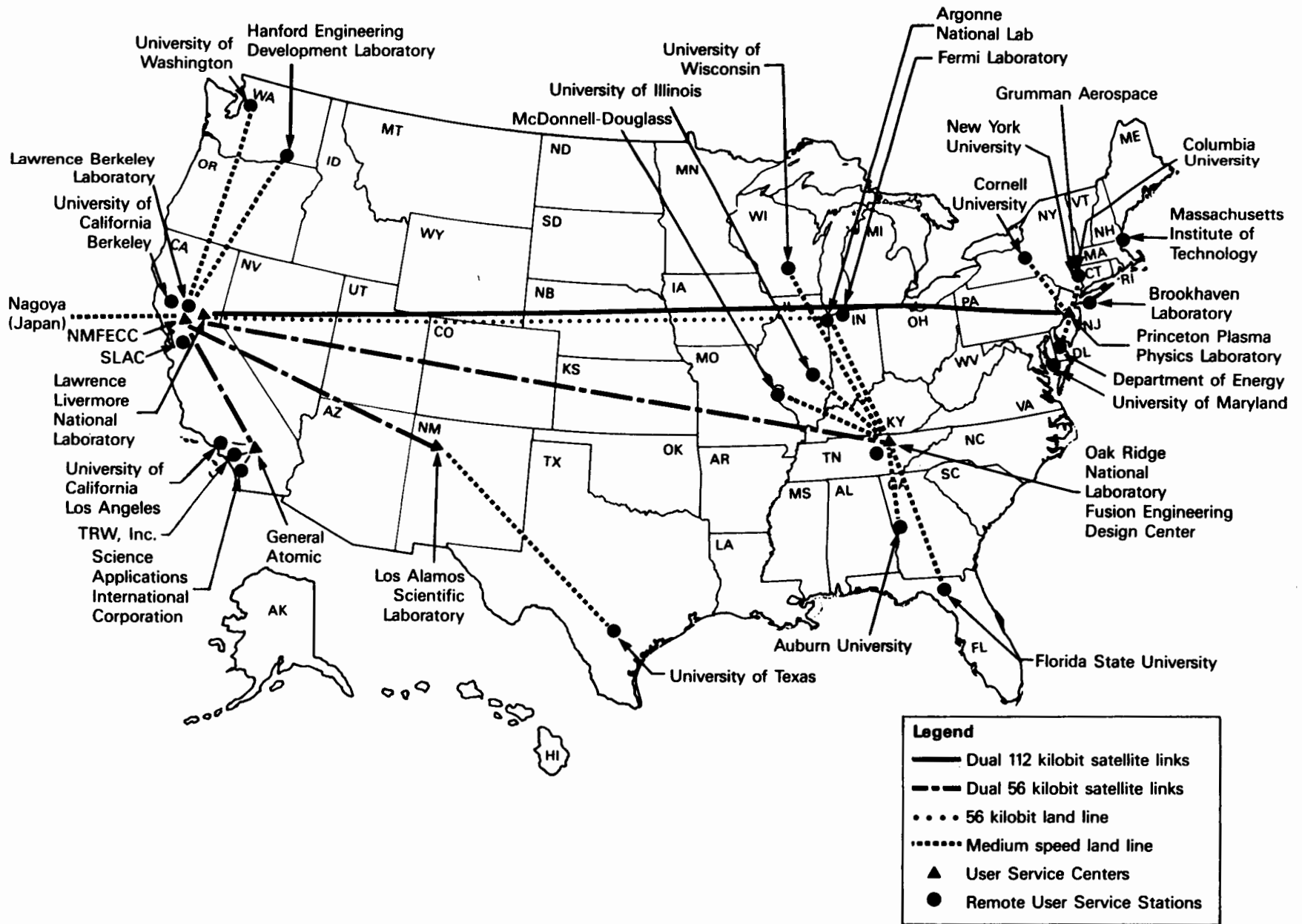


Figure 3.14-1. National MFE Network 1985



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Means of Access

A typical RUSS provides hardwired access to the network. Outside access is not possible.

Gateways

Gateway is provided to ARPANET.

Cost

No charges are associated with use of MFENET.

FUTURE PLANS

Plans are to develop MFENET by doing the following:

- Move toward more standard protocols
  - Do protocol layering
  - Insert IP (Internet Protocol) externally
  - Insert NRP protocol internally
- Replace/upgrade aging and obsolete hardware
  - Plan on major hardware procurement
- Prepare for more general data communications role
  - Develop IP as standard gateway protocol
  - Provide for accounting and access control
  - Perhaps add X.25 in the future
- Address LAN (Local Area Network) requirements
  - Support MFECC access via user site's Ethernet (provide Ethernet based servers; connect VAXs via Ethernet to gateway)
- Upgrade node addressing capabilities
  - Expand node-address field to 16 bits
- Remove certain performance limitations
  - Develop faster processors
  - Eliminate buffering restrictions
  - Remove NAP bottleneck.

---

**ADDRESS**

**MFENET**

**National Magnetic Fusion Energy Computer Center  
Livermore, California 94550**

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**MTSNET FACTS**

**Network Configuration**      A collection of eight universities that have a least one computer running MTSnet as an operating system; not a physical network

**Protocols and Systems**      X.25

**Access**      Access to MTSnet provided by access to BITNET or MAILNET  
Gateways to BITNET/NetNorth, CSNET, MAILNET, USENET, UUCP  
Consultation available through postmaster at each site

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## MICHIGAN TERMINAL SYSTEM NETWORK

MTSnet is grouped in this document among the networks. It is not a physical network, however, but a collection of eight universities in the United States, England, and Canada that have at least one computer running MTSnet as an operating system.

### NETWORK CONFIGURATION

The eight participating universities are as follows:

- Newcastle upon Tyne, Newcastle, England (one site)
- Rensselaer Polytechnic Institute, Troy, New York (one site)
- Simon Fraser University, Vancouver, British Columbia (one site)
- University of Alberta, Edmonton, Alberta (one site)
- University of British Columbia, Vancouver, British Columbia (three sites)
- University of Durham, Durham, England (one site)
- University of Michigan, Ann Arbor, Michigan (three sites)
- Wayne State University, Detroit, Michigan (one site).

These institutions currently belong directly to the MAILNET and BITNET mail communities.

### PROTOCOLS AND SUBSYSTEMS

All members have access to at least one X.25 subscription service.

