

Approved March 28, 1991

Date

House Computers, Communications & Technology  
MINUTES OF THE COMMITTEE ON  
George Dean

The meeting was called to order by \_\_\_\_\_  
Chairperson

7:30 a.m./p.m. on March 21, 1991 in room 529-S of the Capitol

All members were present except:

Rep. Bob Mead  
Rep. Sam Roper  
Rep. Phil Kline

Committee staff present:

Norman Furse, Revisor of Statutes  
Julian Efird, Research  
Diane Duffy, Research  
Mary Valdivia, Committee Secretary

Conferees appearing before the committee:

Mr. Ray Hauke, Regents Director of Planning  
Mr. Roger Lowe, Vice President Administration & Finance, WSU  
Mr. Thomas Rawson, Vice President Administration & Finance, KSU

Meeting was called to order by Chairman George Dean at 7:40 AM.

Mr. Ray Hauke, Regents Director of Planning and Budget provided the committee with document entitled "Comments to House Committee on Computers, Communications, and Technology Concerning Financing University Computer Centers (Attmt. #1) and report entitled "Summary of Report of Activities Ks Board of Regents Computer Advisory Committee December 1991" (Attmt. #2).

Brief introduction was given by Mr. Hauke on how university computer centers are funded and wanted to comment on two areas he felt are principal issues to this committee: 1) finance and 2) control. Mr. Hauke explained the process used to make request to legislature to build new buildings.

It starts out with internal campus planning, then involve board staff with a formal request. If approved by board, then would come to the Joint Building Committee and if they chose to recommend favorably would come to the full legislature, the governor obviously getting involved also.

Chairman Dean asked Mr. Hauke if the Regents felt comfortable with this process? Mr. Hauke said it worked well.

Chairman Dean asked that if the same procedure was used with computer acquisition, would that be a comfortable process? Mr. Hauke felt it would be.

Mr. Lowe, Vice President for Administration and Finance, WSU, commented on fixed expenses. There is control in spending through coding with object codes. Departments cannot spend for anything other than what money is budgeted for.

There is a committee that guides Computer Director and sets priorities on what kind of things come on the computer.

Mr. Rawson, Vice President for Administration and Finance, KSU, commented that Kansas state University manages their computer operations much like Wichita State. KSU has an Academic Advisory Committee consisting largely of faculty who look at expenditures for network development, academic networks on the campus. An Administrative Advisory Committee, which is primarily administrators from the central administration help set priorities.

Meeting adjourned at 8:15 AM. Next meeting is scheduled for Tuesday, March 26, 1991, 7:30 AM.

Unless specifically noted, the individual remarks recorded herein have not been transcribed verbatim. Individual remarks as reported herein have not been submitted to the individuals appearing before the committee for editing or corrections.



COMMENTS TO

HOUSE COMMITTEE ON COMPUTERS, COMMUNICATIONS, AND TECHNOLOGY  
CONCERNING FINANCING UNIVERSITY COMPUTER CENTERS  
(Service Clearing Financing vs. Regular Operating Budget)

by

Ray Hauke, Regents Director of Planning and Budget  
Roger Lowe, Vice President for Admin. & Finance, WSU  
Tom Rawson, Vice President for Admin. & Finance, KSU

March 21, 1991

**Introduction**

University computer centers are presently financed in a manner, virtually identical to the relationship between DISC and its various users in the capitol complex. The computer centers are located in the "off budget" (or service clearing funds in accountant parlance) component of operations. They receive their support by charging users for services rendered. The users (whether state agencies or university departments) have moneys budgeted to them, which they spend for purchase of those computing services. The universities requested and were granted authority by the Board of Regents to request a change to this practice, during the FY 1992 budget year. The Regents requested that university computing centers be budgeted in the regular operating budgets, in a manner essentially similar to the budgeting of libraries. The reason for the institution's request was exclusively a financial issue. However, legislative review of this request has also resulted in considerable discussion of the issue of control of the university computing centers. Today, we hope to review both issues with the Committee.

**Issues of Financing**

University budgets are largely reviewed relative to the two major objects of expenditure, salaries and other operating expenditures (OOE). Legislative appropriations for OOE provide the basis for general use support of university computing centers, since the OOE budgets of various units are utilized to pay the service clearing fund for services rendered. Therein lies the financial problem, which resulted in the request for a change. During several years, the salary budget has increased at a more rapid rate than the OOE budget. Nevertheless, approximately 69 percent of computing center expenditures are for salaries. Therefore, computing center funding is being derived from a source (the OOE budget) which is increasing at a lesser rate than the basis for a large component of its expenditures. Financing this shortfall requires the universities to shift moneys from other areas during any year in which salaries increase at a greater rate than OOE. For each one percent that salaries increase above OOE, the Regents system must shift approximately \$96,000 from other areas to finance the resulting shortfall.

ECT  
3-21-91  
attnd #1

It is this condition which resulted in the Regents request for a conversion of computing center financing from service clearing funds to the regular operating budget. It is noteworthy that this conversion would have no cost during a year in which there is no differential in the budgetary increase allowed for salaries compared to other operating expenditures.

### **Issues of Internal Control**

The major items of legislative reluctance concerning this proposal relate to issues of control, rather than issues of finance. House Appropriations Subcommittee members expressed concern that this proposal would include no incentive to contain costs. Specifically, the various users within the university community now have as a factor, constraining their demand for computing services, the limitations of their OOE budget. In the absence of being required to budget for their computing expenditures, Subcommittee members were concerned that those units would have no particular incentive to contain their demand for computing services.

Obviously, that concern has considerable logic. However, there are a number of factors impacting the likelihood that runaway costs would result from this proposal. First, the request for shifting computing center financing included a recommendation that the universities ultimately allocate the costs to the intra-campus users, for purposes of cost accounting and reporting to federal grant agencies. These allocations would allow managers to determine whether individual departments were inappropriately utilizing central computing services. Secondly, a university computing center is ultimately limited by the total amount of services it can provide. Therefore, allocation of those services to the various units on campus is comparable to deciding how many slices to cut from a pie. The total pie must remain the same, decisions can only be made related to the number and size of slices which can be derived from it. Therefore, university administration will be making allocations of computing service availability to user units, regardless of whether those allocations are in service clearing budgets or the regular operating budget. By way of comparison, libraries are not financed from service clearing funds. To remain within their budgets, they work with the various academic units in determining the total available for new book purchases that may be allotted to a particular discipline. If computing centers are moved to the regular operating budget, allocation procedures will continue to assure that the center remains within the funds available.

The costs involved in a decision to increase the total services which can be provided by a university computing center are such that either a specific program improvements request must be made or a significant reallocation of existing university resources must be made to provide for an increase in the university computing system. In either case significant involvement of university decisionmakers is required, regardless of whether the funds are budgeted in service clearing or the regular operating budget.

### **Issues Of External Control**

Presently, the Governor and Legislature can review computing center budgets from university budgetary submittals. Both the regular operating budget and the service clearing budgets are filed as a part of the legislative request. Additionally, proposals for new equipment purchase are detailed as a part of this legislative budget. Under the present configuration, it is probably more difficult for the Governor or Legislature to adjust a computing center budget, since its actual funding source is a variety of separate OOE budgets. A change to the regular operating budget would make the budgetary detail more accessible, since it would be budgeted in a single location, rather than the multiple OOE budgets.

### **Conclusion**

The Regents reason for requesting a change to present practice was one of financing. The universities understand legislative concerns that growth in computing costs have been a major factor increasing governmental expenditures during recent years. Nevertheless, the universities do not believe this proposal will significantly alter internal procedures on campus. Additionally, the proposal may increase opportunities for external review, due to a centralization of the locations for budgetary review of computing.

**SUMMARY REPORT  
OF  
ACTIVITIES**

**Kansas Board of Regents  
Computer Advisory Committee**

**December 1990**

*CCT  
3-21-91  
attmt #2*

## COMPUTER ADVISORY COMMITTEE

T. E. Keith Faulkner, Chairperson.....	Fort Hays State University
Ed Bair.....	University of Kansas Medical Center
Kathy Connelly.....	Kansas College of Technology
Tom L. Gallagher.....	Kansas State University
Roy Gallup.....	Emporia State University
Dave Gardner.....	University of Kansas
Robert Keith.....	Pittsburg State University
Richard L. Mann, Past Chairperson.....	University of Kansas
Jerry Niebaum.....	University of Kansas
Gary L. Ott.....	Wichita State University
M. Lloyd Edwards, Director Emeritus.....	Emporia State University

**Representatives:**

Soon Merz.....	Kansas Board of Regents
Roberta Giovannini.....	Div. of Information Systems and Computing

## PREVIOUS PUBLICATIONS

- Progress Report No. 1 (February, 1971)
- Progress Report No. 2 (October, 1971)
- Summary Report of Activities (December, 1972)
- Summary Report of Activities (October, 1975)
- Summary Report of Activities (December, 1976)
- Summary Report of Activities (December, 1977)
- Summary Report of Activities (December, 1978)
- Summary Report of Activities (December, 1979)
- Summary Report of Activities (December, 1980)
- Summary Report of Activities (December, 1981)
- Summary Report of Activities (December, 1982)
- Summary Report of Activities (December, 1983)
- Summary Report of Activities (December, 1984)
- Summary Report of Activities (December, 1985)
- Summary Report of Activities (December, 1986)
- Summary Report of Activities (December, 1987)
- Summary Report of Activities (December, 1988)
- Summary Report of Activities (December, 1989)

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## INTRODUCTION

In 1970 the Regents Computer Advisory Committee (CAC) was established by the Council of Chief Academic Officers. CAC consists of the Directors of Computing at the Regents Institutions and a representative from the Board of Regents Office. A representative of the State Division of Information Systems and Computing (DISC) serves as an ex-officio member. Committee chair responsibilities rotate through all of the institution representatives. CAC meets approximately 10 times yearly to discuss and cooperatively plan for the growth of computing at the Regents Institutions. Additionally, the committee plans a yearly Conference on Higher Education Computing in Kansas (CHECK) held at one of the participating institutions for the benefit of staffs of the respective computer centers. Since the late 70's CAC has produced this annual Summary Report of Activities. Because of the changing nature and pervasiveness of computing, a large part of the computing resources and activities are no longer centralized under one authority at the institutions. In this report we have tried to give an institution-wide perspective on all computing at our institutions by including information about microcomputers and departmental systems. Herein you will find a quantification of what we have, what we spend, what we do, and for whom. The systems and services described serve more than 90,000 students, faculty, and staff.

Some of the main items for discussion by CAC in FY'90 were:

1. State purchase contracts for hardware and software
2. Statewide plans for telecommunications
3. Planned acquisitions by the institutions
4. Site licensing for microcomputer software
5. State purchasing procedures for computing equipment and service
6. Purchasing approval procedures used by the State Bureau of Information Resource Management (BIRM)
7. The State Information Technology Master Plan prepared by DISC
8. Computer center staff training
9. Electronic mail and its implications
10. Resource sharing among the institutions
11. Organizational structures and personnel issues
12. Activities at the individual institutions
13. The Regents Information Technology plan prepared by the RCAC

One measure of growth of centralized computing service is the change in annual expenditures over time as shown in the accompanying diagram (Figure 1). FY'85 expenditures reflect the budget rescission that year. Please note that microcomputers and departmental systems are not included in these expenditure amounts and do represent a sizable investment for the institutions.

SIX YEAR TOTAL  
SERVICE GROWTH  
FISCAL YEARS 1985-1990  
Dollars (Millions)

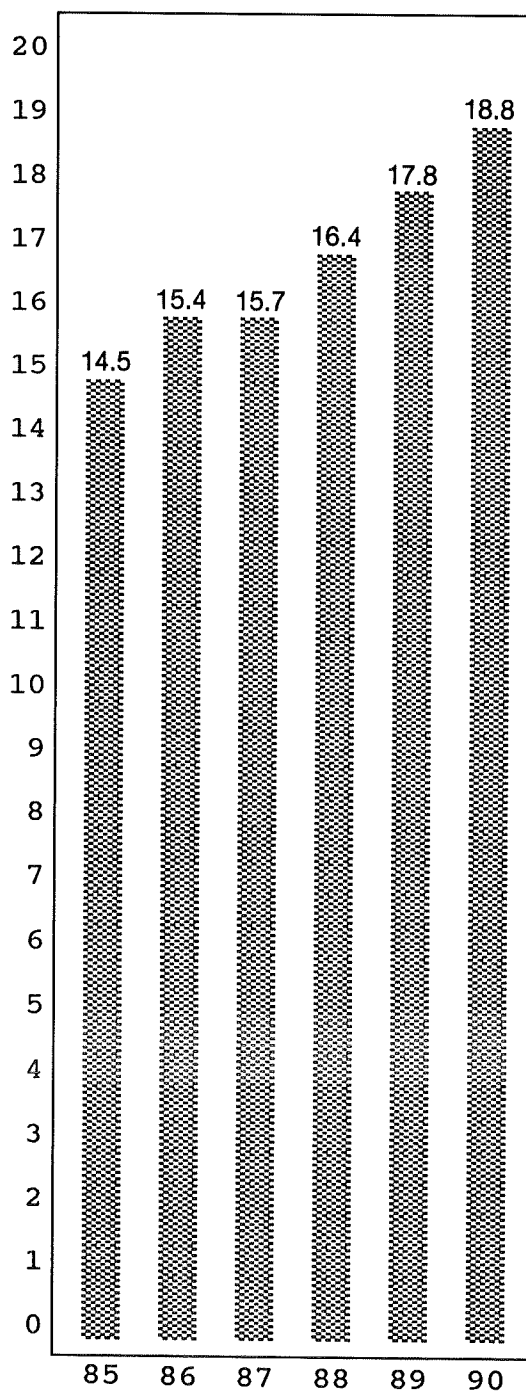


Figure 1

## PROFILES OF REGENTS INSTITUTIONS

In order to acquaint the reader with the computing facilities and activities of each Regents institution, a separate profile of each campus is presented for your information.

### THE UNIVERSITY OF KANSAS

The University of Kansas consists of the main campus in Lawrence and the Medical Center in Kansas City and Wichita. The University also has education, research, and service centers located in several other areas of the state. The University has two primary computing centers: one at the Medical Center and the other on the Lawrence campus. At Lawrence, academic computing is headed by the Director of Academic Computing Services and administrative computing is headed by the Director of the Office of Information Systems. At the Medical Center in Kansas City, computing is headed by the Director of Information Systems. Directors at both campuses report to the University Director for Information Resources.

Academic instruction, research and public service are provided through the College of Liberal Arts and Sciences, Graduate School and twelve professional schools: Architecture and Urban Design, Allied Health, Business, Education, Engineering, Fine Arts, Journalism, Law, Medicine, Nursing, Pharmacy and Social Welfare. Fall '89 enrollment at all branches of the University of Kansas was 28,773.

### COMPUTING SERVICES

Academic Computing Services and the Office of Information Systems, known collectively as Computing Services, provides a broad range of computing services to students, faculty, and staff. Such services include processing, magnetic storage, printing, communications, programming, consulting, facilities management, and maintenance of microcomputers and related equipment. These services are provided by a permanent staff of over 100 and a student staff of about 60 located primarily at the Computer Center, Sunnyside and Illinois. Computing Services provides centralized computing support for instruction, research, and administration with combined budgets of a little over \$6.5 million.



Computer Center

University of Kansas-Lawrence

In FY'90 three mainframe computers were the hub of service at the Computer Center:

	Installed
1. Hitachi (previously NAS 8043)	1985
2. Digital Equipment Corp. VAX 8650	1986
3. IBM 3081 KX3	1988

The IBM 3081 KX3 is the primary administrative computing system. The Hitachi 8043 is shared between academic (research and instruction) and administrative. The VAX 8650 is the primary system for academic use. (Late in the fiscal year, an Amdahl 5890-300E processor was installed to support the administrative systems for the Lawrence and Medical Center campuses. The IBM 3081 KX3 was moved to support academic use and the Hitachi 8043 was removed from service.) Users communicate with these systems by way of a complex set of communications networks. Many administrative users have terminals or microcomputers with coax attached synchronous interfaces. Academic users typically use dial-up or twisted pair asynchronous interfaces. The campus premise distribution wiring system is also used for both academic and administrative systems. An X.25 network which was initiated in 1983, is the primary mode by which users interface to the central systems. Initial implementation of a campus ethernet backbone system began this fiscal year.

In addition to providing campus data communications networks Computing Services provides planning assistance for departmental systems. Currently there are 5 shared logic word processors and 114 departmental minicomputer systems which have been identified. Following is a summary of the existing computer systems in departments or university-related enterprises.

#### Shared Logic Word Processing Systems

Biological Sciences	Xerox 6085
Chancellor's Office	NBI System 64
Educational Services	IBM System 36
School of Law	NBI System 64
University Relations	Wang OIS 50

#### Minicomputer Systems

Athletic Corporation	IBM System 36
Bureau of Child Research	DEC VAX 11/750
Communications Studies	Altos 586
Computer Science	DEC VAX 11/780
	LISP Symbolics 3670
	(4) Symbolics 3620
	AT&T 3B15
	(2) AT&T 3B2
	SUN 386i
	(2) SUN 3
	IRIS 3020
	IRIS 4D
	(2) NEXT
	DEC 5400
CRINC	HP 3000 Series 42
Electrical & Computer Engineering	Applicon AGS 875
	(DEC PDP 11/34)
	(2) VAX 11/750
	(9) VAX Station II
	VAX Station I
	(2) AT&T 3B15
	(7) AT&T 3B2
	SUN 2
	Xerox 1108 Lisp

English	AT&T 3B2
Geography	SUN 4
Kansas Geological Survey	Data General MV20000
Libraries (Acquisitions)	INNOVACQ System
Mathematics	SUN 4/110
Medicinal Chemistry	Evans & Sutherland PS 330
Physics and Astronomy	DEC VAX 11/750
	(2) Micro VAX II's
	(2) DEC 3100
	DEC 3800
Printing Service	IBM System 36
	Linotronic 300
School of Engineering	Harris H-1000
	(45) Apollo Systems
School of Fine Arts	Linotronic 100
Speech-Language-Hearing	(2) PDP 11/23
Tertiary Oil Recovery	Data General Nova III
	DEC 3400
Union Bookstore	NCR 10065
Watkins Hospital	DEC 11/73

More than 3400 microcomputer systems have been added on campus since 1983. It is expected that micros will be added at the rate of 300 to 500 per year for a 3 year planning horizon. Since 1983 Computing Services has provided maintenance service for microcomputers and related peripherals. Service is provided on a contract or time and materials basis. Computing Services also provides facilities management by contract with the School of Engineering for the Harris computer system in Learned Hall.

#### FY'90 Activities

Most of the administrative organizational energies this year have been focused on a consolidation project with the Computing Services department at the KU Medical Center. This project required major changes in the hardware, software and building environments.

During the Memorial Day weekend, an Amdahl 5890-300E processor was installed to support the administrative systems for the Lawrence and Medical Center campuses.

The IBM 3081 KX3 was moved to support the VM systems.

The Hatachi 8043 (formerly NAS) processor was removed from service and sold.

A new IBM 3720 front end communications controller was added to the 3081 system.

Three IBM 7171 controllers and one IBM 3174 SNA controller was added to the 3081 system expanding local access by 300 ports.

New student micro labs were created in Strong and Fraser.

Ten gigabytes of disk storage were added to the VM operating system; 32 gigabytes were added to the MVS system.

The new electronic mail and calendaring system, OFFICE, was installed and implemented during fall, 1989.

One major administrative application completed this year was the interface to the state accounting system, STARS.

Academic Computing Services assisted in the funding of 64 microcomputer systems that were distributed to 40 university departments.

Bids were awarded to Digital Equipment Corporation for upgrading the VAX computing system to a system 9000 model 210 with processing power approximately 8 times the existing VAX system.

Fiber optic hardware was acquired to implement the second phase of a campus ethernet backbone data communications network.

The X.25 network was expanded with a new switch and several new user ports.

A site license for PC-SAS (micro version) was acquired.

Academic Computing Services assisted in the creation of local area networks (LANs) in several university departments.

Five DEC high performance graphics workstations were leased and made available to university researchers and staff.

A VAX 3800 computing system was acquired by Academic Computing Services for the Physics department to replace obsolete VAX systems.

A broad maintenance manager agreement was signed with Bell Atlantic for hardware maintenance.

Comprehensive software consortium contracts were signed for VM and VMS software.

### FY'90 Usage Statistics

The operational statistics for the VAX/VMS system for FY'90 are given below:

	VM	VAX
Timesharing Sessions	242,049	392,835
Printing	599,814,738 lines	812,241 pages

Allocation users of the systems are:

	VM	VAX
Academic Affairs	70.5%	99.0%
Research, Graduate Studies	19.5%	.9%
Student Affairs	.5%	.1%
Administration	9.5%	.0%
	<u>100.0%</u>	<u>100.0%</u>

The major user groups are:

VM	VAX
26.3% School of Business	28.1% Computer Science
10.7% Inst. Public Policy & Bus. Res.	24.1% Chemistry
8.7% Educational Services	14.8% Chem. & Petroleum Engr.
8.3% Museum of Natural History	13.7% Physics & Astronomy
7.0% Chemistry	7.3% Electrical & Computer Engr.
6.1% Psychology	3.6% Mathematics
3.7% Comptroller's Office	1.5% School of Pharmacy
3.4% Office of Inst. Res. & Planning	1.5% School of Business
2.9% Educ. Psych. & Research	<u>94.6%</u>
2.2% Library	
1.8% Sociology	
1.6% Political Science	
1.6% Biological Sciences	
<u>84.3%</u>	

Major applications on the IBM MVS are:

48.0%	1. Library	4.0%	5. HRMS (Payroll/Personnel)
20.0%	2. Student Records	2.0%	6. Billing & Receiv. Sys.
6.0%	3. ODE II(Online Data Entry)	2.0%	7. Alumni
5.0%	4. CICS Overhead	2.0%	8. Financial Aid Mgmt.
Total: 89.0%			

Operational statistics on the IBM MVS system for the fiscal year include the following:

		Net Change (FY'89 to FY'90)
CPU time (hours)	2,619	-9.0%
Lines Printed	547,403,421	+2.7%
Disk I/O Count	1,956,177,803	+8.0%
Tape I/O Count	419,378,822	+7.8%

## UNIVERSITY OF KANSAS MEDICAL CENTER

The University of Kansas Medical Center, formerly known as the College of Health Sciences and Hospital was established in 1905. Today, the Kansas City campus covers approximately 50 acres and includes more than 50 permanent buildings. The University of Kansas Hospital, formerly Bell Memorial Hospital was completed in 1979 as a 500 bed facility. In addition to the hospital there are 15 separate and independent foundations (clinics) associated with the Medical Center. Education is primarily at the graduate level with undergraduate programs in nursing and allied health fields. The Medical Center is composed of the School of Medicine, the School of Medicine at Wichita, the School of Nursing, the School of Allied Health, the Medical Center Graduate School, the University of Kansas Hospital and Clinics, the Dykes Library, and Medical Center Administration. The 1989-90 student enrollment as of Fall 1989 is 2,524.

The Telecommunication Department shares responsibility for data communication. Direct connections to mainframe computers is provided through Telecommunication's Premise Distribution System. Additionally, AT&T ISN data switches are established to enhance connectivity between dissimilar computing devices, the KU network, the Regent's network, and State networks.

Primary computing services are provided by the Department of Computing Services which consists of four sections: Technical Services, Production Services, Programming Services, Micro Computing Services. The Sections are responsible for administrative, academic, and hospital computing activities. The staff includes 55 full-time employees.

Academic and administrative computing is supported by an IBM 4381, model Q14 processor with 24 megabytes of memory, 20.0 gigabytes of on-line disk storage, tape units, printers, card reader and punch, and appropriate control units. The communications network is comprised of bysynchronous and SNA control units and a Comten 3650 communications processor supporting remote control units, dial-up lines, and a direct high speed line connected to the Wichita campus. Approximately 220 devices are connected to the Academic/Administrative computer. The dual operating system environment allows support for normal administrative functions such as accounting, budget, personnel and payroll simultaneously with a large base of research users and students utilizing computer assisted instruction (CAI) programs

The hospital information systems operate on an IBM 3081K processor with 32 megabytes of memory, 22.5 gigabytes of on-line disk storage, and sharing the tape drives and printers of the IBM 4381 processor. Patient Management, Patient Accounting, and Medical Records are the primary systems operating on the hospital computer. Approximately 170 CRTs and 60 printers are connected to SNA control units attached to the 3081 processor.

Personal computer (PC) laboratories are positioned at various locations throughout the Medical Center to serve the computing and record processing needs of the students. Additionally, special terminal laboratories utilizing CAI are available for student use. About 50 PCs and CAI terminals are currently being utilized in the laboratories.

The central computer room housing the IBM processors operates 24 hours per day, seven days per week. The computer operators provide help-desk services for the hospital after normal hours and on weekends.

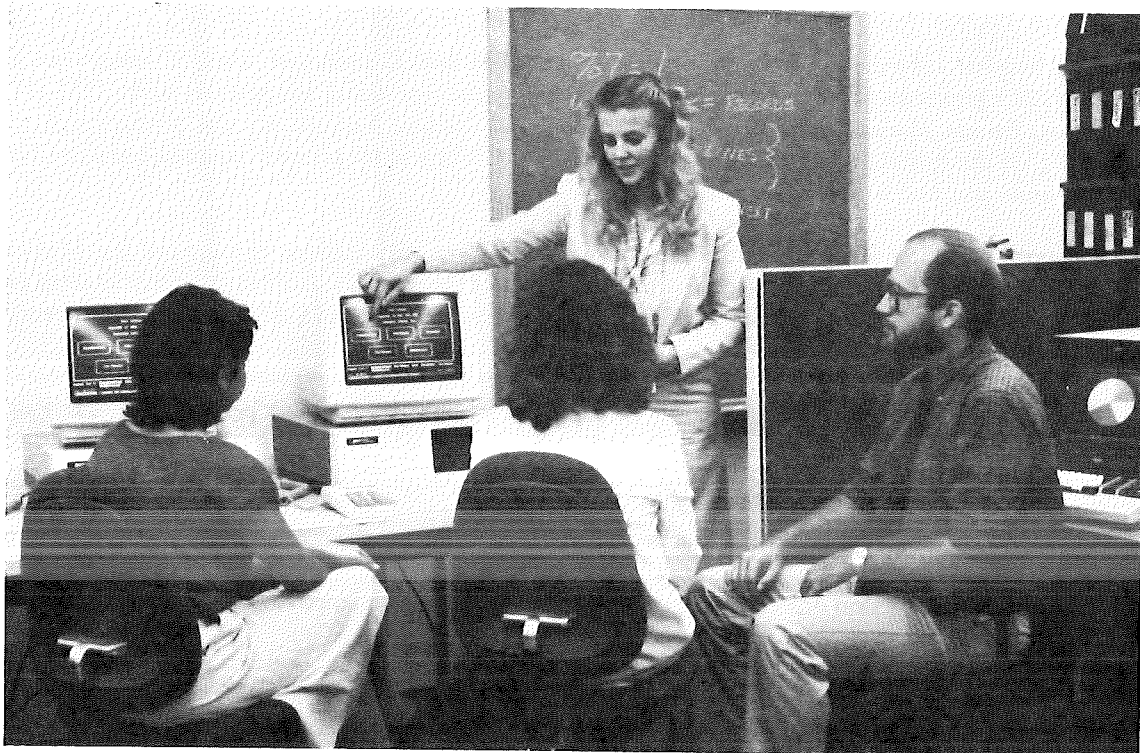
A Microcomputer Technology Center is available to demonstrate and teach the use of micro computers. They are being extensively used for research and instructional applications. The Center provides information and instruction on central computer program products designed for use by non-professional computer personnel.

Several hospital departments and the clinics use mini-computers to aid in the management of resources and patients. With the installation of the new hospital information systems the mini-computers are being connected to the IBM 3081 computer through an IBM Series 1 processor and the Comten 3650 communication processor. The following is a summary of the existing computer systems in departments and clinics.

Anesthesiology  
Clinical Laboratory  
Diagnostic Radiology  
Ophthalmology  
Otorinolaryngology  
Gynecology and Obstetrics  
Family Practice  
Pediatrics  
Medicine  
Mental Retardation  
Neurology  
Pharmacy  
Psychiatry  
Radiation Oncology  
Rehabilitation Medicine  
Surgery  
Surgical Pathology

Datapoint 8600  
CDC Cyber 18  
Datapoint 6600  
Quantel 1450  
DG MV4000  
DG MV15000 and MV8000

MD Spectrum 600  
VAX PDP 11/44  
IBM Series 1  
IBM 8100 and DEC VAX 11/730  
Altos 986-T80  
DG S/250 and Datapoint 6600  
Datapoint 6600  
Datapoint 6600  
IBM System 36



KUMC Microcomputer Technology Center Classes



## KANSAS STATE UNIVERSITY

Located in Manhattan, Kansas, Kansas State University is one of the nation's original land-grant institutions established under the Morrill Act on Feb. 16, 1863. The University has extensive undergraduate and graduate programs in the colleges of agriculture, architecture and design, arts and sciences, business administration, education, engineering, human ecology, and veterinary medicine. The 1989-90 enrollment as of fall 1989 was 20,110.

Computing and Telecommunications Activities provides instructional, research, and administrative support for the campus and various public entities through its five units: Academic User Services, Administrative User Services, Operations Services, Technical Services, and Telecommunications Services. Total staff includes 95 full-time-equivalent employees.

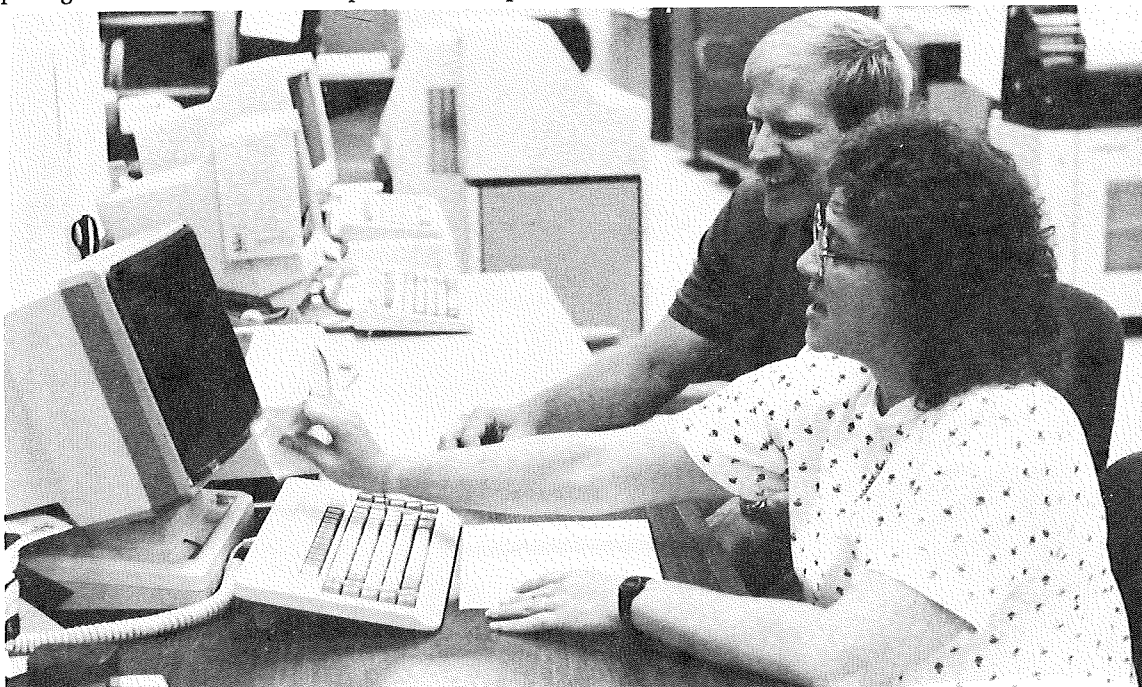
The Academic Computing Advisory Committee recommends policy, practices, and allocation of computing resources for academic users. The Administrative Computing Advisory Committee coordinates the computing activities among the administrative users. An Executive Computing Council obtains the guidance and perspectives of the University's upper management, and promotes management-level involvement and interest in computing. The University Telecommunications Advisory Committee acts in an advisory capacity on all matters pertaining to voice, data, and video service telecommunications activities.

The academic and administrative computing systems at Kansas State were centralized and enhanced in the past year with the installation of an IBM 3084 model Q96 computer to support both areas. This machine has 4 central processors, 96 megabytes of memory, 48 communications channels, and 53.2 gigabytes of online disk storage.

The administrative applications systems are developed and maintained for accounting, payroll, budget, personnel, affirmative action, financial assistance, student records and services, housing, and alumni and foundation. A new fee-assessment/collection system was implemented in spring 1989 to facilitate enrollment and fee handling. A new Student Financial Assistance system is expected to be added in FY 91 along with a student billing and receivables package.

Academic computing services include consulting; programming; project management and development; graphics support; scanning; tape handling; test scoring and record keeping; and microcomputer maintenance, sales, and supplies services. Special consulting and assistance is provided to the University community in the areas of statistical packages, design of research systems, hardware and software selection, and program testing.

Access to the academic system is provided by four public terminal laboratories and five microcomputing laboratories which are open to all campus users. The state experiment stations and many county



IBM 3084 Console



extension offices may access the system via terminals or microcomputers. Service is also provided to other state agencies and educational institutions located in Hays, Manhattan, and Topeka.

Additionally, many micros and terminals are available in departmental laboratories: agronomy, journalism, computing and information science, entomology, physics, psychology, mechanical engineering, electrical and computer engineering, civil engineering, agricultural engineering, and the colleges of agriculture, business administration, education, human ecology, and veterinary medicine. Terminals are also in the residence halls for access by student occupants. Many students regularly access the system via privately owned terminals or micros through standard telephone connections.

K-State is connected to three external networks: BITNET, MIDnet, and KARENET. BITNET (Because It's Time Network) is an international network of computers at universities and research institutions. It supports interactive messages, electronic mail, and file transfer to more than 3,000 computers at over 1,100 institutions.

MIDnet is a regional network of MIDwestern universities and corporations. It allows electronic mail, high-speed file transfer, and the ability to log on to remote computers. Through MIDnet, K-State links to the Internet (a national connection of regional networks) and provides University researchers with access to the six NSF-supported supercomputers in the United States.

KARENET is the KAnsas Board of REgents NETwork; it connects the Kansas Board of Regents institutions and the Board of Regents Office. Capabilities include remote log-in at any of the Regents institutions as well as the State of Kansas Division of Information Systems and Communications computing center in Topeka.

On-campus interconnectivity continues to improve. A high-speed Ethernet network was installed in 1986 to provide interactive data transfer. Eleven buildings are now connected to the fiber optic-based network; three to four more buildings are to be added within the coming year. The Equinox data switch provides access to several University units that have specialized computing systems which supplement the general-purpose computing capabilities of the campus mainframe. These systems are enhanced by expertise in each unit's academic area and are listed below.

#### DEPARTMENT OF AGRICULTURAL ENGINEERING

Two multi-user computers are maintained in the department: a DEC MicroVax II and a Sun 386i-150. The DEC uses the Ultrix32-V2.0 (16 users) operating system, is connected to the data switch and the campus Ethernet, has 20 terminals, and uses the following software: 20/20 spreadsheet, Unify/Accell database, Eroff word processor, and FORTRAN 77 and C compilers. The Sun uses the SunOS 4.0.2 operating system, is connected to the campus Ethernet, has one terminal, and uses the following software: AutoCAD, Basic, and a C compiler.



Lunch and WordPerfect

Teaching Laboratory

Access to both computers, as well as several other computers on campus, is provided by the University's backbone Ethernet. Access to the MicroVax II is also provided by the University's Equinox data-switch system. Twenty ASCII terminals and more than 12 microcomputers are connected to the data switch; two of the microcomputers also have Ethernet connection.

The computer facilities in the department are mainly used for four distinct purposes: computer education through course work and computer applications in agricultural technology management, research projects, office communication and student records, and electronic communication.