### ACCESS

Users are members of BITNET or MAILNET. They access MTSnet according to the specifics itemized below.

---

MTSnet Account      No details known

Means of Access      Members use BITNET or MAILNET to send mail to one another.

Gateways              Gateways are as follows:

- BITNET/NetNorth
- CSNET
- MAILNET
- USENET
- UUCP.

Consultation          Each site has a postmaster available to answer questions and assist with problems.

FUTURE PLANS          Not known

ADDRESS                  MTSnet  
University of Michigan  
Ann Arbor, Michigan

---

**NRAO FACTS**

**Network  
Configuration**

**Fifteen nodes**

**Protocols and  
Systems**

**DECNET**

**Access**

**Limited to astronomical observatories**

**Gateways to CITNET**

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**NATIONAL RADIO ASTRONOMY OBSERVATORY NETWORK**

The National Radio Astronomy Observatory (NRAO) network is a DECNET-based network connecting hosts at 15 U.S. observatories. DECNET supports remote log in, file transfer, and electronic mail.

**NETWORK CONFIGURATION** Fifteen hosts are connected to NRAO via 9600 bps lines. The precise topology is unknown.

**PROTOCOLS AND SUBSYSTEMS** NRAO supports DECNET.

**ACCESS** Access to the network is limited to astronomical observatories. Access specifications are itemized below.

NRAO Account Not known

Means of Access Not known

Gateways CITNET provides a gateway between NRAO and other networks.

Cost Not known

**FUTURE PLANS** Not known

**ADDRESS** Not known

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**NSFNET FACTS**

**Network Configuration**      An internet consisting of a 56 kbps backbone, in addition to several wide-area, statewide, and campuswide networks; still being developed

**Protocols and Systems**      DDN (Defense Data Network) Protocol Suite supported by NSFnet

**Access**      NSFnet being developed as a general-purpose communications network for the academic research community and industrial researchers

Proposal requesting funds for linkage with NSFnet--required by National Science Foundation

Access to differ among member networks

Protocol conversion to be responsibility of member networks

No costs associated with approved research

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## NSFNET

The National Science Foundation's NSFnet is an internet of existing physical networks. NSFnet also has its own high bandwidth backbone designed to provide widespread access to supercomputing facilities.

NSFnet encompasses wide-area networks, including ARPANET, the San Diego Supercomputer Center Network, John Von Neumann Center Network, and the Illinois Supercomputer Center Network. Plans are to connect to other wide-area networks, such as BITNET, CSNET, and MFENET, in addition to many statewide and campuswide networks.

## NETWORK CONFIGURATION

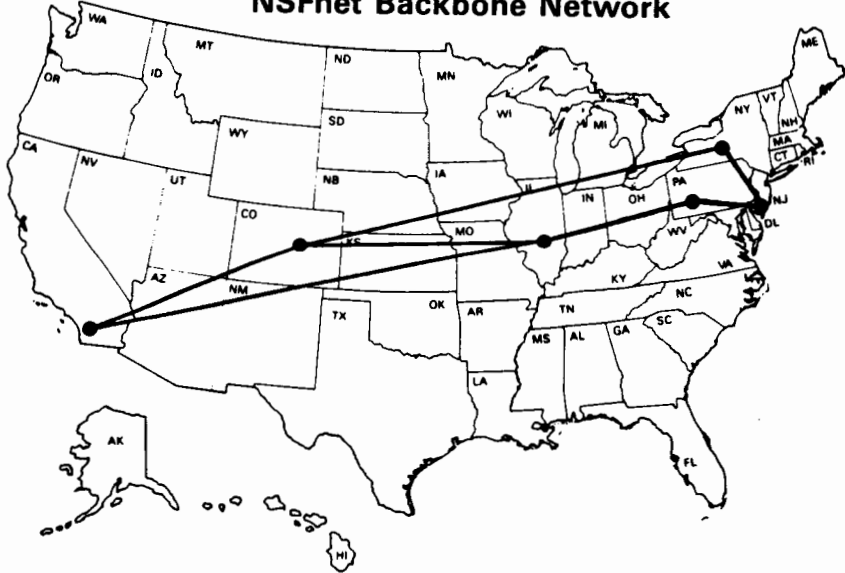
The NSFnet topology includes ARPANET, the National Supercomputing Centers, and the NSFnet backbone, shown in Figure 3.17-1. Each backbone site will have gateways to other networks as they become compatible with NSFnet.

## PROTOCOLS AND SUBSYSTEMS

An entire suite of protocols has been implemented on ARPANET. The suite is organized into a hierarchial structure comprising three levels, with the lowest level first identified below. The protocols on a particular level utilize the services of those on a lower level and provide services to those on a level higher than their own.

- Network-access protocols (level 1) providing interface between a host and the network. ARPANET currently supports two network-interface protocols:
  - X.25 access protocol
  - ARPANET access protocol.
- Data transport service protocols (level 2) providing host-to-host communications:
  - Internet Protocol (IP), which provides a means of communication between nonhomogenous hosts

**NSFnet Backbone Network**

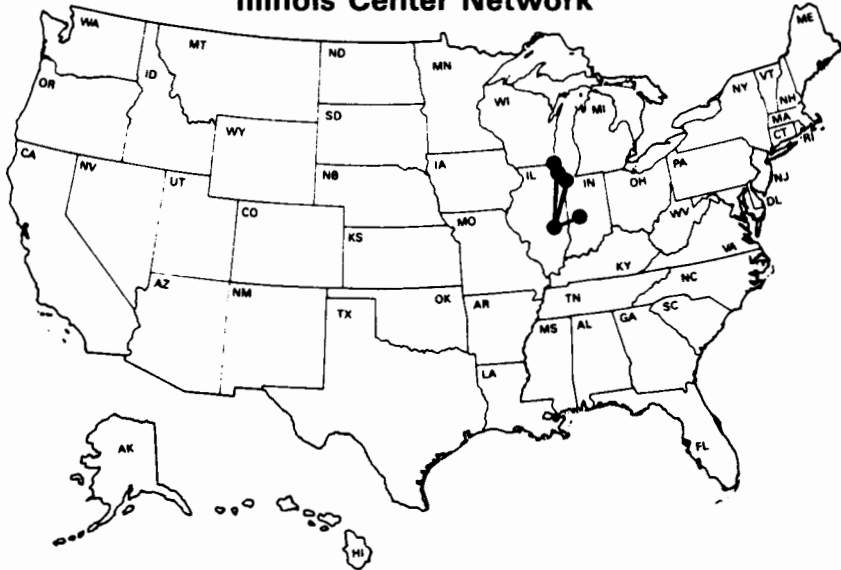


**Princeton Consortium Network**



ORIGINAL PAGE IS  
OF POOR QUALITY

**Illinois Center Network**



**San Diego Consortium Network**



**Figure 3.17-1. NSFnet Backbone Network**

- 
- Transmission Control Protocol (TCP), which maintains connectivity between two hosts and ensures the reliability of data flow.
  - Protocols necessary to implement user-specific requirements (level 3):
    - TELNET, which handles terminal-to-host communications
    - File Transfer Protocol (FTP), which provides file management services
    - Simple Mail Transfer Protocol (SMTP), which manages electronic mail functions
    - Native Mode protocols, which are terminal-specific protocols.