### COLLEGE OF ENGINEERING

The College maintains a DEC VAX 11/750, two Harris H800-2CP super minicomputers, a network of 16 HP/Apollo engineering workstations, an AT&T 3B15 minicomputer for its faculty and student research and education.

#### Hardware Configurations:

	DEC VAX 11/750	Harris H800 (2)	HP/Apollo network - total	AT&T 3B15
Main Memory	8 Mb	3 Mb (each)	163 MB	16 Meg
Disk Drives	2 - 598 Mb total	4 - 474 Mb each	4.4 GB (12 disks)	2 - 340 Mb each
Tape drive	1 - 9 track	1 - 9 track	3 - cartridge	1 - 9 track
Serial ports	40	20 and 24 each	16	42
Networks	none	X.25 local	Token ring	Ethernet

The college has reserved approximately 300 data switch lines for its own terminals and computer ports. Twenty nine lines are used for ports to the Harris computers; 8 lines for ports on the VAX 11/750. Data switch connections are installed in most classrooms, offices and laboratories. As a result, most faculty, staff, and students have access to the data switch network from terminals within their own departmental areas or offices.

#### Primary uses and software applications:

The two Harris H800 scientific super minicomputers and associated peripherals' primary purpose is to provide a specialized hardware and software environment suited to the specific needs of engineers, with emphasis on CAD/CAM/CAE software and applications packages, and on interactive graphics. Utilization is restricted to the College of Engineering faculty, staff, and students in support of both research and teaching.

The VAX 11/750 is connected with a Grinnell Signal Processing system and associated peripherals. The primary purpose is to provide a dedicated environment for signal-processing research. Utilization is primarily by the Department of Electrical and Computer Engineering.

The AT&T 3B15 is currently being integrated into teaching activities in the Department of Electrical and Computer Engineering.

The primary purpose of the network of 16 HP/Apollo engineering workstations is to support research efforts in the Center for Research in Computer-Controlled Automation (recently renamed the Advanced Manufacturing Institute), a KTEC Center of Excellence. This network also supports general research, and some teaching, as a secondary purpose.

Three engineering laboratories and three public laboratories are housed in the College of Engineering. Two of the public laboratories are general purpose, and the other provides graphics and plotting capabilities.

## DIVISION OF CONTINUING EDUCATION

The division has an IBM System 36 with 17 terminals, one IBM XT, three IBM Model 30's, 10 IBM Model 50's, one IBM Model 70 for desktop publishing, and five IBM Model 55's attached. System 36 processing includes four specialized continuing-education registration systems, accounting, and more than 400 marketing mailing lists.

## DEPARTMENT OF COMPUTING AND INFORMATION SCIENCES

A DEC VAX 11/780, Harris HCX-9, and two AT&T 3B15 minicomputers are maintained for faculty and student research and education. A Scientific Computer Systems SCS-40 near-supercomputer is maintained for research use by KSU faculty and graduate students. These systems are located in Nichols Hall, Room 114. Their configuration, major uses, and primary software applications are described below:

### Hardware Configurations:

	DEC VAX 11/780	Harris HCX-9	AT&T 3B15 (each)	SCS-40
Main Memory:	16 Mb	8 Mb	16 Mb	4 Mw (32 MB)
Disk drives:	4 - 474M Fujitsu	1 - 474M Fujitsu	4 - 340M CDC 4 - 172M CDC	2 - 680M DD-680
Tape drive:	Kennedy 9400	Harris TA-6740	CDC 1600 bpi CDC 6250/1600bpi	N/A
Serial ports:	64	24	32	N/A
Networks:	Ethernet	Ethernet	Ethernet	Ethernet, data switch

Most of the serial ports are connected to an Equinox data PBX (data switch). There are approximately 100 terminals, PCs, and workstations likewise connected to the data switch, so that a user may select one of a variety of computers from any terminal or workstation. Many workstations and all minicomputers are interconnected by a departmental network based on Ethernet, Starlan, and Apple LocalTalk technologies. These networks permit sharing of resources among the systems in the department, and access to other computers across campus and around the world. Several phone lines are also reserved for remote access.

The SCS-40 is accessible via a DEC MicroVax II front-end which is connected to the data switch and Ethernet network.

### Primary uses and software applications:

The VAX 11/780 and one of the AT&T 3815s are used primarily for faculty and graduate student research and education. The other 3B15 is dedicated to undergraduate instruction, while the Harris HCX-9 is used for graduate and faculty research only. On all systems, documents are prepared with typesetting software for professional journal articles, grant proposals, graduate student theses and dissertations, correspondence, and reports for course work. A wide variety of languages are supported on these systems for both research and education. These include C, C++, Concurrent C, Pascal, Modula-2, FORTRAN, Ada, LISP, ML, and Prolog. They also support a wide variety of other applications, including database management systems, software engineering and graphics tools, and network communications. The VAX 11/780 and Harris HCX-9 connect the department with several national and international computer networks, including NSFNET, and USENET.

The speed of the SCS-40 (18 MIPS) is utilized by a variety of departments across campus for the research needs of their faculty and graduate students. The SCS-40 provides an extensive Cray FORTRAN programming environment, including the IMSL mathematical, statistical, and scientific libraries.

## UNIVERSITY LIBRARIES

KSU Libraries is currently implementing the NOTIS system, originally developed at Northwestern University. NOTIS now supports acquisitions, serial/periodicals check-in bibliographic database maintenance, and the public online catalog (called LYNX). The NOTIS database contains over 500,000 MARC-format bibliographic records; this represents 65 percent of KSU's total cataloged collection. Annually, the system will be tracking over 15,000 orders for new books and the receipt of over 50,000 serial issues. By early FY 91, NOTIS is expected to be implemented for circulation and reserves.

The NOTIS system operates under MVS using CICS on the IBM 3084 mainframe. The first phase of NOTIS features a network of 75 terminals and 25 printers in the main library and the branches. Temporarily, the library continues to use the LS/2 system for circulation and reserves. LS/2 runs on a Data General Eclipse S/250 with six 300-megabyte drives and a network of terminals and printers serving the main library and branches tracking 400,000 circulations annually.

The Libraries are linked via 11 terminals to OCLC, the national cataloging and interlibrary loan 23-million-record database. Cataloging records input by other OCLC members are transferred to NOTIS and LS/2 and modified for local use.

The Libraries also utilize approximately 20 microcomputers for use by patrons in accessing indexes to journal literature on compact disk systems and from remote online commercial databases. Six of these microcomputers are linked by a local area network which accesses seven different databases on a "juke box" compact disk player.

#### **DIVISION OF PHYSICAL FACILITIES**

The department is currently using an IBM System 36, model 5360-D2K. This system consists of a CPU with one megabyte of memory, 716 megabytes of disk, 8 - 3916 terminals, 3 - 3197 terminals, 5262 band printer (600 lpm), SSP operating system, and a Quarterdeck tape stream backup system. Also attached to the System 36 are 15 personal computers and six additional system printers.

A job-costing system maintains the status of several thousand jobs as to material, labor, and equipment charges attributed to projects. Inventory and Counter Sales are provided to the storeroom to track inventory levels and to charge materials to various jobs in job costing. Accounts Receivable provides accounting with accurate information as to the status of invoiced charges.

#### **DEPARTMENT OF PHYSICS**

The department's computer system is configured with a DEC VAX 11/750 CPU in conjunction with RA80 and RA82 disk units which are accessed by a UDA50 disk controller. Peripheral and supporting units include DEC and Emulex reel-to-reel tape drives, an LP32 line printer, and an LN03 Plus laser printer. Faculty and graduate student researchers access the computer through 36 terminals including three graphics terminals.

The primary use of the computer is for faculty and graduate student research. The computer is also used in conjunction with both undergraduate- and graduate-level courses. Most of the research is sponsored from grants and contracts from the Department of Energy and the National Science Foundation.

The department's computer system is linked with the MIDnet regional network and MFEnet, the DOE network to supercomputer computers at Lawrence Livermore National Laboratory.

The Physics Department computer system uses the DEC VMS operating system and has software maintenance contracts with DEC for VMS and FORTRAN. Other major software include the IMSL mathematics and statistics library and Speakez.

#### **DEPARTMENT OF STATISTICS AND THE STATISTICAL LABORATORY**

A Harris H-700 system, 45 terminals, and DP-600 printers are used primarily for instructional purposes and data analysis in research activities utilizing the Statistical Analysis System (SAS). Files are created for SAS jobs which are submitted and run on the university mainframe. Undergraduate use accounts for about five percent, graduate use is about 80%, and 15% is used by faculty and a few other departments.

#### **FY 90 activities**

- The Margin of Excellence program (in its second year) provided \$150,000 additional funding for computing growth at K-State.
- The University began taking bids for a Student Financial Assistance system.

- Farrell Library's basement was renovated to prepare for the delivery of the IBM 3084 mainframe, which arrived Nov. 16, 1989. This machine plus peripheral equipment replaced the academic computer in Cardwell and the administrative computer in Farrell. The administrative computing system was moved to the new IBM 3084 mainframe during Christmas break to prevent interruption of service. At the same time, academic dispatch services were relocated from Cardwell to Farrell; new dispatching hours and procedures were implemented. The academic computing system was moved to the vacated administrative IBM 4381 computer for two months (while VM/XA system development continued on the 3084), with final moves to the 3084 accomplished during spring break. A celebration of the new computer facility was held June 14; President Jon Wefald participated in a ribbon-cutting ceremony, and tours of the new facility were given.
- Installation of NOTIS on the University mainframe is progressing on schedule. Online access to K-State's library catalog system is expected to be available on the mainframe in fall 1990.
- FOCUS (a fourth-generation computer language) was installed to allow departments to generate custom reports from available University databases.
- A PC-SIG disk was established on the academic system; it contains more than 2,100 "disks" of microcomputer shareware.
- The PostScript Interpreter was installed on the academic system to provide 43 new fonts for use with the IBM 3812 Pageprinter and to provide another method for printing microcomputer output on a mainframe laser printer.
- CTA signed an agreement with Sun Microsystems Inc. and Solbourne Computer Inc. to purchase components of a Unix system for public use. In May, the first public Unix lab on campus was established in the basement of Cardwell; it contains four Sun workstations served by a Solbourne processor in the basement of Farrell Library. A Unix users group has been formed on campus.
- More than 8,600 faculty, staff, and students now have personal computing accounts, compared to 4,740 at this time last year. Allocations for personal accounts were raised to \$200 per week in fall 1989 to adequately provide for computing classwork and personal use.
- A fifth public micro lab was established on campus. Located in Dickens 1/1A, it contains 20 micros and two printers connected with a Novell network.
- The National Center for Supercomputing Applications renewed K-State's academic-affiliate grant for 1990; it provides small amounts of computer time on a Cray X-MP/48 supercomputer.
- A microcomputer training facility was created in Cardwell. It contains 12 IBM-compatible workstations networked with Novell NetWare; all are connected to the data switch for access to mainframe facilities.
- Novell networks were installed in the Seaton and Fairchild public micro laboratories to link micros together and provide access to popular software programs.
- Public micro lab changes: Thermodynamics 5.30 was added in Dickens 1/1A and Justin 325; MS-Kermit was made available in Seaton 23 on the two transfer stations. Two conversion stations each in Seaton 23 and Dickens 1/1A were connected to the data switch.
- The first public Macintosh facility on campus will be created in fall 1990 with the addition of nine Macs and two dot-matrix Apple Imagewriter printers in Dickens. A Macintosh and a laser printer will also be placed in the K-State Union Copy Center to meet the growing demand for public printing facilities.

## THE WICHITA STATE UNIVERSITY

The Wichita State University (WSU), a medium-sized, state-supported university is located in the city of Wichita. WSU entered the State of Kansas Board of Regents system in 1964, and has grown into a comprehensive institution of higher education. Students may now choose from over 180 areas of academic concentration in undergraduate and graduate degree programs in business administration, education, engineering, fine arts, health related professions and liberal arts and sciences. Doctoral programs are offered in chemistry, communicative disorders and sciences, applied mathematics, psychology, educational administration and supervision. The college of engineering offers doctoral programs in aeronautical engineering, electrical engineering, industrial engineering and mechanical engineering.

An urban institution, WSU had a Fall 1989 enrollment of 17,419. Of these, over 12,961 work part or full time; 1,143 are foreign students; 9,175 are enrolled in evening courses and 3,914 are over 34 years of age. About 3,300 students are enrolled in graduate programs, and 1,660 other students are pursuing programs in Continuing Education. The average age of WSU students is 28.2, and the University's faculty currently numbers more than 1000 members.

Located on the first floor of Neff Hall, University Computing and Telecommunications Services (UC & TS) serves the students, faculty and staff of the University community by providing contemporary computer and telecommunications facilities for instruction, laboratory research, sponsored programs, administrative data processing and public service. These services include systems analysis and design, programming, data preparation, interactive time-sharing, modem pooling, networking, batch and remote printing computer operations, and on-line administrative data bases. End-users assistance is available for both microcomputer and mainframe computing. Consultation with users in their preparation of requests of competitive bids for the selection and acquisition of computers and related equipment is also provided by the UC&TS.

Two committees were established during fiscal year 1990 to improve the strategic and tactical planning activities of the university unit. A Computing and Telecommunications Strategic Planning Advisory Committee and a Computing and Telecommunications Management Information Systems Advisory Committee were established. The first task of the strategic planning committee was to address the immediate concern of central mainframe computing constraints. The IBM 3081 has reached a level of operation unacceptable to the campus as CICS response time has risen to over twenty seconds or more for trivial response transactions. Numerically intensive faculty computer runs have been restricted to night time processing only which has severely impacted faculty research activities. A comprehensive eight year plan to upgrade the mainframe environment was developed and has been accepted by the university administration. A fiscal year 1992 legislative budget request has been submitted to allow the plan to be initiated. A minor upgrade of the IBM 3081-D to an IBM 3081-K is planned during the summer of 1990 to improve the computer response times but will not alleviate the major constraints of the operating system software. A conversion from the DOS operating system to the MVS operating system must be accomplished to satisfy the growing mainframe needs of the institution.

The central computing facility is normally available for use seven days a week, 24 hours a day. The facility has two central processing units, an IBM 3081 model D-16 with sixteen million characters of main memory, and a VAX 8650 with thirty-two million characters of main memory.

Seven 1600/6250 character-per-inch magnetic drives, one 800/1600 character-per-inch magnetic tape drive, a 4,000 lines-per-minute line printer, a twenty-four page-per-minute laser printer, and an off-line digital plotter are available for general use. Remote printing facilities operate from the Social Science Laboratory and the Controller's Office. An IBM 3720 communications processor, twenty-three local CRT controllers and a network of over 1,600 microcomputers and 496 CRT terminals provide interactive computing for campus classrooms, laboratories and offices. These terminals are used with the academic time-sharing systems (CMS), computer graphics, and the administrative terminal system (CICS). A professional service oriented dedicated staff continues to provide computing support activities in support of the administration, instruction, and research activities of the institution. Currently thirty-nine full-time staff members and twenty part-time students are employed by UC&TS.

The operational statistics of the central system for fiscal year 1990 are listed below, including the percentage of change from the previous year.

Jobs processed	676,110	+ 10.5%
Time-sharing sessions	403,579	+ 10.1%
CICS transaction (millions)	20.2	+ 6.3%
Card images read (millions)	348.0	+ 103.9%
Lines printed (millions)	690	+ 88.5%
Non-paging disk I/O (millions)	1,002	- 55.8%
Tape I/O (millions)	1,171	+ 494.4%
Tape reels mounted	339,666	+ 143.8%

For fiscal year 1990 University Computing had an operating budget of \$2,336,032. This represented 2.6% of the University's \$87,686,385 operating budget. Salaries accounted for 52% of the Center's expenditures; 40% was spent for hardware and software, and 8% was expended for supplies and other services. The Telecommunication Services operating budget was \$1,202,057 for 1990. During the past year service was provided to 9,323 students in 208 different classes which made use of the facilities as a regular part of their academic studies. Nine hundred sixty-six computer service projects were used in the pursuit of academic instruction, faculty research, theses, student projects and administrative data processing.

The University Computing and Telecommunication Services organization was extremely busy during the past fiscal year. Telecommunications services provided extensive support for all aspects of telecommunications activities to the entire campus. Networking continued to explode on campus as several departments installed local area networks and the campus fiber optics ethernet backbone was extended to several buildings. The Cabletron fiber distribution equipment was selected to provide the ethernet network for the future. The ISN data switch now supports over 600 end-points and several departmental LANs are bridged through the ISN equipment. The AT&T System 85 software was upgraded to R2V4 to position WSU to take advantage of full ISDN capabilities when function and cost are to WSU's advantage. A remote module was also installed to support the southern and eastern expansion of the campus. Telecommunications staff assisted in the planning and installation of the AT&T "POP," located on the WSU campus, to provide KANS-A-N video, voice, and data services to the State. This was one of three major installations, in the state, to enhance the telecommunications capabilities of all state agencies and to contain the costs of providing these services in the future.

#### FY'90 Computing Activities

The use of the international electronic mail system, BITNET, has continued to increase and provided services for over 300 faculty in support of their instruction and research activities. WSU plans to join the MIDNET national computer network during fiscal year 1991.

Administrative programming recorded another successful year of high-level support on application specific systems across the University. Specifically, new systems were developed for student certification and the first phase of our student information database system was designed and implemented. Other developments included a budget transfer tracking system, a human resources time reporting system, a new WSU accounts payable system, and a new prospect tracking system for the endowment association. The Derby USD 260 school district system has been ported to the IBM System 36 located in the school district. This system has operated on WSU's mainframe for a number of years running in a CICS environment. A major conversion to the latest DOS/VSE/SP release and the VTAM terminal environment required extensive modifications to most applications currently supported. The administrative programming staff was increased by two positions to satisfy new administrative application requirements.

WSU's IBM mainframe was connected to DISC to support the STARS application by implementing a VTAM to VTAM communications link. The controller's office makes extensive use of this new capability.

The scientific support staff continued to provide training, consulting, documentation, and many other services to the faculty and students of WSU; New software releases such as: EQS Structural Modeling, MPSX Linear Programming, NASTRAN, SPSSX, SAS, BMDP, and WATFOR77 were installed and

documented. New documentation papers were developed for KARENET, DEC VAX Guide, PROF's, Displaywrite, the Interactive Chart Utility, and the FORTRAN callable mathematical subroutines. Two new professional support staff were hired and trained to expand our instructional support activities.

The operations and technical support staff continued to improve the operational capabilities of the department. The DOS operating system was upgraded to the latest IBM release, VTAM was implemented, a new IBM 3720 communications processor was installed, and several program products were acquired and installed to enhance our capabilities. A disaster recovery plan was documented and implemented to improve data backup and integrity. The DEC VAX/8650 operating system was upgraded to release 5.3.1, TCP/IP was implemented, an ethernet link to the University of Kansas was installed to allow WSU to participate in a single software license from DEC, and Wordperfect 5.0 was implemented on the VAX VMS platform. The microcomputer lab located in Neff Hall was networked to the DEC VAX/8650 using the DEC PCSA networking hardware and software to expand computer science students capabilities in the lab. USENET connections between St. Francis Hospital and WSU and between NCR-Wichita and WSU were completed. Using the University of Kansas to WSU ethernet link, WSU faculty now have access to MIDNET and the Internet networks.

### **Department of Computer Science**

A new network of DEC workstations consisting of one DECstation 5000 running UNIX, two DECstation 3100s running UNIX, seventeen DECstation 3100s running either UNIX or VMS, one VAX 11/750 running VMS, and one Symbolics 3670 LISP machine was implemented. The VAXstations and DECstations are used primarily in a lab environment for software engineering and machine learning instructional requirements. The workstations also provide UNIX exposure to the upper-division and graduate level instructional activities. The department uses the DEC VAX/8650 for academic and faculty support activities. Every student majoring in computer science is automatically provided a VAX account for the duration of their major.

### **National Institute for Aviation Research**

The new research facilities for the National Institute for Aviation Research (NIAR) was completed and occupied during the 1990 fiscal year. The new research facility provided several opportunities for the expansion of our computer networking capabilities to the campus. WSU's ethernet backbone was expanded from local backbone to a campus wide ethernet using optical fiber and twisted pair copper cabling. This technology allows ethernet access to the DEC VAX/8650 from the new facilities and also will allow easy expansion of the ethernet to other research activities located anywhere on campus as the need arises. The Walter Beech Wind Tunnel was the first remote research facility added to the campus wide ethernet. NIAR also installed an IBM AS/400, acquired through a grant from IBM, to develop a Computer Integrated Manufacturing program (CIM). The new CIM lab will provide a modern training facility to the local manufacturing business located in the Wichita area.

The Institute also runs several CAD/CAM workshops each semester. The CAD/CAM workstations were upgraded to the latest IBM workstations and are housed in a lab in the new facility. Optical fiber was also used to connect the CAD/CAM workstations to the IBM 3081 in University Computing using a FiberMux fiber controller. The experience gained connecting the new NIAR research facility to the university network has proven the use of optical fiber and twisted pair technology has reached a level of cost/reliability that will allow rapid growth in networking to the campus.

### **W. Frank Barton School of Business**

The college provides a student laboratory with 64 Zenith PC microcomputers model 159's with OKIDATA printers. This micro facility is used for instruction of spread sheets, word processing, and data base software. The labs will be networked during the next fiscal year to allow connection to the campus network facilities.

### **College of Education**

With an installed base of 41 Apple microcomputers the College of Education offers instructional computing using PFs and Appleworks software. Thirty micros are for student use with 11 used for research purposes.



### **Department of Electrical Engineering**

The department has 22 Zenith microcomputers available for student use. Several of the machines have extended graphics capabilities. Spread sheets, word processing, graphics, and data base software are all available in the department. All micros in the department are networked using the Novell networking products.

### **Department of Industrial Engineering**

The department provides 40 Zenith microcomputers with hard disk drives for student instructional purposes. The following software is supported: Lotus 1-2-3, Auto CAD, Dbase III, and BASIC. The micros all have color monitors, a microsoft mouse, and every two micros share a printer.

### **Department of Industrial Technology**

The department supports a Macintosh lab comprised of eleven SE's, two SE's with 20MB hard disks, 3 512K Mac's, and two Mac IIX's. One of the two Mac II's is used for server/spooler support using the AppleTalk networking software. The lab also has a full page monitor, a laser printer, a CD/Rom player, a flat bed scanner and three Image Writer printers. The server is also connected to the campus network through the ISN data switch.

### **Social Science Research Laboratory**

Last year was an exciting year in computing for social science lab as the lab entered the era of computerized testing. During the Spring 1990 semester a testing system was implemented on the DEC VAX/8650 platform with 70 students taking all tests for Psychology 111 in an online environment. The system was so successful that over 700 students will use the system during the Fall 1990 semester. The lab also operates a National Computer Systems NCS Sentry 7006 Scanner for campus wide testing services. The scanner is connected to the IBM mainframe using 4800 baud line drivers which then provide mainframe processing of the test data using the CMS timesharing system.

### **Elliott School of Communciations**

A microcomputer lab with 15 Apple Macintosh SE's are currently available in the Elliott School of Communciations. The computers are networked using AppleTalk and also provide three Image Writer printers for student use. The lab is used primarily as a writing lab for students enrolled in communications courses. Several faculty are also connected to the lab network and have access to a laser printer on the network.



Computer Center

Wichita State University

## EMPORIA STATE UNIVERSITY

Emporia State University, located in Emporia, Kansas, offers Associate and Bachelor degrees on the undergraduate level and Master's degrees on the graduate level. The University is divided into four schools offering 72 different fields of study: 37 undergraduate, 15 graduate and 20 both graduate & undergraduate levels. The 1989 fall enrollment was 6,021 students.

The Data Processing Center at Emporia State University is responsible for both academic and administrative computing activities. The center is staffed with two unclassified, fifteen classified and five part-time student employees.

The center operates on a 24-hour basis. The computer is attended by staff or student operators from 7:00 a.m. until 9 p.m., Monday through Friday, 8 a.m. until noon, Saturday. For the remainder of each day and Sunday the computer operates unattended.

The installed computer system is an IBM 4381 with sixteen megabytes of memory. It has four IBM 3380 disk storage devices (2.5 billion bytes), one IBM 3411 tape drive (dual density), three IBM 3430 tape drives, an IBM 4520-20 printer. Communications controllers installed are: IBM 3277, two ITT Courier 2721, Harris H274, IBM 3174, two IBM 3274, and an IBM 7171.

The staff worked on a total 392 programs. Of the 392, 52 (13.3%) were new programs and 340 (86.7%) were programs on which maintenance was performed. Program maintenance fell into three categories. 238 (70.0%) of the programs maintained were enhanced so they were of more benefit to the user. 44 programs (12.9%) had previously undetected errors fixed. 58 programs (17.1%) were changed due to system or software changes. There is a total of 924 individual programs in the various systems in operation. There are thirty-six data bases on-line for daily processing.

The need for maintenance on systems makes it difficult to plan new systems with specific completion dates. Revisions of existing systems and application program continues to be a part of the planning along with the development of new systems and applications software.

### **FY'90 Activities**

During the year an IBM 3380 disk storage device and an IBM 7171 communications controller were installed. VM/SP Rel 6 was installed. Access to BITNET was obtained through the Wichita State University.

A User Services Consultant position was added to provide PROFS, CMS, etc., training, conduct seminars, assist faculty and staff in using the data processing facilities and serve as the BITNET coordinator.

During the year extensive work was done on the student accounts receivable systems (STARS) along with enhancements and maintenance of the payroll system. An on-line student transcript system was completed.

The Information Center continues to provide a training resource for faculty and staff on microcomputer hardware and software. The Center currently provides the facilities and tutorials to learn about selected IBM compatible software.

The NOTIS software package for the library was installed and implemented.

A new Systems Analyst I position was obtained and the position was filled, to help in the fiscal affairs area.

A new Electronics Technician I position was obtained and filled.

### **FY'91 Plans**

Plans for fiscal year 91 include the further investigation of a student information package development system; the installation of a new disk storage device; replacement of the old Courier terminals.

The NOTIS circulation system is scheduled to go on-line in October, 1990.

Move the Data Processing and communications/Maintenance Centers to our new facilities in Cremer Hall in May 1991.

### **Division of Accounting and Computer Information Systems**

There are 36 IBM micros, 20 Zenith micros along with 10 terminals and 1 printer connected to the mainframe for student use.

### **Division of Mathematical and Computer Science**

There are 17 IBM, 10 AT&T, and 6 Zenith, along with 4 terminals connected to the mainframe for student use.

An IBM 9370 model 20 minicomputer is used for instructional use the Computer Science program. They have 34 terminals connected to it. The software installed is: VM/IS, Fortran, PASCAL, Basic and SQL.

### **Division of Administration and Teacher Education**

There are 35 apple micros available in the "Apple Orchard" for students to use.

### **School of Library Information Management**

SLIM has 2 IBM, 4 Apples, and 12 Zeniths, for student use.

### **Division of English**

The Writer's Workbench text editing programs and the English computer lab were used in the fall 1989 semester as voluntary supplemental editing help for several freshman composition classes. In the spring of 1990, five pilot EN 107 (Comp I) sections required its use. The Division of English faculty determined that spring to allow individual faculty henceforward to decide whether to require Writer's Workbench.



IBM 4341

Emporia State University

# PITTSBURG STATE UNIVERSITY

Pittsburg State University has completed its fifth annual strategic planning cycle which has resulted in the establishment of a comprehensive University strategic plan. This plan incorporates the program and supportive resource requirements of the entire University community which have been prioritized to provide a blueprint for the University accomplishments during the coming months. The University Office of Information Systems (OIS) is an integral part of that planning process.

During the strategic planning cycle, OIS surveys all University departments and offices to assist them in identifying and effectively planning for their individual information system needs. This survey and followup interview process provides OIS with the information necessary to establish a meaningful and coherent information systems plan as an important part of the overall University strategic plan. From this planning process the University has established several key "directions" in the evolution of University information services;

- ... students must have ready access to the information systems tools which will allow them to effectively compete in their chosen career fields;
- ... faculty must have the training, support, and availability of the information systems resources to complete their instructional and research activities;
- ... staff must have the use of information systems which will allow timely and innovative decision making in providing efficient and cost effective services which meet the mission objectives of the University;
- ... information services must be available to the entire University community at a location convenient for their ready use;
- ... where possible, information systems resources should be shared.

These key directions provide the basis for the detailed planning and implementation activities of the Office of Information Systems.

## Academic Information Services

The evolution of University academic services being supported from a single centralized computing resource to multiple networked resources is virtually complete. As a result of this evolution, the University now provides over 200 separate software services to over 160 client micro computers using three micro computer based servers. This local area network (LAN) has been established using AT&T Starlan and StarGroup technology over a campus-wide fiber optic cable system. These services include the full range of language compilers, word processing, spreadsheet and data base systems including several UNIX based interactive systems. The Statistical Package for the Social Sciences (SPSS) is now available via UNIX, as are several language compilers and fourth generation data base management systems.



Pittsburg State University

Microcomputing Laboratory

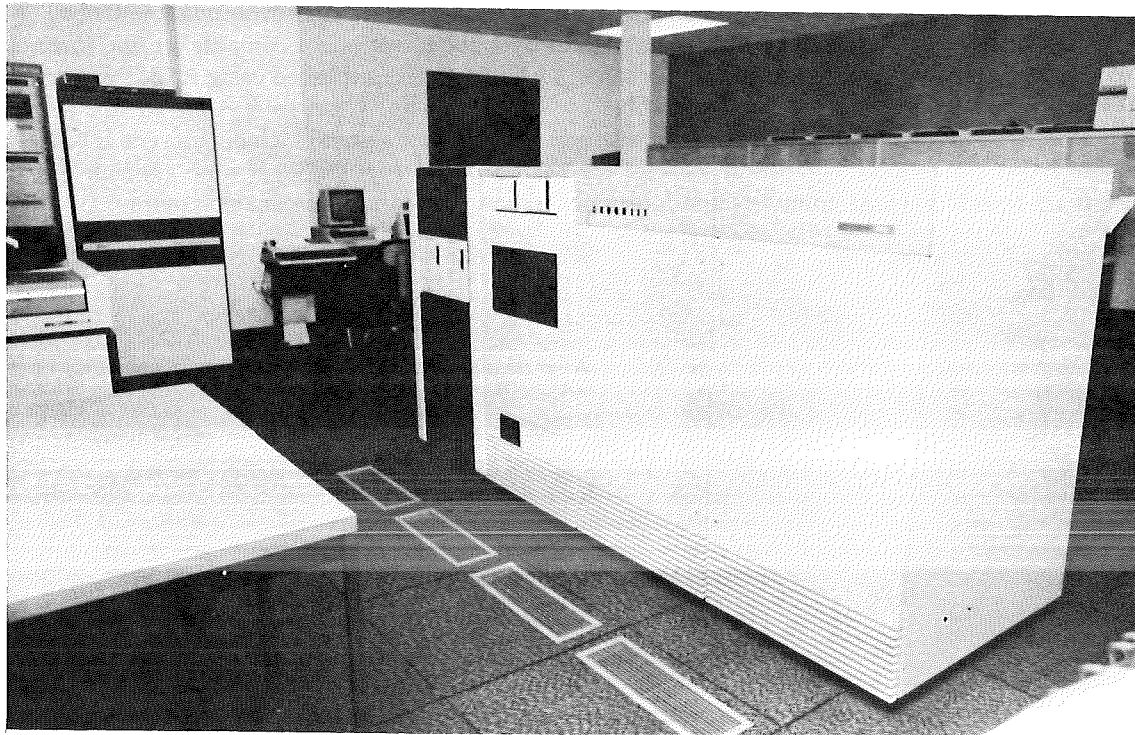
OIS now sponsors University-wide training in the basic, intermediate, and advanced use of many of the networked software products. A newly established faculty and staff computing resource center provides the physical focal point for most of the training activities allowing trainees to learn through "hands on" use of the products.

During fiscal year 1990 the University completed the introduction of its student oriented GORILLA CARD (GoCARD) services. These services, through the use of a personalized microcomputer diskette, allow students to view many of their University records, including demographic, course schedule, and transcript information. This data is also available to the student's faculty advisor. GoCARD also provides a streamlined capability for student pre-enrollment, and direct access to electronic mail and bulletin board systems. Major new GoCARD services are added at the rate of one new service per month.

The University's seven major computing laboratories are all connected to the LAN. The physical location of these labs allows students in any University discipline to have ready access to a broad range of information system tools. Each laboratory has a faculty coordinator responsible for the day-to-day operation of the facility. On a regular basis these coordinators meet with the Academic Computing Coordinator to discuss mutual issues of lab operation and, as a group, assure a consistent level, in all labs, of student use and support.

The concept of networked computing services at the University will continue to allow growth in an "add on" manner as opposed to the classic "replacement" approach. As new technologies are introduced, the University will be able to add these technologies to existing networked resources. The establishment of network data protocol standards allows the connectivity of, and hence sharing of, information system resources which, in the past, would have been used in standalone mode.

OIS expects continued emphasis on the use of physically decentralized resources which are shared via the use of networking concepts. Higher levels of faculty training and availability of information systems resources will continue to be stressed at the University.



Pittsburg State University

Administrative Computing System (Prime Model 6350)

### **Administrative Information Services**

In the Fall of 1989 the University installed a Prime 6350 minicomputer replacing the existing Prime administrative computing system. This new equipment provides a threefold increase in administrative computing capacity. Over 180 client terminals are located in every administrative office and department on campus. The University provides administrative computing services through the use of over 45 major, real time, on line, application systems. All of these systems, using an identical fourth generation data base management system, provides a full range of data manipulation and user oriented data retrieval capability to each service user.

The University administrators are now using a fully functional file transfer capability which allows the uploading and downloading of data between the Prime system and microcomputer based workstations. This facility allows service users to individually manipulate data in a microcomputer environment using familiar word processing, spread-sheet, and data base products then storing the result of that work on the central University system. Conversely, data which is acquired by using microcomputers can subsequently be transferred to the central computing system for further processing and/or storage.

Several new administrative information services including, new student orientation (C.A.R.E.S.) program administration, honors program and Continuing Studies transcripts, were added in fiscal year 1990. Additionally, OIS staff completed over 600 administrative systems requests within an average of 2.1 days from the date of user request.

The Office of Information Systems continues to sponsor the University Information User Group (IUG) which brings together representatives of all of the University administrative functions. The IUG meets on a bimonthly basis to hear presentations from other information users on campus and to mutually discuss system opportunities and concerns. This forum provides yet another valuable source of information in support of the continued improvement of the University's administrative information services.

### **Off Campus Information Services**

The University continues to emphasize the utilization of information services available off campus through the use of the Kansas Regents Data Network (KARENET). This valuable network allows the University students, faculty, and staff to use information services which were heretofore unavailable. New off campus services are literally available on a daily basis and the OIS will, as time and funding allow, make more and more of these services available to all of its information constituents.



## FORT HAYS STATE UNIVERSITY

Fort Hays State University has established 10 goals to carry out its mission. Two of the 10 goals will have a direct impact upon the Computing Center and its resources. They are:

1. To become a unique and eminent regional university by "electrifying" our campus environment.
2. To foster a liberal arts framework for student thinking through a computerized curriculum.

These goals are being met by providing each college and department the opportunity to automate or use the automation of the curriculum and by providing all users with workstations necessary to utilize the academic support services of the University.

The University has undergraduate programs leading to the Associate and Bachelors degrees with graduate programs leading to the Masters and Education Specialist degrees in its four colleges. More than 80% of the students come to the over 3,000-acre campus from the western two-thirds of Kansas.

The Fall 1989 enrollment figures show 3,671 undergraduate students, 731 graduate students, and 575 continuing education students for a total of 4,997. The Fall enrollment generated 55,602 credit hours.

The University has one mainframe computing facility to meet the computing needs of academic, research and administrative users utilizing one staff and budget. The Computing Center supports all micro computing on campus by providing repair of all micros and peripherals, demonstrations, consulting, problem resolution, hardware and software installation and uploading and downloading of data files. In addition, the Center supports the data and networking aspects of the telecommunications activities of the campus and their interactions with all other state agencies.