#### ACCESS

NSFnet had originally been designed with two purposes: to enable supercomputer users to gain access to supercomputers, and to make it possible for supercomputer users to communicate with each other. Current plans are for NSFnet to serve the academic research community and industrial researchers as a general-purpose communications network. Access specifications are given below.

#### NSFnet Account

Interested wide-area, State, and local area networks must submit a proposal to the National Science Foundation requesting funds to link with NSFnet. Protocol conversion must be managed on the local level.

#### Means of Access

Means of access will vary with each member network but will include dial-up, leased, and permanent lines.

#### Cost

No costs are associated with approved research.

#### FUTURE PLANS

Plans for NSFnet include the following:

- Upgrading the NSFnet backbone to T1 speed, which means speeds of at least 1.544 mbps

- 
- Expanding the backbone as the number of Phase II centers increases
  - Encouraging universities to submit proposals
  - Migrate to ISO/OSI protocols.

**ADDRESS**

NSFnet  
National Science Foundation  
Office of Advanced Scientific Computing  
Washington, D.C. 20550

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**SPAN FACTS**

**Network  
Configuration**

Consists of four primary nodes interconnected by the 56 kbps NASA PSC highway, with routes at these nodes connecting to the primary nodes

**Protocols and  
Systems**

DECNET

**Access**

Potential applicants must submit a proposal to the SPAN Project Manager for review and approval by the Data System's Users Working Group (DSUWG) Steering Committee

No costs associated with using SPAN

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## SPAN

The Space Physics Analysis Network (SPAN) started as a pilot project at Marshall Space Flight Center, and was funded by the Space Plasma Physics Branch of the Office of Space Science of NASA Headquarters in 1980. The objective was to investigate ways of performing correlative space plasma research on a daily and nationwide basis.

A user group, Data Systems User Working Group (DSUWG), was formed to provide space science community interaction and direction for this pilot. In December 1981, SPAN became operational with three major nodes: University of Texas at Dallas, Utah State University, and MSFC. Since that time, SPAN has grown rapidly, adding nodes at other NASA Centers, universities, other Government agencies, and at European, Canadian, and Japanese facilities.

- SPAN now connects over 500 nodes and supports space plasma, oceans, planetary, astrophysics, atmospheric, land science, high energy physics, and climate research.
- SPAN is managed by the National Space Science Data Center (NSSDC) at Goddard Space Flight Center (GSFC).
- SPAN supports electronic mail, file transfer, and remote log-in.
- SPAN is a mission-independent computer-to-computer network.

### NETWORK CONFIGURATION

SPAN has four primary nodes interconnected by the 56K bps PSC highway. Routers at each primary node connect hosts to the primary nodes (most 9.6K bps digital lines). Figure 3.18-1 illustrates the SPAN-backbone.

Figure 3.18-2 illustrates the SPAN configuration. Figures 3.18-3 and 3.18-4 provide illustrations of space tail circuits and oceanography tail circuits, respectively.