Highlights of the year include:

- \* Implemented year five of the Federal Title III Grant, including installation of a tape drive, a 5.1 gigabyte disk drive and five terminal controllers. Began development of a Facilities Management System, finished the enhancement of the Housing System and installed 155 AT&T micros and 45 terminals in faculty offices to complete the objective of all full-time and selected part-time faculty receiving a workstation.
- \* Developed and put into production an on-line Scholarship System.
- \* Developed and installed a Career Planning System using SQL/DS and CSP software.
- \* Replaced a 14-year-old computer system printer with a newer state-of-the-art printer for better reliability.
- \* Set up and support a graphics lab with 11 Apple II CX micros primarily for the Departments of Art and Communications.
- \* Set up and support a College of Education lab consisting of 16 Apple micros and 3 IBM micros for use by education majors.
- \* Expanded premise distribution system by adding fiber optics to five academic buildings.
- \* Installed Hays Public Library as a satellite segment on the NOTIS Library System.
- \* Installed Kansas College of Technology as a satellite segment on the NOTIS Library System.

Plans for the next year include:

- \* Finish up year five of Federal III Grant which expires September 30, 1990.
- \* Acquire and install an Alumni and Endowment system running in SQL/DS.
- \* Install three networks of 75 client micros from a donor program by AT&T Corp. The first network will be a 30 micro lab for the Department of Psychology.
- \* Install a 15 client micro network from a grant program funded by IBM Corp.
- \* Enhance the student accounts receivable system by adding the financial assistance awards segment.
- \* Begin the design of an on-line degree audit system.
- \* Provide for distributed on-line enrollment at the advisor's desk.
- \* Install a voice message minicomputer for business applications and develop academic applications of the system.

Microcomputer and terminal labs outside of the Computing Center are not department owned although a department may have primary access. The labs are:

Stroup Hall—14 micros on a Starlan network with which the Department of Nursing has primary access, 21 micros on a Starlan network connecting nursing faculty.

McCartney Hall—two separate labs—6 micros on a Novell network and 14 standalone micros in one and 36 micros in the second, with the College of Business having primary access to both.

Rarick Hall—26 micros and a corvus file server with primary use by the Department of Mathematics and Computer Science, 11 micros with primary use by the Departments of Art and Communication, 19 micros with primary use by the College of Education, 28 terminals with primary use by the Department of Mathematics and Computer Science, 4 terminals for faculty development in the Department of Mathematics and Computer Science.

Davis Hall—5 micros and a plotter with primary use by the Department of Industrial Education running computer aided design software.

Forsythe Library—30 terminals and four printers connected to the ISN with primary use by the Department of English for Writers Workbench Software, 6 micros for dialing into off campus library data bases.

Agnew Residence Hall—two four-terminals labs.

McMindes Residence Hall—six four-terminal labs.

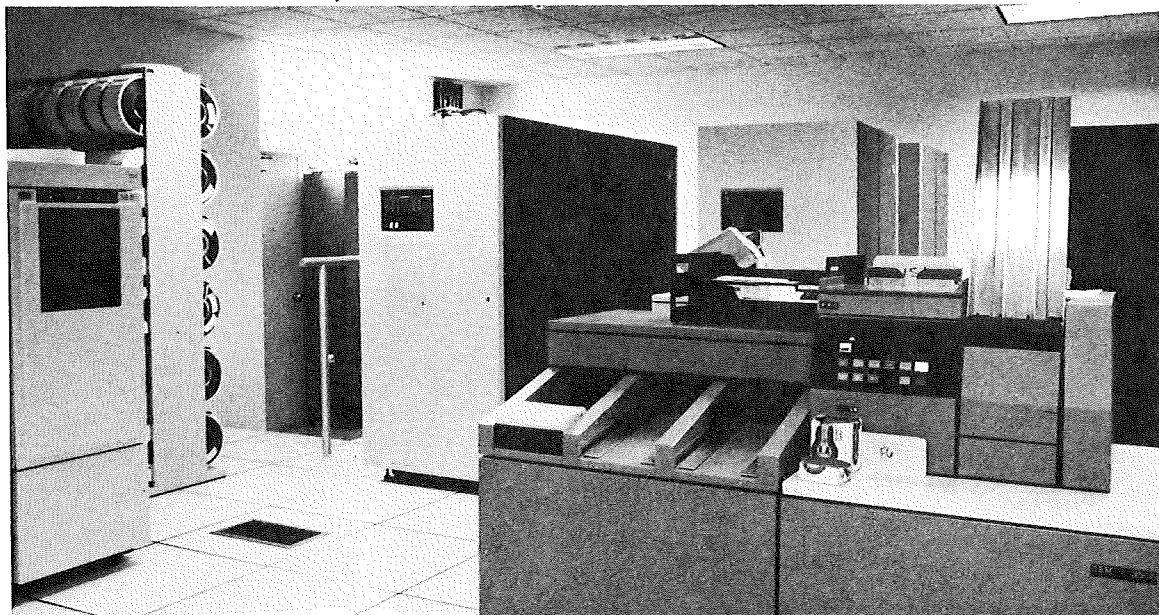
Wiest Residence Hall—four four-terminal labs.

All terminal labs are connected to the ISN data switch which allows each to access the mainframe computer and the three mini computers (see figure 12).

The Computing Center staff is made up of 15.5 classified, 4.5 unclassified, and 20 student employees. Distribution of the permanent staff shows two in management, two in Academic Support, six in the Information Center, five in Application Programming, three in Systems Programming, one in Microcomputer Repair and Consulting, and one in Data Communications.

The Computing Center reports to the Provost. A campus Computer Advisory Committee consisting of eight faculty and two students recommends policy and allocation of resources.

Housed in a self contained building with building hours of 7am - 11pm, Monday through Friday, 9am - 5pm Saturday, and 2pm - 10pm, Sunday. The remainder of the time is available for staff usage or to run unattended, for the student and staff terminal users. There are eight inbound modems for remote users to dial in 24 hours a day.



Computing Center

Fort Hays State University



## KANSAS COLLEGE OF TECHNOLOGY

Kansas College of Technology is celebrating its 25th anniversary this year. The mission of the school is to provide education of technologists and technicians in the fields of engineering technology, information technology and science technology, and to serve the needs of the local community and state. Associate of Technology degrees currently being offered are: Aviation Maintenance Technology, Chemical Engineering Technology, Civil Engineering Technology, Surveying Technology, Computer Engineering Technology, Computer Science Technology, Computer Information Systems, Electronics Engineering Technology, Industrial Engineering Technology, Mechanical Engineering Technology, Professional Pilot, and Aeronautical Technology. Certificates offered are: Aviation Maintenance and Helicopter Maintenance. The enrollment for Fall 1990 term was 674 with a FTE of 393.

The Information Systems Department is responsible for the support and administration of computer needs in the areas of academic and administration operations. Computer services of this office include overall control of maintenance, training, and support of the computer systems as well as networking of these systems on campus, including the Kansas Regents Data Network Systems and the on campus Starlans. Two full time employees and workstudy students comprise the total staff for Information Systems. The Computer Operations Supervisor reports to the Vice President of Academic Affairs.

The computer center, located in the Computer/Electronics Technology Building, 2307 Hein Avenue houses both the academic and administrative computers. The administrative computer is a Data General Eclipse S-120 with 512 KB of memory, two 73 MB Winchester disk drives, a 1600 BPI tape drive, an operator's console, 15 work stations (24 total capacity), one system printer, and two remote printers. The academic computer is a Harris H800 with 1536 KB IMS memory, 48 MB virtual memory, 6 KB cache memory, one 1600/6250 BPI tape drive, one 675 MB disk drive and one 474 MB disk drive, 13 standard CRTs, 8 color graphics terminals, an operator's console, a Tektronix 4662 plotter and one system printer.

There are currently three academic LANs on campus:

1. The Computer Department has three microcomputer labs connected using Starlan with an AT&T 6386 file server.
2. General Studies has two Starlan labs with an AT&T 3B2/310 file server.
3. Electronics Technology has a Novell Lan with a Z-386 file server.

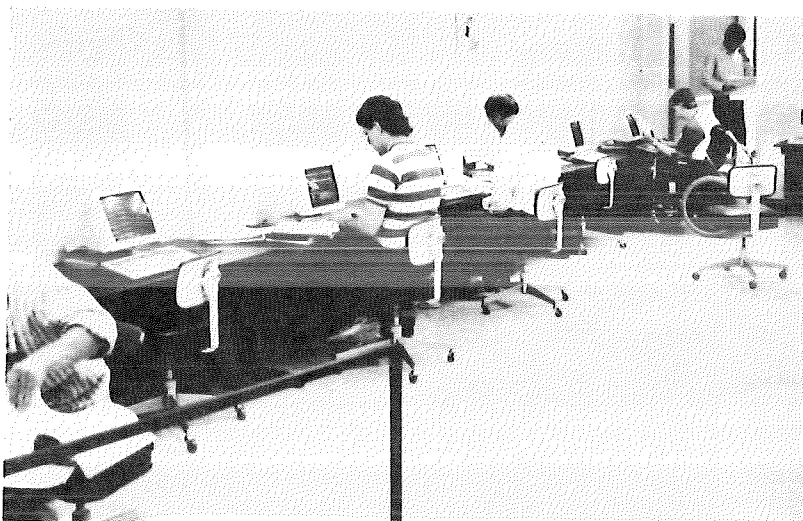
### Highlights of this past year:

Installation of the ISN.

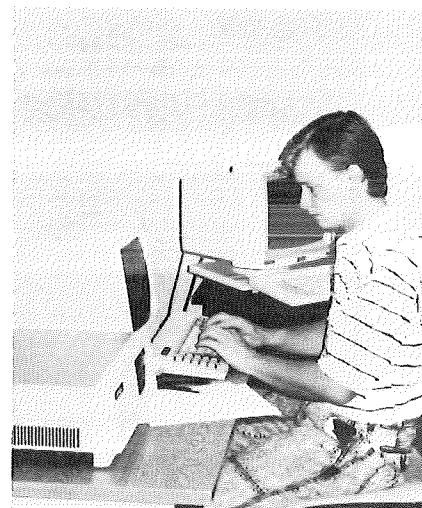
The Resource Center is on line with NOTIS (Library card catalogue search) system at Fort Hays State University.

Implementation of the Starlans.

STARS Accounting on line (interactive)



Harris terminal lab



Student programming

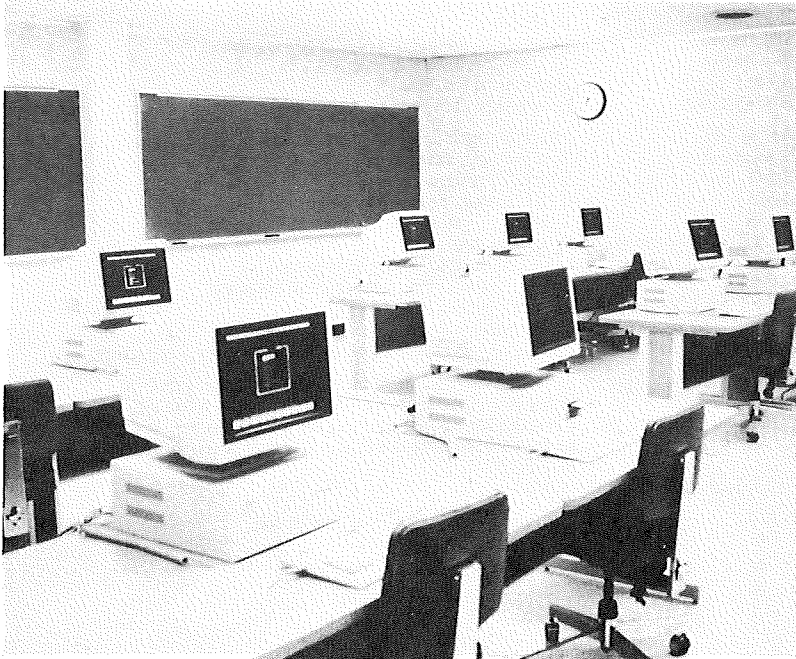
**Coming activities are:**

Aircraft Service Training—Starlan. Plans to interconnect all individual Starlans (General Studies, Computer, Aircraft Service Training, and Civil)

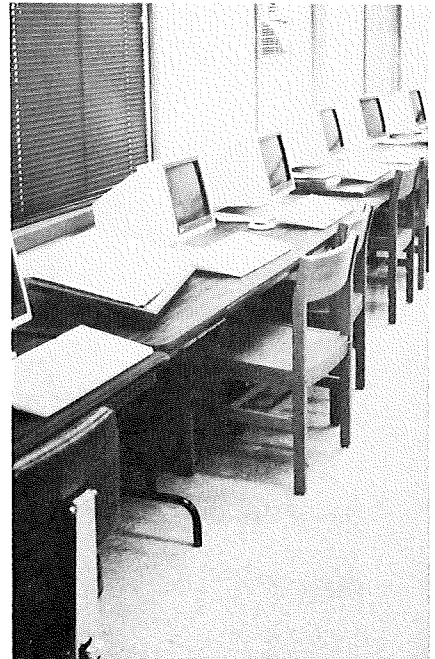
KCT is the leader in Geographic Information Systems. GIS is a computer-based system that stores, integrates, and analyzes information about land aspects: what is on it (and under it), who owns it, what it is worth, and where the natural resources, utilities, and environmentally sensitive areas are located relative to each other and to other land aspects.

Software education for businesses and industry providing students with state-of-the-industry software.

The school as a whole is laying plans for the use of computers in a variety of technologies. Microcomputers are used throughout campus for both academic and administrative activities. The number and type of microcomputers which are available by department/office with their use are as follows:



Zenith 386 SX Starlan lab



Terminal lab in General Studies

**KANSAS COLLEGE OF TECHNOLOGY**  
**Microcomputer usage**

Department	No.	Type	Use
Aeronautical	1	Z-159	Spread sheet, Word processing
	1	Z-386SX/40	Word processing, spread sheet, teacher preparation
	1	Z-386SX/80	Word processing, spread sheet, fixed based operator, weather briefing
Air Services Training	2	Z-386	Word processing, spread sheet
	1	Z-386	Weather retrieval
Civil/Mechanical	5	Apple II+	Fluid problem solving, CAD
	1	MacIntosh	Teacher preparation
	8	Z-158/159	CAD
	3	Z-158/159	Teacher preparation & office
	9	Z-100	CAD
	4	Z-386	CIS/CAD/3D modeling
Computer	1	Z-Turbo Sport	Teacher preparation
	2	Z-286	Teacher preparation
	2	Z-159	Teacher preparation
	17	Z-158/159	Instruction (Starlan)
	4	MacIntosh	Instruction
	3	MacIntosh	Teacher preparation
	12	AT&T 6310	Instruction (Starlan)
	12	Z-386SX/40	Instruction (Starlan)
Electronics	3	Apple IIE	Interface with instrumentation for data acquisition
	1	MacIntosh	Teacher preparation
	1	Z-241	Teacher preparation
	3	Z-386	CAD, circuit design and analysis
	2	Z-159	Teacher preparation
	1	AT&T 6300	Programming
	1	Jade	HAM radio transmission control
	1	HP 9807	Power transmission monitoring research
	8	AT&T 6310	Laboratory instruction
	1	Z-386SX/80	Department administration
	1	Z-386	File server (Novelle Network), laboratory instruction
General Studies	5	Apple II E	Interface with instrumentation for data acquisition
	5	MacIntosh	Teacher preparation and desk top publication
	2	Z-100	Remediation, programming, wordprocessing
	17	AT&T 6310	Remediation, programming, word processing, software applications
	(16/AT&T terminals linked to 3B2/310)		
Physical Plant	1	Z-248	Campus Inventory, Work order log
	1	Z-158	Central Stores Inventory
	1	Z-100	Word processing
Library	3	Z-159	Word processing, database
	1	Z-159	CD-ROM: Readers guide
	1	PS-2	CD-ROM: Encyclopedia
	1	LaPac	CD-ROM: Library catalog
	1	IBM-50Z	Word Processing, Spread sheet
	1	Bibliofile	CD-ROM: Cataloging
	(4 IBM terminals to use for NOTIS administration)		
Academic Affairs	1	Z-386SX/80	Word processing, spread sheet
	1	Z-159	Word processing, spread sheet
Career Development	1	Z-159	Word processing, spread sheet
	1	MacIntosh	Employer lists, teacher preparation
Information Systems	1	Z-159	Terminal emulation, software application
	1	Z-248	Terminal emulation, software applications, ISN administration, word processing, spread sheet
	1	AT&T 6386	Terminal emulation, software application server administration
	1	AT&T 6386	File server for Starlan labs
Registrar	1	Z-386SX/40	Terminal emulation, spread sheet, word processing
	1	Z-159	Spread sheet, word processing
Institutional Research	1	Z-386	Institutional research, spread sheet, terminal emulation
Continuing Ed. Development	15	Z-181 portables	Off campus software instruction
	1	Z-159	Endowment, Alumni records, terminal emulation, spread sheet, word processing
President's Office	1	Z-159	Word processing
Public Affairs	1	MacIntosh	Publications
Student Services	1	MacIntosh	Publications, word processing
	1	Z-100	Spread sheet, word processing, terminal emulation
	1	Z-159	Residence hall
	2	Z-159	Financial aid analysis
Business Office	2	Z-159	Spread sheet, word processing, database, employee and student employee records
	1	Z-248	Spread sheet, word processing, data base, employee records
	1	Z-386	Spread sheet, word processing, database inventory

(All of the above department is on line with the Stars System)

# *Kansas Research and Education Network KARENET*

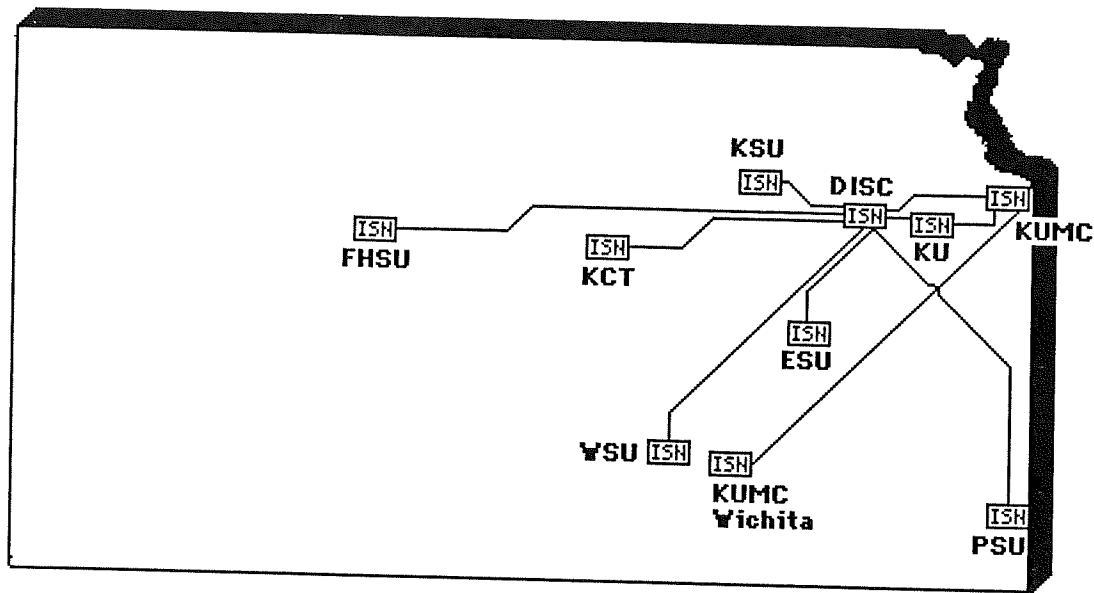


FIGURE 2

PARTIALLY DISTRIBUTED NETWORK FACILITIES OF THE KANSAS BOARD OF REGENTS INSTITUTIONS

Institution	Central Processor(s)	Operating Systems	Tape Drives Quantity Tracks/Density	Disk Capacity	Telecommunications Type of Capability	Telecommunication Terminal Facilities	
						Local	Dial-up or Leased Line Service
						No. Type	Speed (baud-rate)
Board of Regents Office - Topeka Regents Center Shawnee Mission University of Kansas	None				IBM 3270 X.25	None	4800
	None					None	4800
	DEC VAX 8650	VMS	4 9Tr 1600/6250 BPI	5,356 MB	X.25 Packet Net Campus ETHERnet	2-X.25 Trunks ETHERnet	4800/9600
	Amdahl 5890-300E (128MB)	MVS/XA-JES2 -CICS/VS -IMS/DB VM/XA	13 9Tr-1600/6250 BPI	63 GB	IBM 3720 FEP TTY ASCII IBM 3275 IBM 2780 IBM 3278 IBM 3279 IBM 3770 IBM 7171	320 CRTs 7 PRTs 128 X.25 LAN's	1200 2400 4800/9600
University of Kansas Medical Center -Kansas City	IBM 3081-KX3 (32MB)	VM/XA-RSCS -CMS Timesharing	(shared)	20 GB	(shared 3720) IBM 7171 Campus Ethernet	31 CRTs 1 PRTs X.25	9600 4800
	IBM 4381Q14 (24MB)	VM/SP-RSCS -CMS MVS/SP-CICS -IMS/DG -PHOENIX	8 9Tr-1600/6250 BPI	20 GB	Comten 3650 FEP IBM 3278 TEXEX 179 IBM 3279 Harris H178 IBM 3178	182 CRTs 20 PRTs	1200 4800 9600
	IBM 3081K(32MB)	MVS/SP-CICS -S2000	(shared)	22.5 GB	TELEX 179	163 CRTs 59 PRTs	9600
	Burroughs B1985	MCP-CANDE -SMCS -DMS2 -ODESY	1 9Tr-800/1600 BPI	190 MB	IBM 3276 Bur MT983 IBM 3278	18 CRTs 1 PRT	1800 2400 9600
Kansas State University	IBM 3084 Q96	VM/XA OS/MVT-HASP MVS/SP-JES 2 SHADOW IDMS/DC INTERACT CICS CMS Time-Sharing CMS Batch	7 9Tr-1600/6250 BPI	55 GB	IBM 3705-F1 FEP TTY ASCII Cur 1700 HASP Work Station Campus Ethernet Cur 7411 Harris H274 Harris H178 IBM 7171	590 CRTs 27 PRTs	300/1200 2400 4800 9600
	Wichita State University	IBM 3081-D (16MB)	VM/HPO-RSCS -CMS Batch -CMS Time Sharing -CAD/CAM DOS/VSE-POWER/VSE -CICS/VS -DL/1	1 9Tr-800/1600 BPI 7 9Tr-1600/6250 BPI	31.2 GB	IBM 3720 FEP TTY ASCII IBM 3277 IBM 2780 IBM 3278 IBM 3272 IBM 3279 IBM 3274 IBM 3780 IBM 3276 Telex 476L IBM 7171 ISN ASC II	496 CRTs 15 TPRs 120 PRTs 5 RJE
	DEC VAX 8650	VMS	1 9Tr-1600 BPI	2.5 GB		600 Ports	1200 2400

FIGURE 3

2-32

PARTIALLY DISTRIBUTED NETWORK FACILITIES OF THE KANSAS BOARD OF REGENTS INSTITUTIONS

Institution	Central Processor(s)	Operating Systems	Tape Drives Quantity Tracks/Density	Disk Capacity	Telecommunications Type of Capability	Telecommunication Terminal Facilities		
						Local No. Type	Dial-up or Leased Line Service Speed (baud-rate)	
Emporia State University	IBM 4381-P13 (16MB)	DOS/VSE-Power/VSE	1 9Tr-800/1600 BPI	10 GB	Cur 2721 Harris IBM 3274 IBM 3174	IBM 3277 H274 IBM 3174	192 CRTs 10 PRTs	1200/2400
		-CICS/VS -DL/1 VM/SP-CMS Time-Sharing	4 9Tr-1600/6250 BPI					
	IBM 9370/20	VM/IS	1 Tr-1600 BPI	800 MB	Harris		12 CRTs	
Pittsburg State University	PRIME 6350 (32MB)	PRIMOS/INFORMATION	1 9Tr-800/1600 BPI	2,592MB	TTY ASCII/SYNC		184 CRTs 22 PRTs	1200/2400
Fort Hays State University	IBM 4381-R14 (32MB)	VM/HPO-RSCS	3 9Tr-1600/6250 BPI	23.4 GB	Comten 5620 FEP IBM 3276 IBM 3278 IBM 3179 IBM 3274 IBM 3174 IBM 7171 IBM 3164	TTY ASC II Telex 476L Telex 179 AT&T 4410 AT&T 610 AT&T 605 AT&T 630 AT&T 705	341 CRTs 29 PRTs	1200/2400 9600
		-CMS Time-Sharing DOS/VSE-Power/VSE -CISC/VS -DL/1						
30 Kansas College of Technology	Harris H800	VOS	1 9Tr-1600/6250 BPI	1149 MB	TTY ASCII		13 CRTs 8 GRAs 1 PRT	None
		DATA GEN. CS200 MCSCAN	1 9T-1600 BPI	146 MB	TTY ASCII		15 CRTs 3 PRTs	None

+FEP — Front-End communications Processor  
 BPI — Bytes per inch (Tape drive recording density)  
 MB — Megabytes (Disk capacity in millions of characters)  
 GB — Gigabytes (Disk capacity in billions of characters)

N — Number of ports or terminals using networks  
 CRTs = Number of locally attached CRT display terminals  
 GRAs = Number of locally attached graphics CRT terminals  
 PRTs = Number of locally attached terminal line printers

TPRs = Number of locally attached typewriter terminals  
 RJE = Number of locally attached remote job entry terminals  
 MPXs = Number of locally attached multiplexed terminals

Figure 3 contains a brief summary of the computing hardware and terminal communications capability at each institution within the Board of Regents. The first column is the name and location of each institution. The second column, "Central Processor(s)," gives the major vendor name and the central processing unit (CPU) model number. The third column, labeled "Operating Systems," describes the principal system software used at that site. The fourth & fifth columns show the total disk capacity in megabytes (MB) or millions of characters, as well as the number of tape drives and their recording density in bytes per inch (BPI) or characters per inch of tape. For example, an entry of 1400 MB would mean a total disk capacity of 1400 million characters, an entry of 2 9Tr-1600 BPI means a total of two tape drives which read from or write on nine parallel paths or tracks on a tape where 1600 characters (Bytes) are stored per inch on the tape.

The sixth column describes the type of telecommunications capability offered at that installation. This consists of the manufacturer and model designation of the communications front-end computer processor, e.g. IBM 3705-A1, if one is installed, and types of terminals and their model numbers, e.g. Courier 270, supported at that site.

The seventh column, "Local," gives the number and type of locally connected terminals, e.g. 44 CRTs, currently installed. Generally speaking, locally attached terminals are directly connected "by a cable" to a nearby computer, as compared to the use of commercial carrier Dial-up or Leased lines to connect terminals to a computer which may be miles away.

The last column provides information about Dial-Up and Leased Line facilities. The "Speed" column gives the operating speed of terminals in "baud-rate," (number of characters transmitted per second times ten).

FIGURE 3 (cont.)

2-33

PERCENTAGE OF COMPUTING SERVICE USAGE  
BY  
INSTRUCTION, ADMINISTRATIVE, RESEARCH AND PUBLIC SERVICE ACTIVITIES  
(Summer, Fall, Spring 1989-90)

Category of Usage Data	University of Kansas Lawrence	University of Kansas Med. Ctr.	Kansas State University	Wichita State University	Emporia State University	Pittsburg State University	Fort Hays State University	Kansas College of Technology	Total
<b>INSTRUCTION</b>									
Undergraduate Classwork	6.3	5.0	9.1	9.4	13.7	38.1	24.9	32.0	9.9
Graduate Classwork	2.5	11.4	17.4	15.6	1.0	3.4	1.1	-	8.5
Subtotal	8.8%	16.4%	26.5%	25.0%	14.7%	41.5%	26.0%	32.0%	18.4%
<b>ADMINISTRATIVE</b>									
Student Services	19.0	5.2	14.1	18.7	25.1	16.8	28.8	41.5	16.6
General Services	26.9	33.6	31.4	25.3	48.0	14.1	33.4	23.0	29.5
Ancillary Services	3.3	-	1.6	3.1	1.0	12.9	.4	.5	2.5
31 Subtotal	49.2%	38.8%	47.1%	47.1%	74.1%	43.8%	62.6%	65.0%	48.6%
<b>RESEARCH</b>									
Other Research	20.3	9.7	25.4	17.1	-	2.1	2.2	-	16.3
Library Services*	21.1	0.1	.2	7.2	8.8	12.2	8.9	3.0	9.8
Subtotal	41.4%	9.8%	25.6%	24.3%	8.8%	14.3%	11.1%	3.0%	26.2%
<b>PUBLIC SERVICE</b>									
Educational and Non-Profit Institutions	.1	-	.8	2.2	2.4	.3	.3	-	.6
Federal State and Local Government Agencies	.1	-	-	1.4	-	-	-	-	.2
Hospital Services	.3	35.0	-	-	-	-	-	-	6.0
All Others	.1	-	-	-	-	.1	-	-	.0
Subtotal	.6%	35.0%	.8%	3.6%	2.4%	.3%	.2%	-	6.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

NOTE:

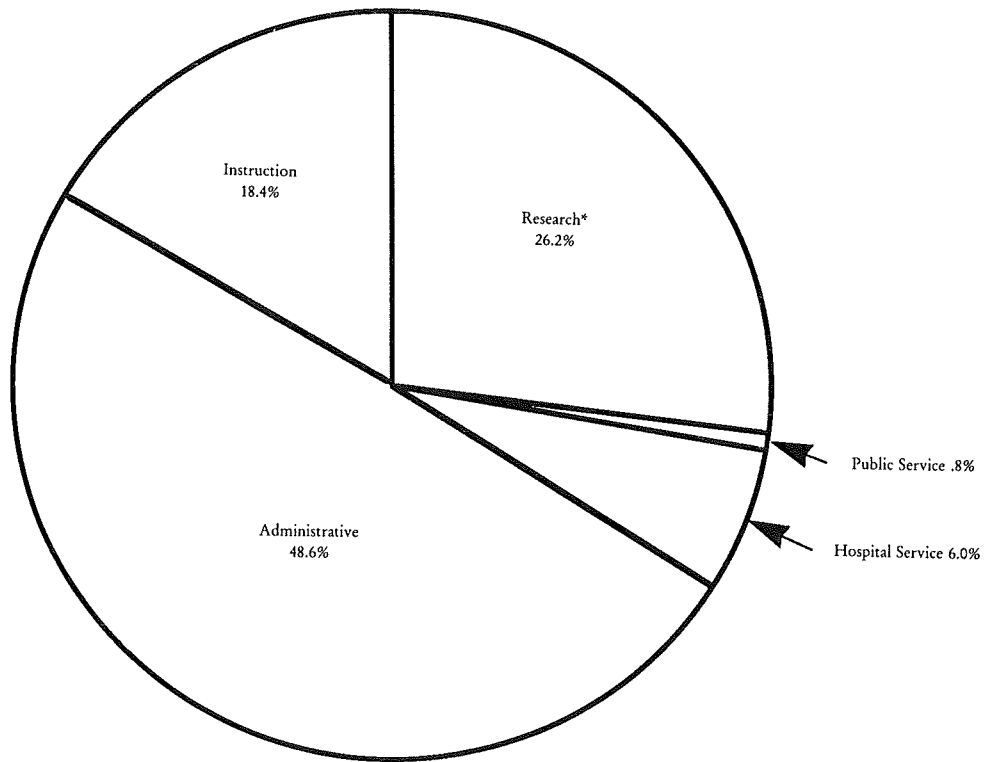
These percentages are derived from the proportion of computing services used within the particular category relative to the total amount of computing services provided by an institution.

\*In FY <sup>1989</sup>1990, Library Services was moved from Administrative Activities to Research Activities.

FIGURE 4

2-34

TOTAL DISTRIBUTION OF USAGE  
(Summer, Fall, Spring 1989-90)



\*In FY 1989, Library Services was moved from Administrative Activities to Research Activities.

FIGURE 5



COMPUTER EXPENDITURE AND BUDGET DATA  
(Service Clearing Activities)  
(Summer, Fall, Spring 1989-90)

	University of Kansas Lawrence	University of Kansas Med. Ctr.	Kansas State University	Wichita State University	Emporia State University	Pittsburg State University	Fort Hays State University	Kansas College of Technology	Total
EXPENDITURES (FY 1990)									
Salaries and Wages	\$4,039,875	\$2,002,739	\$2,323,591	\$1,227,960	\$583,023	\$457,252	\$693,809	\$ 87,282	\$11,415,531
Contractual Services									
Rental of Equipment	177,179	6,800	121,728	47,144	18,073	0	0	0	370,924
Service Contracts	529,260	464,358	381,285	173,074	53,063	61,247	138,787	29,990	1,831,064
All Others	346,155	74,437	359,961	81,478	14,767	38,764	111,623	941	1,028,126
Commodities	349,505	170,294	266,162	176,004	19,223	29,469	58,240	5,071	1,073,968
Capital Outlay	1,230,184	431,526	351,159	722,012	152,389	128,569	103,828	19,205	3,138,872
Total Expenditures	\$6,672,158	\$3,150,154	\$3,803,886	\$2,427,672	\$840,538	\$715,301	\$1,106,287	\$142,489	\$18,858,485
Percentage of Total	35.4%	16.7%	20.2%	12.9%	4.5%	3.8%	5.9%	0.8%	100.0%
BUDGET (FY 1991)									
Salaries and Wages	\$4,435,906	\$2,126,289	\$2,581,989	\$1,379,921	\$625,464	\$467,000	\$707,685	\$ 77,128	\$12,401,382
Contractual Services									
Rental of Equipment	49,860	6,800	213,543	50,000	40,650	0	0	0	360,853
Service Contracts	312,009	65,635	556,140	165,000	49,483	67,000	145,726	38,540	1,399,533
All Others	240,502	97,658	251,692	85,574	16,783	27,000	106,337	988	826,534
Commodities	357,978	191,516	194,400	134,550	22,700	33,000	55,000	5,323	994,467
Capital Outlay	1,270,051	802,488	430,396	596,500	100,244	141,000	90,000	21,764	3,452,443
Total Budget	\$6,666,306	\$3,290,786	\$4,228,160	\$2,411,545	\$855,324	\$735,000	\$1,104,748	\$143,743	\$19,435,212
Percentage of Total	34.3%	16.9%	21.8%	12.4%	4.4%	3.8%	5.7%	0.7%	100.0%

NOTE:

The Expenditure Data is the actual expenditures for the designated fiscal year. Expenditure categories conform to those specified by the *Handbook of Uniform Object Classification*. The Contractual Services category is subdivided as follows: Rental of Equipment, Codes 235, 236, and 237; Service Contracts, Codes 243, 246, 247, 248; all others, all other codes in the 200 series.

The Budget Data is the budgeted expenditures for the designated fiscal year. Budget categories conform to the same subdivisions as given in the Expenditure Data.