3.18-2

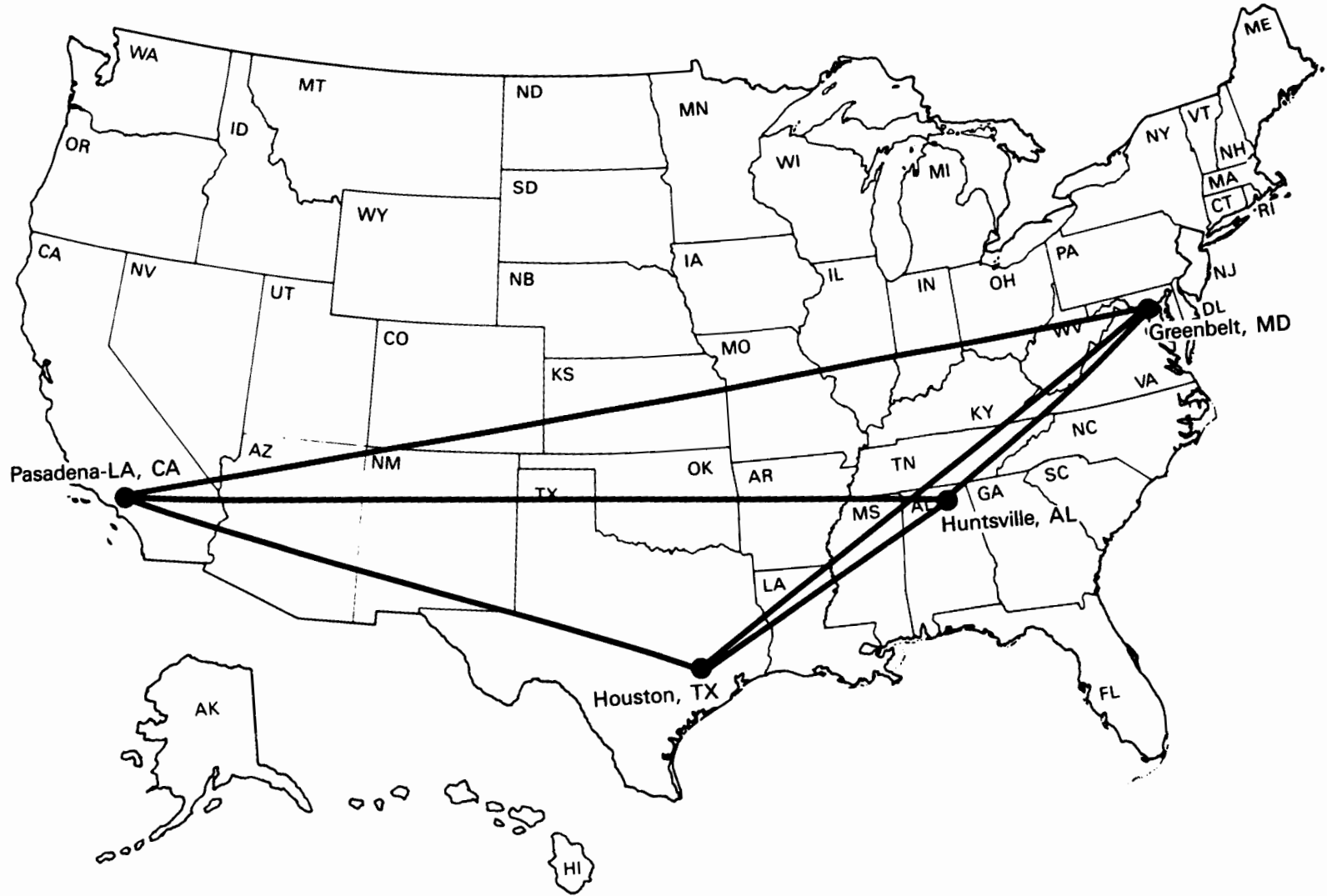


Figure 3.18-1. SPAN Backbone

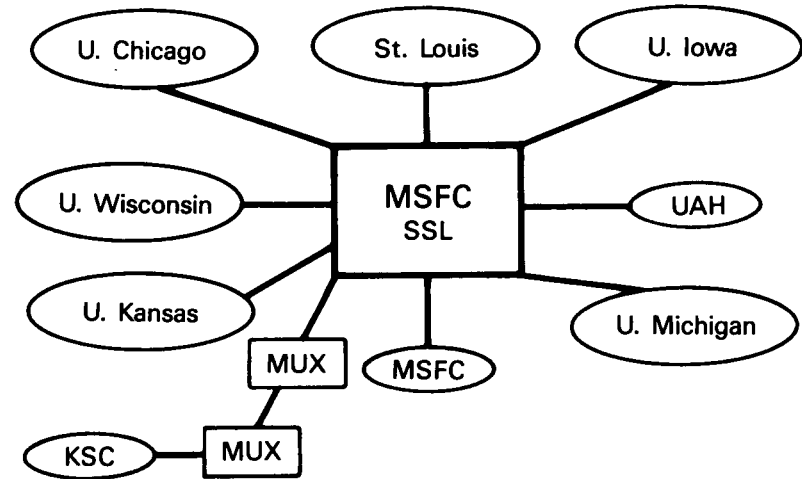
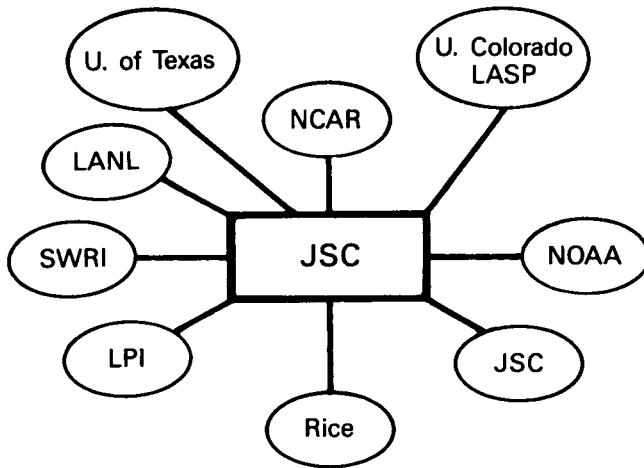
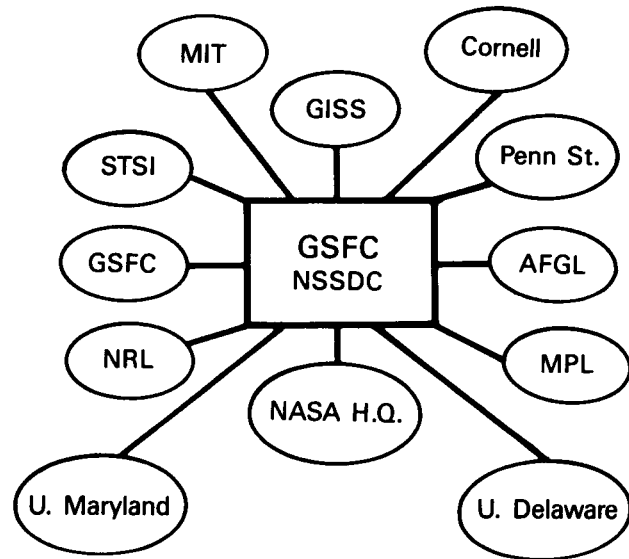
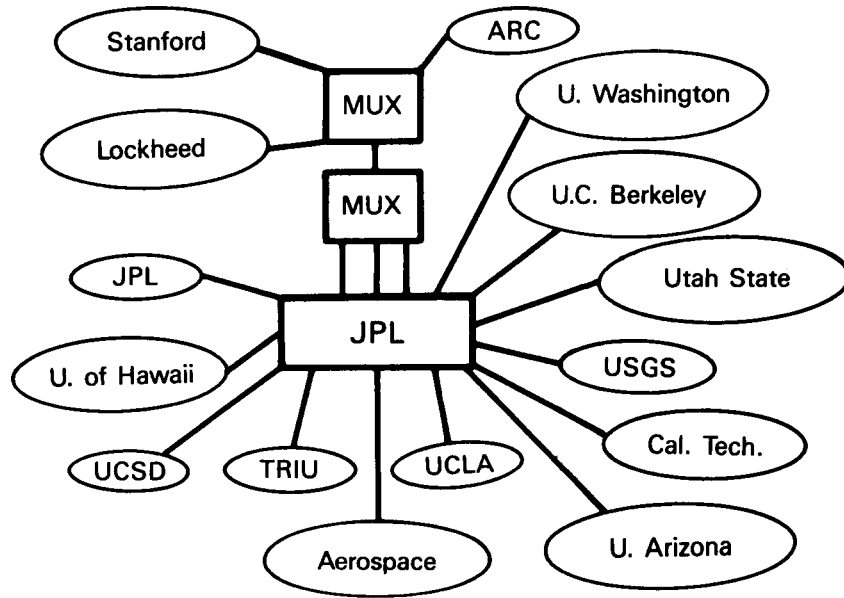


Figure 3.18-2. SPAN Configuration



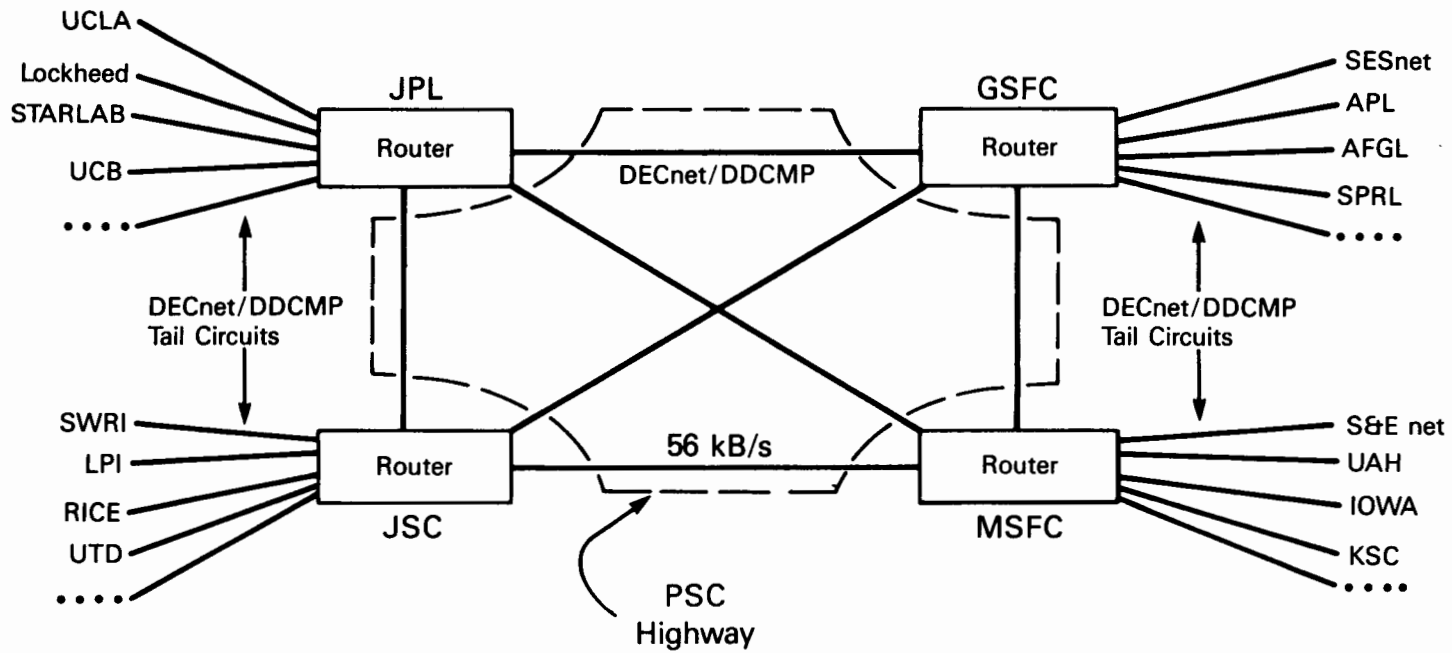


Figure 3.18-3. SPAN Use of PSC

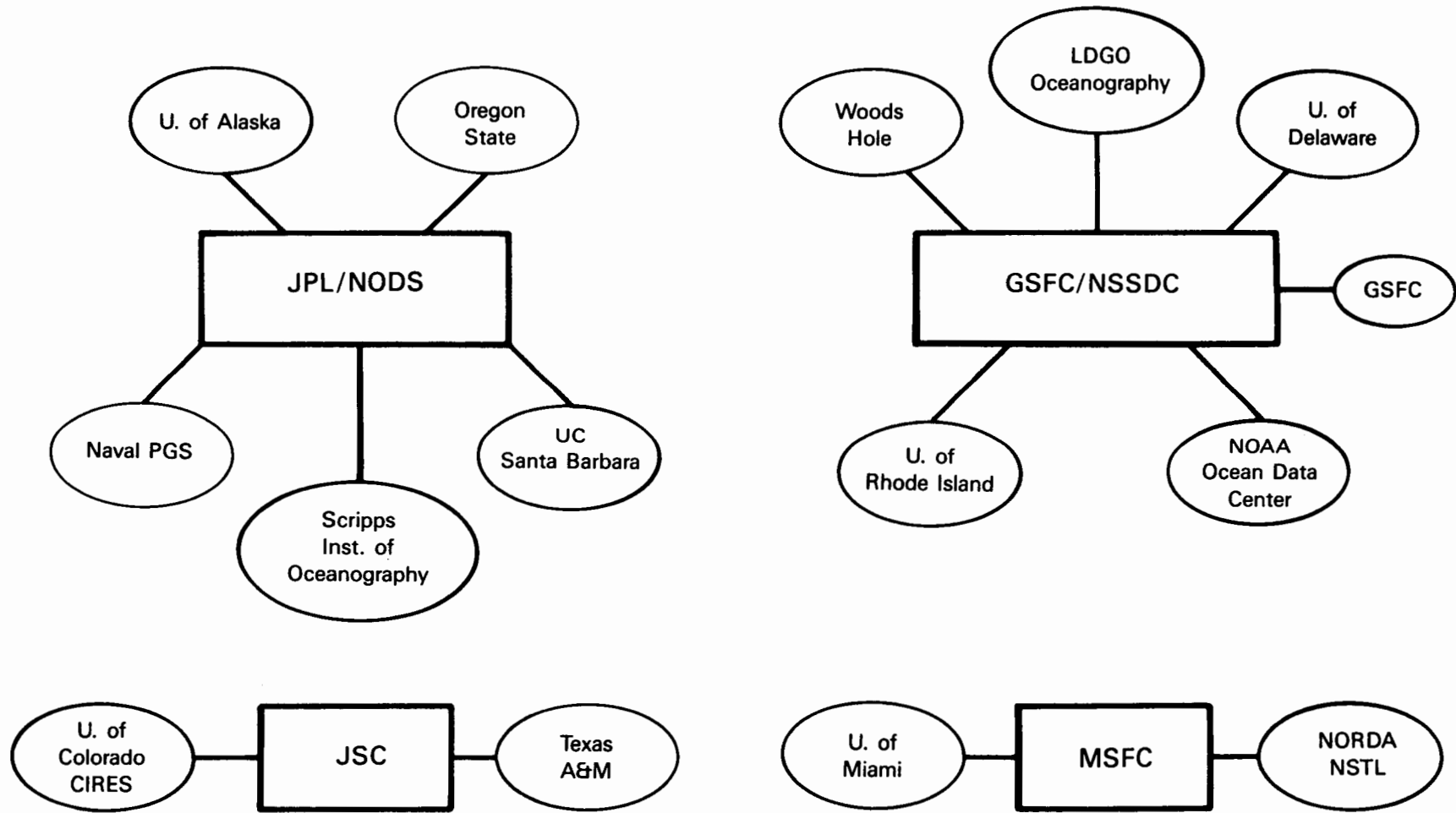


Figure 3.18-4. SPAN/Ocean Network

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**PROTOCOLS AND  
SUBSYSTEMS**

SPAN supports DECNET protocols.