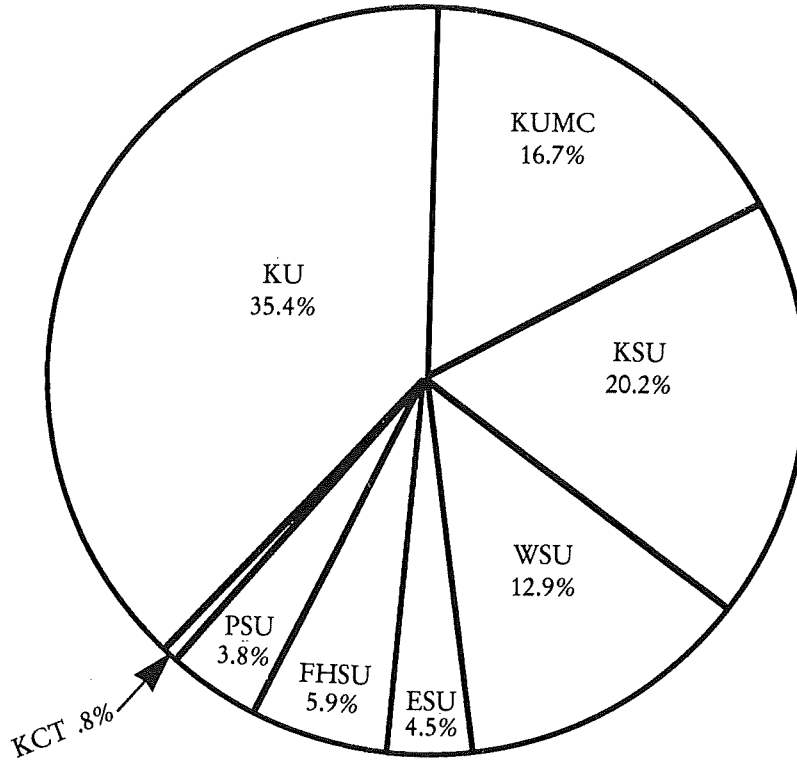
FIGURE 6

2-36

# TOTAL DISTRIBUTION OF EXPENDITURES

(Service Clearing Activities)

(Summer, Fall, Spring 1989-90)



ESU - Emporia State University  
FHSU - Fort Hays State University  
KSU - Kansas State University  
KCT - Kansas College of Technology  
KU - The University of Kansas  
KUMC - The University of Kansas Medical Center  
PSU - Pittsburg State University  
WSU - Wichita State University

FIGURE 7

FIGURE 7

DISTRIBUTION OF USAGE OF CENTRAL FACILITY

FISCAL YEARS 1985-1990

Dollars (Millions)

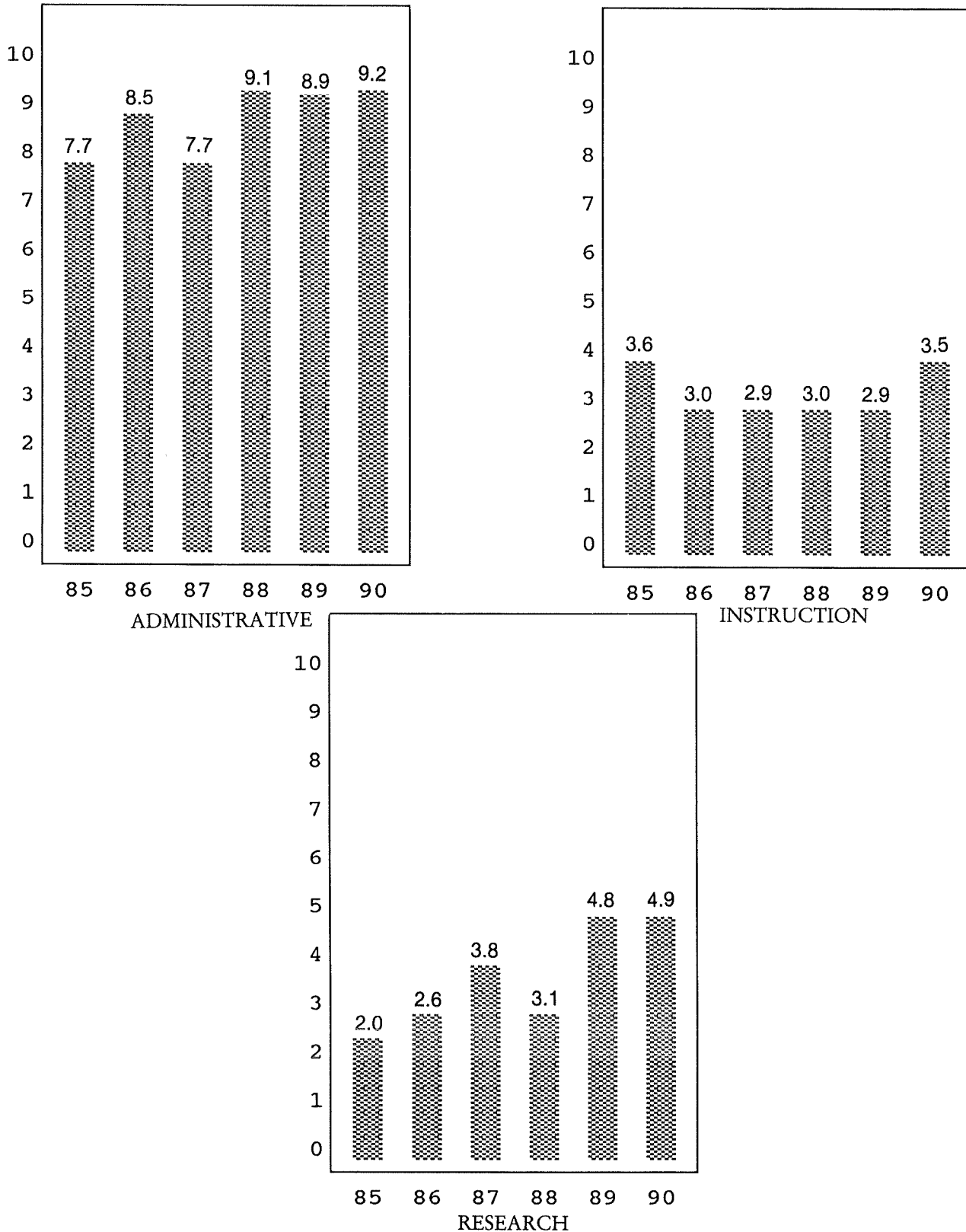


FIGURE 8

<sup>1989</sup>  
 \*In FY 1990, Library Services was moved from Administrative Activities to Research Activities.

2-38

## ADMINISTRATIVE COMPUTING APPLICATIONS\*

Application	KU	KUMC	KSU	WSU	ESU	PSU	FHSU	KCT
<b>STUDENT SERVICES</b>								
1. Student Records Information System	I	-	I	I	I	I	I	I
2. Computerized Class Scheduling	-	-	I	I	I	I	I	I
3. Pre-enrollment System	I	-	I	I	I	I	I	I
4. Student Transcript Master Records	I	-	I	I	I	I	I	I
5. Student Transcript Full Detail Records	I	I	I	I	I	I	I	I
6. Financial Aid Information	P7	I	I	I	I	I	P9	I
7. Course Catalog	I	-	I	I	I	I	I	I
8. On-Line Fee Assessment	-	-	I	I	I	I	I	I
9. Timetable of Course Offerings	I	-	I	I	I	I	I	I
10. Degree Check	-	-	-	I	P6	I	-	I
11. Course Transfer Evaluation	I	-	-	I	I	I	I	-
<b>GENERAL SERVICES</b>								
1. Budget Forecasting	I	I	I	I	I	I	I	I
2. Budget Preparation	I	I	I	I	I	I	I	I
3. Budget Position Control	I	I	I	I	I	I	I	I
4. Affirmative Action Reports	I	I	I	I	I	I	I	I
5. General Fund Ledger	I	P1	P1	I	I	I	I	I
6. General Fund Expenditure Accounting	I	P1	P1	I	I	I	I	I
7. Departmental Expenditure Accounting	I	P1	P1	I	I	I	I	I
8. Student Accounts Receivable	P7	I	I	I	I	I	I	I
9. Payroll/Personnel	I	I	I	I	I	I	P8	-
10. Research Project Accounting	I	I	I	I	-	I	I	-
11. Research Proposal Monitoring	-	-	I	I	-	I	-	-
12. Tuition and Fee Accounting	I	I	I	I	I	I	I	I
13. Residence Hall Accounting	I	-	I	I	I	I	I	I
14. Telephone Accounting	I	I	I	I	I	I	I	I
15. Facilities Inventory (Space)	I	I	I	I	I	I	I	I
16. Residence Hall Assignment	I	-	I	I	I	I	I	-
17. Food Service Menu Planning and Inventory	I	I	I	-	-	-	-	-
18. Purchasing Information System.	I	I	-	I	-	I	-	I
19. Stores Inventory	I	I	I	I	I	I	I	I
20. Traffic Violations Records	I	I	I	I	-	I	-	I
21. Physical Plant Job Scheduling	I	I	I	-	-	I	-	I
22. Equipment Preventive Maintenance	I	I	-	-	-	I	-	-
23. Computer Services Billings System	I	I	I	I	I	I	I	-
24. Perkins (Formerly NDSL)	P11	-	I	I	I	I	I	-
25. Word Processing System	I	-	P3	I	-	I	I	P3
26. Student Career Placement System	I	-	I	I	I	I	I	I
27. Key System	I	I	I	-	I	-	I	-
<b>LIBRARY</b>								
1. Acquisitions	P10	I	P4	P5	P5	I	P5	I
2. Cataloging	I	-	P4	P5	P5	-	P5	P5
3. Circulation Control	I	I	P4	I	I	I	P5	P5
4. Serial Holding	I	I	P4	I	I	I	P5	P5
5. Bibliographical Search Service	-	-	P4	I	-	I	P5	P5
6. Educational Media Services	I	I	-	I	I	I	-	-
7. Reference Room System	-	-	-	I	-	-	-	-
<b>ANCILLARY SERVICES</b>								
1. Bookstore Inventory and Operations	I	-	I	I	-	-	-	I
2. Alumni Records	I	-	I	I	I	I	I	I
3. Foundation and Gift Records	I	-	I	I	I	I	I	I
4. Athletic Event Ticket System	I	-	-	-	-	I	I	-
5. Union Room Usage	I	-	I	-	-	I	-	-
6. Union Return Check Tracking	I	-	-	-	-	-	-	-
7. Law Enforcement Training	I	-	-	-	-	-	-	-
8. Continuing Ed. Event Tracking	I	I	I	I	-	I	-	I
9. University Relations	I	-	I	-	-	I	-	I
10. Cooperative Purchasing	-	-	-	-	I	-	-	-
<b>HOSPITAL SERVICES</b>								
1. Patient Registration/Admission	-	P2	I	-	-	-	-	-
2. Hospital Census	-	P2	-	-	-	-	-	-
3. Medical Records	-	P2	-	-	-	-	-	-
4. Dietary/Food Service	-	P2	-	-	-	-	-	-
5. Laboratory Information System	-	P2	-	-	-	-	-	-
6. Radiology Information System	-	I	-	-	-	-	-	-
7. Pharmacy Information System	-	I	-	-	-	-	-	-
8. Patient Billing/Accounts Receivable	-	P2	I	-	-	-	-	-
9. Hospital Financial Information System	-	P2	I	-	-	-	-	-
10. Diagnostic Related Groups/Case Mix	-	P2	-	-	-	-	-	-

I Developed in-house

P1 Information Associates Financial Records System

P2 SMS

P3 Word Perfect & Word STAR

P4 ALIS American Library Information Systems

P5 NOTIS

P6 PACE Programmed Academic Curriculum Evaluation

P7 Information Associates

P8 ISI

P9 Act Sara

P10 Innovack

P11 SFSC Student Financial Services Corp

FIGURE 9

## FIVE YEAR SUMMARY OF COMPUTER EXPENDITURES

<b>University of Kansas</b>	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
Salaries and Wages	\$ 2,937,862	\$ 3,053,579	\$ 3,177,689	\$ 3,742,750	\$ 4,039,875
Contractual Services					
Rental of Equipment	160,488	9,423	164,185	186,130	177,179
Service Contracts	714,033	708,674	588,212	528,248	529,260
All Others	79,548	347,596	346,309	275,233	346,155
Commodities	300,240	140,323	264,458	308,483	349,505
Capital Outlay	1,393,711	1,154,566	1,252,623	1,742,903	1,230,184
Total Expenditures	\$ 5,585,882	\$ 5,414,161	\$ 5,793,476	\$ 6,783,747	\$ 6,672,158
<b>University of Kansas</b>	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
Medical Center					
Salaries and Wages	\$ 1,561,332	\$ 1,627,065	\$ 1,613,917	\$ 1,844,020	\$ 2,002,739
Contractual Services					
Rental of Equipment	178,312	9,500	3,347	165,436	6,800
Service Contracts	226,450	509,000	427,841	222,575	464,358
All Others	119,782	53,000	32,753	83,747	74,437
Commodities	280,564	102,114	176,128	147,278	170,294
Capital Outlay	370,585	470,000	532,287	537,918	431,536
Total Expenditures	\$ 2,737,025	\$ 2,770,679	\$ 2,786,273	\$ 3,000,974	\$ 3,150,154
<b>Kansas State University</b>	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
Salaries and Wages	\$ 1,724,669	\$ 1,838,998	\$ 1,927,016	\$ 1,982,132	\$ 2,323,591
Contractual Services					
Rental of Equipment	81,071	95,945	125,271	131,254	121,728
Service Contracts	277,655	290,519	275,972	278,070	381,285
All Others	179,413	184,162	213,713	176,481	359,961
Commodities	190,686	178,648	164,737	233,216	266,162
Capital Outlay	528,078	459,777	337,861	429,795	351,159
Total Expenditures	\$ 2,981,572	\$ 3,048,049	\$ 3,044,570	\$ 3,230,948	\$ 3,803,886
<b>Wichita State University</b>	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
Salaries and Wages	\$ 897,303	\$ 937,766	\$ 973,268	\$ 1,113,509	\$ 1,227,960
Contractual Services					
Rental of Equipment	102,064	90,377	86,766	85,144	47,144
Service Contracts	187,272	219,094	194,269	178,375	173,074
All Others	50,106	42,174	70,012	87,220	81,478
Commodities	115,065	112,810	125,657	159,638	176,004
Capital Outlay	568,062	875,906	967,455	662,675	722,012
Total Expenditures	\$ 1,919,872	\$ 2,278,127	\$ 2,417,427	\$ 2,286,561	\$ 2,427,672
<b>Emporia State University</b>	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
Salaries and Wages	\$ 337,498	\$ 360,105	\$ 313,666	\$ 395,273	\$ 583,023
Contractual Services					
Rental of Equipment	48,816	40,046	40,752	68,937	18,073
Service Contracts	68,087	62,675	59,688	50,308	53,063
All Others	14,705	12,726	14,428	13,625	14,767
Commodities	28,259	23,970	28,052	26,493	19,223
Capital Outlay	62,425	61,027	106,068	144,545	152,389
Total Expenditures	\$ 559,790	\$ 560,549	\$ 562,654	\$ 699,181	\$ 840,538
<b>Pittsburg State University</b>	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
Salaries and Wages	\$ 269,033	\$ 281,500	\$ 305,399	\$ 360,500	\$ 457,252
Contractual Services					
Rental of Equipment	0	0	1,500	0	0
Service Contracts	70,150	78,200	66,064	62,000	61,247
All Others	6,137	6,800	8,450	19,250	38,764
Commodities	18,004	27,250	16,190	21,850	29,469
Capital Outlay	168,813	178,200	226,142	224,000	128,569
Total Expenditures	\$ 532,137	\$ 571,950	\$ 623,745	\$ 687,600	\$ 715,301

FIGURE 10

<b>Fort Hays State University</b>					
	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
Salaries and Wages	\$ 397,050	\$ 443,121	\$ 540,548	\$ 627,954	\$ 693,809
Contractual Services					
Rental of Equipment	6,414	51,573	100	0	0
Service Contracts	43,573	61,629	70,899	110,987	138,787
All Others	0	30,245	114,683	157,204	111,623
Commodities	118,401	45,130	40,923	52,214	58,240
Capital Outlay	279,930	195,336	242,692	91,558	103,828
Total Expenditures	\$ 845,368	\$ 827,034	\$ 1,009,845	\$ 1,039,917	\$ 1,106,287
<b>Kansas College of Technology</b>					
	FY 1986	FY 1987	FY 1988	FY 1989	FY 1990
Salaries and Wages	\$ 127,670	\$ 93,639	\$ 92,783	\$ 0	\$ 87,282
Contractual Services					
Rental of Equipment	8	2,849	3,072	0	0
Service Contracts	36,667	66,094	46,561	0	29,990
All Others	7,465	4,089	4,627	0	941
Commodities	7,029	6,820	3,925	3,925	5,071
Capital Outlay	54,029	37,641	22,031	81,007	19,205
Total Expenditures	\$ 232,868	\$ 211,132	\$ 172,999	\$ 89,559	\$ 142,489
<b>GRAND TOTAL</b>	<b>\$15,394,514</b>	<b>\$15,681,681</b>	<b>\$16,410,989</b>	<b>\$17,818,487</b>	<b>\$18,858,485</b>