**ACCESS**

Specifications for accessing SPAN include the requirements and services identified below.

**SPAN Account**

Potential users of the network must submit a proposal to the SPAN Project Manager to either of the following addresses:

- Dr. James L. Green  
Code 630.2  
Goddard Space Flight Center  
Greenbelt, Maryland 20771
- Ms. Valerie L. Thomas  
Code 633  
Goddard Space Flight Center  
Greenbelt, Maryland 20771

**Means of Access**

Users must log onto the SPAN host, the method depending on the host (i.e., dial-up/leased lines, X.2T networks, etc.).

**Gateways**

The following gateways exist between SPAN and other networks:

- ARPANET
- GTE Telenet
- BITNET
- NASA Packet Switched System.

The following DECNET networks are now physically connected to SPAN:

- High Energy Physics Network (350+ nodes) (HEPNET)
- Texas Academic Network (TEXNET)
- Data Analysis Network (DAN) of CANOPUS.

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Two additional gateways are planned for the future:

- NASA Earth Science Network.

Cost

There are no costs for using SPAN.

**FUTURE PLANS**

Plans to continue developing SPAN include:

- Setting up links to Europe and Japan
- Developing the proposed NASA Earth Science Network gateway
- Setting up the NASA Packet Switched System gateway.

**ADDRESS**

Space Physics Analysis Network (SPAN)  
NASA Goddard Space Flight Center  
Code 630.2  
Greenbelt, Maryland 20771



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**EASYNET**

EASYNET (or E-NET) is a network of DEC hosts utilizing DECNET. EASYNET supports remote log-in, file transfer, and electronic mail.

**NETWORK  
CONFIGURATION**

Currently, 4,000 to 6,000 hosts are connected to the network worldwide. There is no existing precise topology.

**PROTOCOLS AND  
SUBSYSTEMS**

The protocol that EASYNET supports is DECNET.

**ACCESS**

Any host utilizing DECNET can connect to EASYNET.

**EASYNET Account**

Not known

**Means of Access**

Not known

**Gateways**

The gateways existing between EASYNET and other networks include:

- ARPANET.

**FUTURE PLANS**

Not known

**ADDRESS**

Not known

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**GRAPEVINE FACTS**

**Network Configuration**      4,000 to 5,000 hosts on Xerox Internet

No precise topology

**Protocols and Systems**      PUP

XNS

**Access**      Any host on the Xerox Internet can utilize Grapevine

Gateways to ARPANET, UUCP

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**GRAPEVINE**

Grapevine is the mail system of the Xerox Research Institute (RIN). The RIN and the Corporate Internet (CIN) comprise the Xerox Internet (XIN), an international network with nodes located in the United States, Canada, Japan, and the United Kingdom. CIN and XIN are highly interconnected.

**NETWORK  
CONFIGURATION**

Grapevine supports about 4,000 users worldwide. The XIN has about 4,000 to 5,000 hosts, of which about half are part of RIN.

**PROTOCOLS AND  
SUBSYSTEMS**

Grapevine is structured under the following protocols:

- PUP
- XNS.

**ACCESS**

Grapevine may be utilized by any host on the Xerox Internet. The following identifies some of the specifications for accessing the network.

**GRAPEVINE  
Account**

Not known

**Means of Access**

Not known

**Gateways**

The following gateways exist between Grapevine and other networks:

- ARPANET
- UUCP.



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**FUTURE PLANS**

Not known

**ADDRESS**

Xerox Corporation  
Office Products Division  
Network Systems Administration Office  
3333 Coyote Hill Road  
Palo Alto, California 94304

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**UUCP FACTS**

**Network  
Configuration**

5,000 to 10,000 hosts worldwide

No precise topology

**Protocols and  
Systems**

UUCP

**Access**

Open to any host running UNIX

Gateways to ARPANET, BITNET, EASYPNET, CSNET, AND ACSNET

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**UUCP**

Unix to Unix CoPy (UUCP) is derived from a component of the UNIX Operating System, which allows machines running UNIX to communicate with each other. Normally, only sending files is permitted, and the files must be publically readable and the destination publically writeable.

**NETWORK  
CONFIGURATION**

Over 5,000 machines are connected to this network worldwide; accounting for unregistered machines, this total may be raised to 10,000. There is no precise topology.

**PROTOCOLS AND  
SUBSYSTEMS**

The protocol used is UUCP, provided by UNIX.

**ACCESS**

Access to UUCP is open to any host running UNIX. The following specifications will aid in accessing the network.

**UUCP Account**

No account is necessary for accessing UUCP. The only requirement is a machine that runs UNIX.

**Means of Access**

Not known

**Gateways**

The following gateways exist between UUCP and other networks:

- ARPANET
- BITNET
- DEC EASYNET
- CSNET
- ACSNET.

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FUTURE PLANS

Not known

ADDRESS

Not known

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LIST OF ACRONYMS

AAED	Academic American Encyclopedia Database
ACMC	Advanced Computational Methods Center
ADP	Automatic Data Processing
ADS	Automated Data Service
AHIP	Asynchronous Host Interface Processor
AISC	Assessment and Information Service Center
ALT	Seasat Altimeter
AMA	American Medical Association
AMPS	Advanced Map Blotting System
ATC	Asynchronous Terminal Concentrator
AVHRR	Advanced Very High Resolution Radiometer
BCS	Boeing Computer Services
BITNIC	BITNET Network Information Center
BPI	bits per inch
BPS	bits per second
CAC	Climate Analysis Center
CCAE	Center for Computer Assisted Engineering
CCRS	Canada Center for Remote Sensing
CCT	Computer Compatible Tape
CDF	Climate Data File or Common Data File
CDP	Crustal Dynamics Project
CFEI	CRAY Front-End Interface
CFS	Common File System

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CFT	CRAY FORTRAN
CIC	Computer Information Center
CIN	Corporate Internet
CODD	Central On-Line Data Directory
COS	CRAY Operating System
CPU	Central Processing Unit
CSNET	Computer Science Network
CSU	Colorado State University
CTC	Cornell Theory Center
CTSS	CRAY Time-Sharing System
CZCS	Coastal Zone Color Scanner
DAN	Data Analysis Network
DARPA	Defense Advanced Research Project Agency
DCA	Defense Communication Agency
DDCS	Distributed Data Catalog System
DDN	Defense Data Network
DDN PMO	Defense Data Network Project Management Office
DIFAX	Digital Facsimile
DIS	Data Information System
DMSP	Defense Meteorological Satellite Program
DOE	Department of Energy
DSUWG	Data Systems User Working Group
EARN	European Academic Research Network
EDC	EROS Data Center
ER	DOE Office of Energy Research
ESA	European Space Agency
ESAD	Earth Science and Applications Division

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ESD	Environmental Satellite Data
ESDD	Earth Science Data Directory
FAA	Federal Aviation Administration
FGGE	First GARP Global Experiment
FIPS	Federal Information Processing System
FIRN	Florida Information Resources Network
FPS	Floating Point Systems
FSU	Florida State University
FSUCC	Florida State University Computing Center
FTP	File Transfer Protocol
GARP	Global Atmospheric Research Program
GDR	Geophysical Data Record
GOES	Geostationary Operational Environmental Satellite
GOLD	Global On-Line Data
GSFC	Goddard Space Flight Center
GTE	General Telephone and Electronics
HFEP	Host Front-End Processor
HEPNET	High Energy Physics Network
IAA	International Aerospace Abstracts
IBM	International Business Machines
ICN	Interconnect Nodes
IMP	Interface Message Processors
IN	Inquiry
INORAC	<u>IN</u> quiry, <u>OR</u> der, and <u>AC</u> counting
I/O	Input/Output
IP	Internet Protocol

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IPS	inches per second
IRC	International Record Carrier
IRS	Information Retrieval Service
ISW	Interregional Switches
JASIN	Joint Air-Sea Interaction Experiment
JP	Job Price
JPL	Jet Propulsion Laboratory
LAN	Local Area Network
LFM	Limited Fine Mesh
LLR	Lunar Laser Ranging
LNA	Low Noise Amplifier
McIDAS	Man-computer Interactive Data Access System
MFENET	Magnetic Fusion Energy Network
MHCC	Murray Hill Computation Center
MIT	Massachusetts Institute of Technology
MNP	Microcom Networking Protocol
MSI	Minnesota Supercomputer Institute
MSS	Multispectral Scanner
MSU	Milliservice Units
NAC	National Allocations Committee
NAFAX	Analogue Facsimile
NAL	National Agricultural Library
NAS	Numerical Aerodynamics Simulation
NASA	National Aeronautics and Space Administration
NAVOSY ADS	U.S. Naval Observatory Automated Data Service
NCAR	National Center for Atmospheric Research
NCC	Network Control Center

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NCSA	National Center for Supercomputing Applications
NDBO	National Data Buoy Office
NEDRES	National Environmental Data Referral Service
NESDIS	National Environmental Satellite, Data, and Information Service
NGM	Nested Grid Model
NGS	National Geodetic Survey
NJE	Network Job Entry
NMC	National Meteorological Center
NMFECC	National Magnetic Fusion Energy Computer Center
NOAA	National Oceanic and Atmospheric Administration
NODCS	NSSDC On-Line Data Catalog System
NODS	NASA Oceanographic Data System
NOS	Network Operating System
NRAO	National Radio Astronomy Observatory
NSCAT	NASA Scaterometer
NSESCC	NASA Space Earth Sciences Computing Center
NSF	National Science Foundation
NSSDC	National Space Science Data Center
NTIS	National Technical Information Service
NWS	National Weather Service
OASC	Office of Advanced Scientific Computing
ORSL	Oceanic Remote Sensing Library
OSSA	Office of Space Science and Applications
PAGES	Print and Graphic Express Station
PCDS	Pilot Climate Data System
PEP	Procedures for Executing Programs

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PLDS	Pilot Land Data System
PRB	Peer Review Board
PSC	Pittsburgh Supercomputing Center
PSF	Production Supercomputer Facility
PTTI	Precise Time and Time Interval
PUCC	Purdue University Computing Center
RBV	Return Beam Vidicon
REI	Research Equipment, Inc.
RESORS	Remote Sensing On-line Retrieval System
RIM	Relational Information Management
RJE	Remote Job Entry
RSCS	Remote Spooling Communications Subsystem
RSW	Regional Switches
RUAC	Remote User Access Centers
RUSS	Remote User Service Stations
SAR	Synthetic Aperture Radar
SASS	SEASAT-A Scatterometer System
SBU	System Billing Units
SDC	System Development Corporation
SDCS	SAR Data Catalog System
SDLC	Synchronous Data Link Control
SDR	Sensor Data Records
SDSC	San Diego Supercomputer Center
SESC	Space Environment Services Center
SESNET	Space and Earth Sciences Network
SIR	Shuttle Imaging Radar
SLR	Satellite Laser Ranging

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SMMR	Scanning Multichannel Microwave Radiometer
SMTF	Simple Mail Transfer Protocol
SNA	Systems Network Architecture
SNL	Synchronous Network Link
SP	Scientific Processors
SPAN	Space Physics Analysis Network
SRU	Systems Resource Unit
SSD	Solid State Storage Device
SSEC	Space Science and Engineering Center
SSM/I	Special Sensor Microwave/Imager
STAR	Scientific and Technical Aerospace Reports
SU	Service Unit
TAC	Terminal Access Controller
TBM	Terrabit Memory
TCP	Transmission Control Protocol
TEP	Terminal Emulator Processor
TEXNET	TEXAS Academic Network
TM	Thematic Mapper
USC	User Service Center
USCN	University System of Georgia Computer Network
USGS	U.S. Geological Survey
UUCP	Unix to Unix CoPy
VAS	VISSR Atmospheric Sounder
VLBI	Very Long Baseline Interferometry
VMS	Virtual Memory System
VSIN	Voluntary Standards Information Network
VSOS	Virtual Storage Operating System

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XIN Xerox Internet

XHIP X.25 Host Interface Processor

## EARTH SCIENCE DATA SYSTEMS QUESTIONNAIRE

1. What is the name of your system? Why was this system created? Who currently uses the system? Are there restrictions on who can use the system?
2. Is your system fully operational? If not, when do you expect it to become fully operational?
3. What data sets/data bases can be accessed through your system? What are the sources of these data? What is the flow of the data from their initial source until they become part of the system? How much of this data are actually on-line at any given time?
4. How are data sets selected to be included in your system? What restrictions do you have for inclusion of new data? How would a user go about requesting that a particular data set be included?
5. On what medium/media are the data sets/data bases archived? How does the system access this data?
6. What is the period-of-record of each data set/data base?
7. How often are the data sets/data bases updated?
8. Are all of the data on your system accessed through one system, or are there separate subsystems? If so, how many are there, and what data does each contain?
9. How would a potential user initiate initial access to your system? What hardware would be needed?
10. What networks/protocols are used? What are the essential terminal/printer/modem configuration and transmission parameters used?
11. Once initial access has been authorized, what are the specific logon procedures?

12. Is the system menu driven or command driven? If command driven, is the software written in a particular language? How would you describe the system's level of user-friendliness? Does the system have a "help" feature?
13. Which parameters support searching or selection? How is this accomplished?
14. What output products/media are available?
15. Does the system have data transmission capability? If so, what are the options, procedures, and constraints?
16. Does the system have graphics capability? If so, what are the options, procedures, and constraints?
17. Does the system have data reduction, data manipulation, or data processing capabilities? If so, what are the options, procedures, and constraints?
18. Does the system support a data catalog feature? If so, what are the attributes contained for each data set/data base? Does the catalog include information from other systems and information on how one may access the other systems? How comprehensive is this catalog?
19. Does the system support a bibliographic feature? If so, what are the options, procedures, and constraints?
20. Is the system physically linked to other systems? If so, which systems, and what is the nature of the link? What functions does the link support? Is the link transparent to users?
21. Is there a User's Guide for the system? If so, how may one obtain a copy of it? How often is it updated?
22. Is there a User Service's function? If so, what are the appropriate hours and telephone numbers?

23. What is the name, address, and phone number of the Project Manager and other individuals users may wish to contact?
24. What are the costs associated with using the system?
25. What are the outstanding attributes of this system that make it unique/useful/functional/etc. to the user community?
26. Are changes anticipated within the next 2 years? If so, what are they, and what impact will they have on any system function or user access?
27. What are the long-range goals of the system?

## VECTOR PROCESSING/SUPERCOMPUTING FACILITY QUESTIONNAIRE

1. What are the name and address of your facility? Who is the director or head administrator?
2. What is the configuration of the hardware in your facility? What are the major components, and how are they linked? What Operating Systems are used? What software is supported by your facility (utilities, languages, graphics packages, math/stat package, etc.)?
3. What types of research/operations does this facility presently support? In light of the current workload, what are the short-range and long-range prospects for potential outside users to access this facility?
4. What prerequisites must prospective users meet (in terms of hardware at their site, software compatibility, research design and objective, etc.) before they would be able to access the facility? What type of help can you offer in this regard?
5. What modes of access are available to your facility (interactive and batch) for outside users? What data networks/protocols does your facility support? What are the appropriate characteristics of any non-commercial (i.e., internal) networks?
6. What are the costs of using your facility and how are they determined?
7. What type of written documentation/user consultation is available? What are the names and telephone numbers of individuals that users may wish to contact?
8. What is the primary responsibility and scope of your facility?
9. What plans do you have for upgrade in the next 2 years?
10. What are your long-range upgrade plans?



11. To which constraints must potential users adhere with regards to computer time, storage, scope of research, funding, etc.?
12. What attributes of your facility make it unique among similar facilities and warrant special attention from potential users?
13. Does your facility presently support any NASA funded research activities? If so, what is the scope of the research and who are the principal investigators?

## DATA NETWORK QUESTIONNAIRE

1. What is the name of your system? If applicable, what does the acronym stand for?
2. Who manages this system? What is the name and address of a contact involved with: a) system technology b) user access?
3. How did this system begin, and how has it evolved over time?
4. What are the primary capabilities of your system?
5. What types of links does your system support? What are the related protocol suites, or protocol levels that are compatible with each type of link? What are the bandwidths of each link? What are the limitations and restrictions of each type of link?
6. Does your system have any subsystems or application specific features? If so, what are they, and what are their attributes?
7. How does an interested potential user obtain access to your system and/or subsystems? What hardware is required? What is the cost of this service and how is it determined?
8. Does your system provide gateways or interfaces to other networks? If so, what is the nature of these links?
9. Where are the current nodes of your system located?
10. Are there any projects/systems etc. that use your system as a communications link that would be of interest to Earth environmental or space-related researchers? If so, is there a contact or source of information?

11. What steps, if any, are being taken in the area of standardization? Are any of these strictly internal or is there cooperation among other communication groups?
12. What changes/advances do you foresee in your system in the next 2 years?
13. What are the long-range goals of your system?
14. What attributes of your system are particularly well suited to use by the Earth science research community?

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		8. Performing Organization Report No.	
7. Author(s)		10. Work Unit No.	11. Contract or Grant No. NASW-3622
9. Performing Organization Name and Address Science Applications International Corporation 400 Virginia Avenue, S.W. Suite 810 Washington, DC 20024		13. Type of Report and Period Covered Contractor Report	
		14. Sponsoring Agency Code EET	
12. Sponsoring Agency Name and Address Earth Science and Applications Division National Aeronautics and Space Administration Washington, DC 20546			
15. Supplementary Notes  James C. Dodge, Code EET, Technical Monitor			
16. Abstract  This document contains overview descriptions of on-line environmental data systems, supercomputer facilities, and networks. Each description addresses the concepts of content, capability, and user access relevant to the point of view of potential utilization by the Earth and environmental science community. The information on similar systems or facilities is presented in parallel fashion to encourage and facilitate intercomparison. In addition, summary sheets are given for each description, and a summary table precedes each section.			
17. Key Words (Suggested by Authors(s)) Environmental Data Systems Supercomputer Facilities Networks On-line Access		18. Distribution Statement  Unclassified - Unlimited  Subject Category 42	
19. Security Classif.(of this report) Unclassified	20. Security Classif.(of this page) Unclassified	21. No. of Pages -	22. Price