FIGURE 10 continued

## MICROCOMPUTER, DEPARTMENTAL SYSTEMS, AND WORD PROCESSORS INVENTORY BY CIP DISCIPLINE

Academic Discipline	KU			KUMC			KSU			WSU			ESU			PSU			FHSU			KCT		
	MIC	DS	WP	MIC	DS	WP	MIC	DS	WP	MIC	DS	WP	MIC	DS	WP	MIC	DS	WP	MIC	DS	WP	MIC	DS	WP
100 Agriculture & Natural Resources	-	-	-	-	-	-	450	6	2	-	-	-	-	-	-	-	-	-	17	-	-	-	-	-
200 Architecture & Environmental Design	58	-	-	-	-	-	79	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
300 Area Studies	9	-	-	-	-	-	4	-	-	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-
400 Biological Sciences	158	-	1	122	4	4	231	2	7	22	-	-	10	-	-	8	-	-	33	-	-	-	-	-
500 Business Management	113	-	-	-	-	-	115	-	-	167	-	-	24	-	1	21	-	1	105	-	-	-	-	-
600 Communications	20	1	-	-	-	-	32	-	-	62	-	-	-	-	-	5	-	-	8	-	-	45	-	-
700 Computer & Information Sciences	235	15	-	-	-	-	289	40	-	157	3	-	56	-	-	11	1	-	5	-	-	52	-	-
800 Education	607	2	-	34	-	-	150	-	10	124	1	10	86	-	1	15	-	-	60	-	-	-	-	-
900 Engineering	200	31	-	-	-	-	448	111	1	231	5	1	-	-	-	42	1	-	-	-	-	-	-	-
1000 Fine and Applied Arts	100	-	-	-	-	-	24	1	-	96	-	-	4	-	-	14	-	-	34	1	-	-	-	-
1100 Foreign Languages	23	-	-	-	-	-	7	-	-	-	-	1	2	-	-	3	-	-	5	-	-	-	-	-
1200 Health Professions	38	1	-	520	12	48	97	1	5	120	-	4	-	-	-	4	-	-	37	-	-	-	-	-
1300 Home Economics	-	-	-	-	-	-	98	-	-	-	-	-	4	-	-	2	-	-	2	-	-	-	-	-
1400 Law	39	-	1	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1500 Letters	87	2	-	-	-	-	30	-	-	21	-	-	28	-	-	-	-	-	2	-	-	-	-	-
1600 Library Science	31	-	-	34	-	-	-	-	-	105	-	4	20	-	-	17	-	-	-	-	-	-	-	-
1700 Mathematics	61	-	-	-	-	-	40	9	-	46	-	-	33	1	-	6	-	-	45	2	-	-	-	-
1800 Military Science	5	-	-	-	-	-	2	-	-	2	-	-	-	-	-	1	-	-	1	-	-	-	-	-
1900 Physical Science	471	15	-	23	1	4	167	12	5	100	3	6	34	-	-	30	-	-	39	-	-	-	-	-
2000 Psychology	137	1	-	-	-	-	42	2	-	40	-	-	12	-	-	14	-	-	20	-	-	-	-	-
2100 Public Affairs & Service	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	5	-	-	-	-	-
2200 Social Science	308	1	-	-	-	-	91	-	2	22	-	-	3	-	-	7	-	-	22	-	-	-	-	-
2300 Theology	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2400 Interdisciplinary Science	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9100 Technology	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63	2	-	-	-	-	-	-	-
9900 Other	156	4	-	-	-	-	339	-	-	55	-	6	-	-	-	162	-	-	22	-	-	73	-	-
Administrative	464	4	3	258	-	84	511	9	1	205	-	15	143	-	-	84	-	4	215	1	-	24	-	-
<b>Total</b>	<b>3415</b>	<b>77</b>	<b>5</b>	<b>991</b>	<b>17</b>	<b>140</b>	<b>3246</b>	<b>194</b>	<b>33</b>	<b>1609</b>	<b>12</b>	<b>47</b>	<b>459</b>	<b>1</b>	<b>2</b>	<b>518</b>	<b>4</b>	<b>6</b>	<b>677</b>	<b>4</b>	<b>0</b>	<b>211</b>	<b>0</b>	<b>0</b>

MIC=Microcomputer  
DS=Departmental Systems  
WP=Word Processors  
CIP=Classification of Instructional Program

FIGURE 11

2-42

# COMPUTER CENTER CONFIGURATIONS

UNIVERSITY OF KANSAS  
COMPUTING SERVICES

CONFIGURATION  
JUNE, 1990

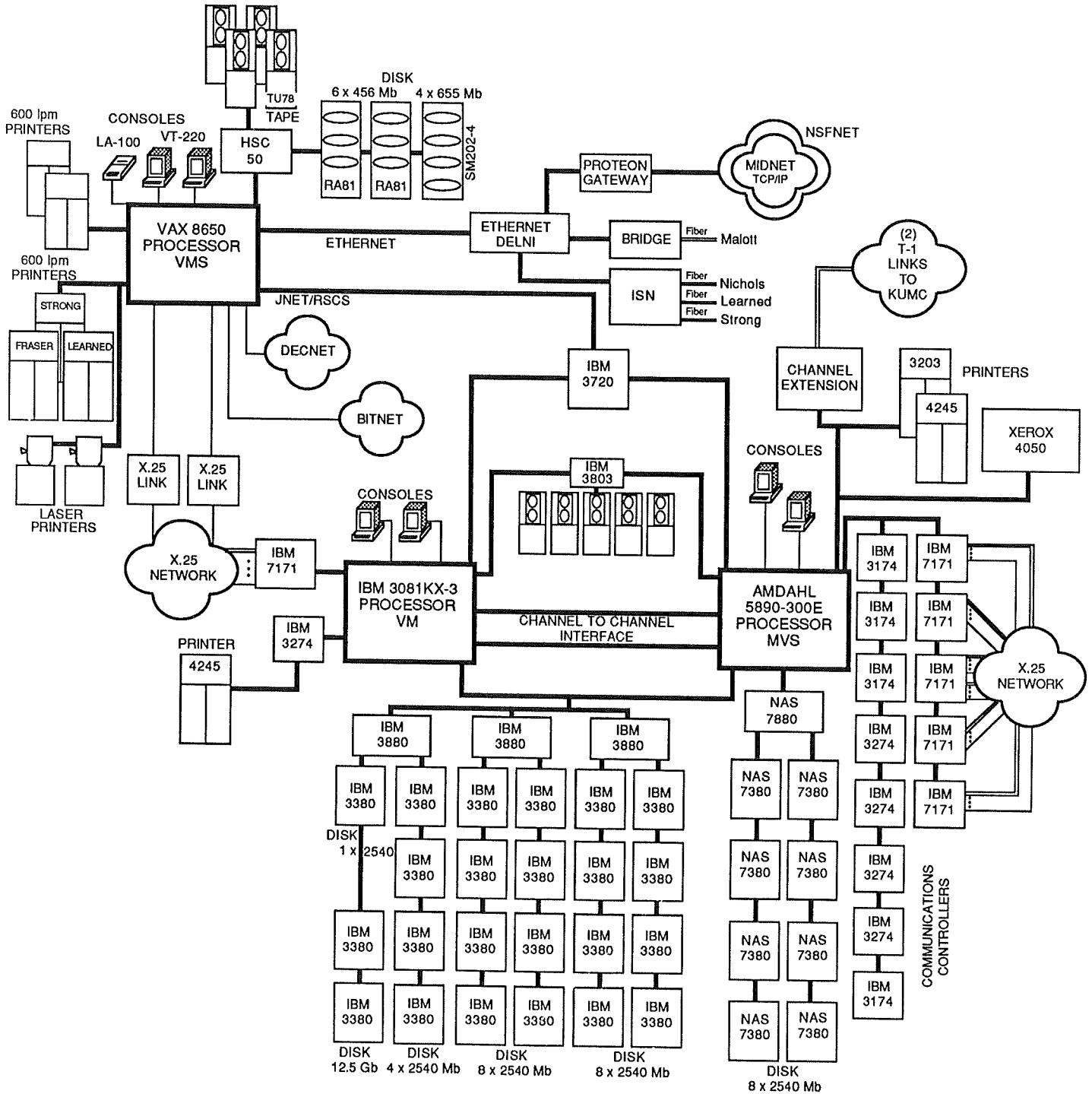


FIGURE 12



# UNIVERSITY OF KANSAS MEDICAL CENTER Machine Configuration

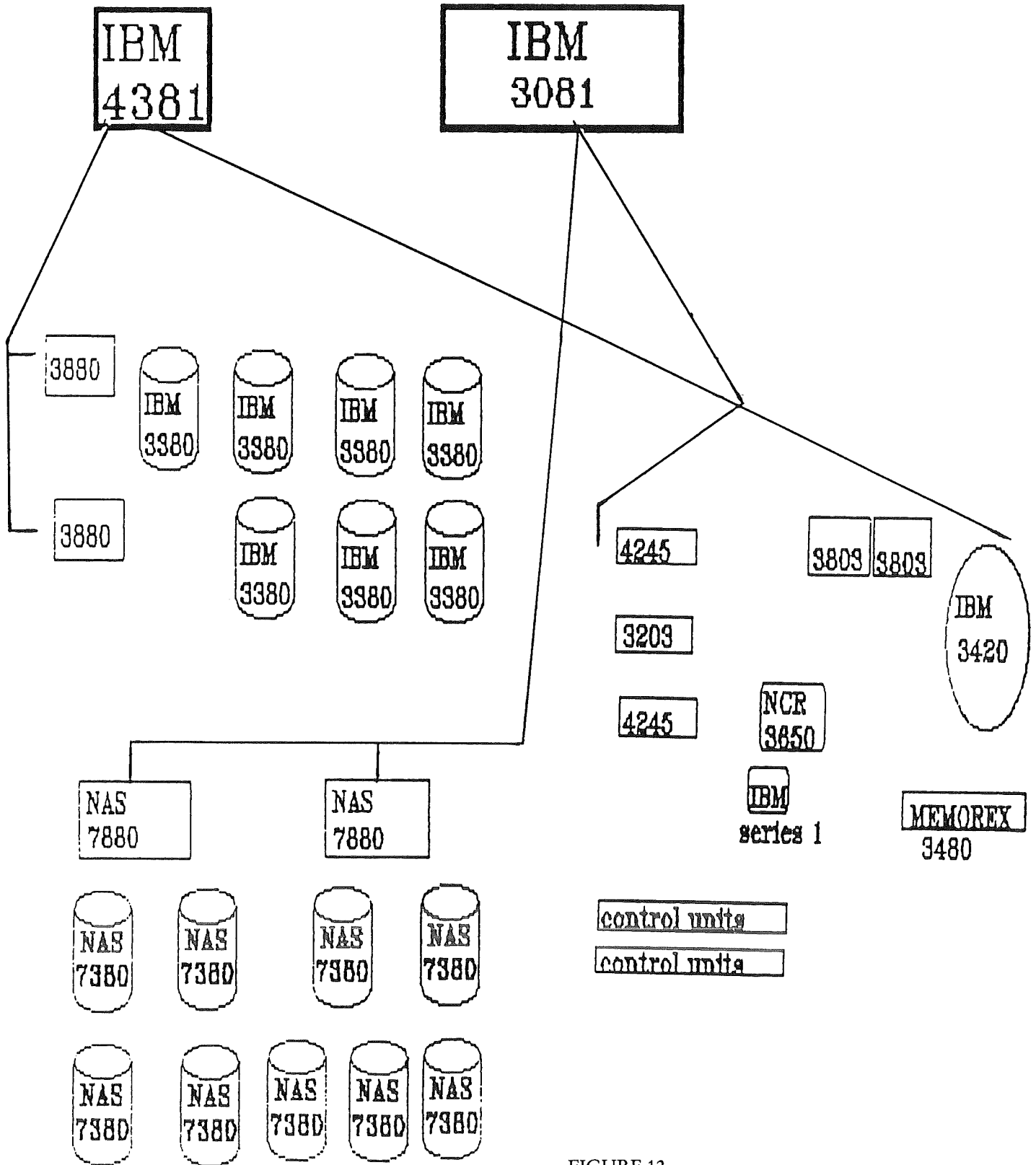


FIGURE 12

# KANSAS STATE UNIVERSITY COMPUTING ACTIVITIES

CONFIGURATION  
JUNE, 1990

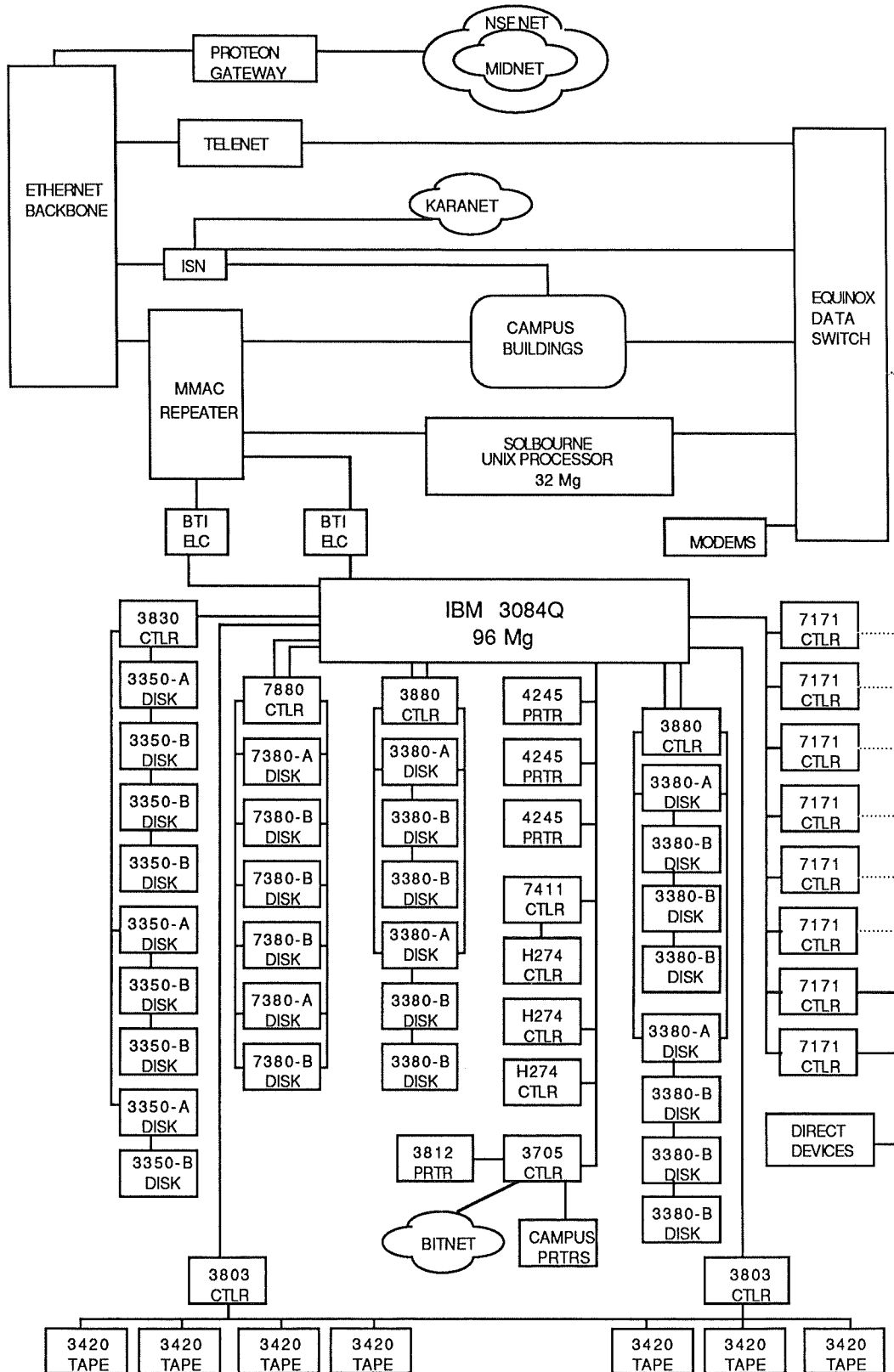


FIGURE 12

*2-45*

WICHITA STATE UNIVERSITY  
CENTRAL COMPUTING CENTER CONFIGURATION

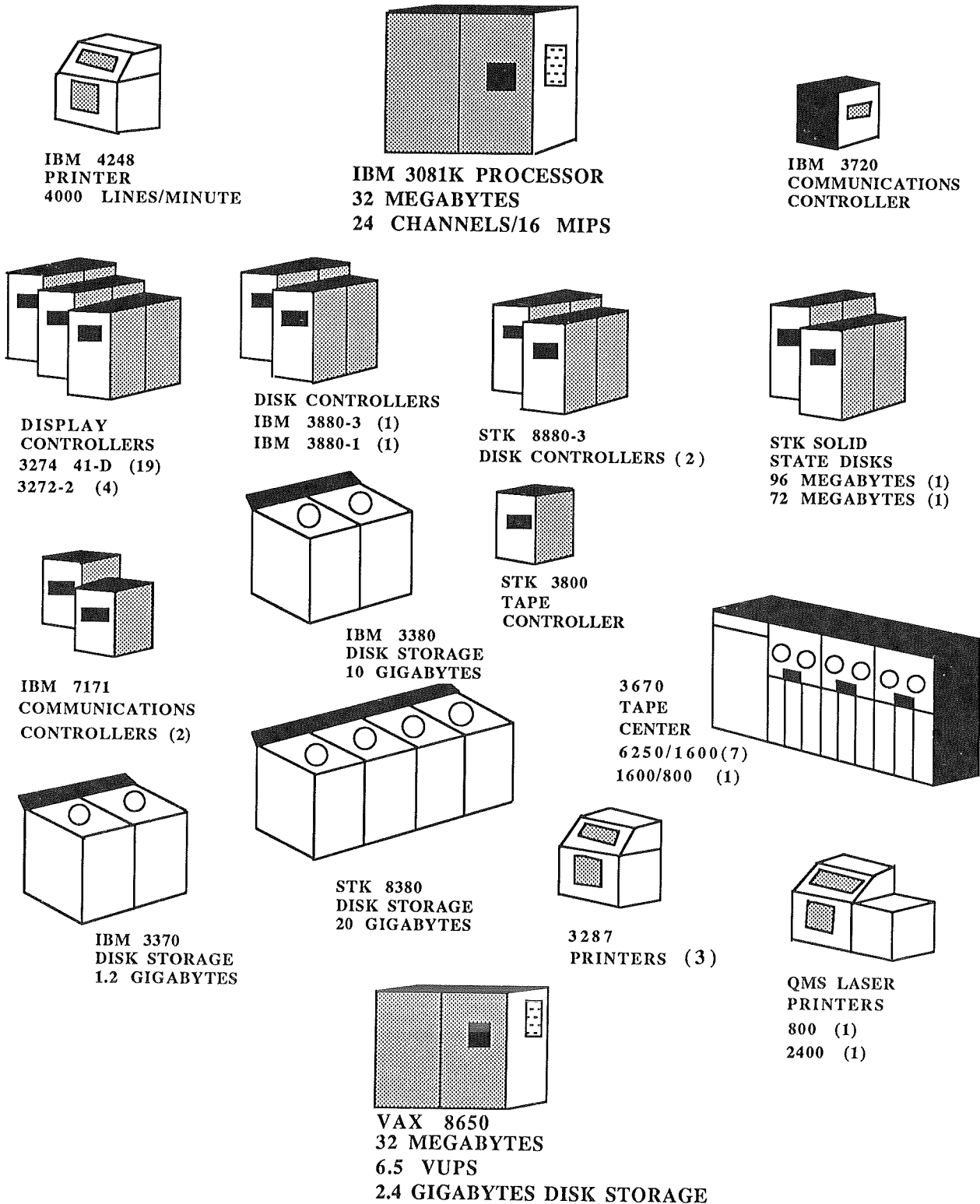


FIGURE 12

2-46

EMPORIA STATE UNIVERSITY COMPUTER CENTER

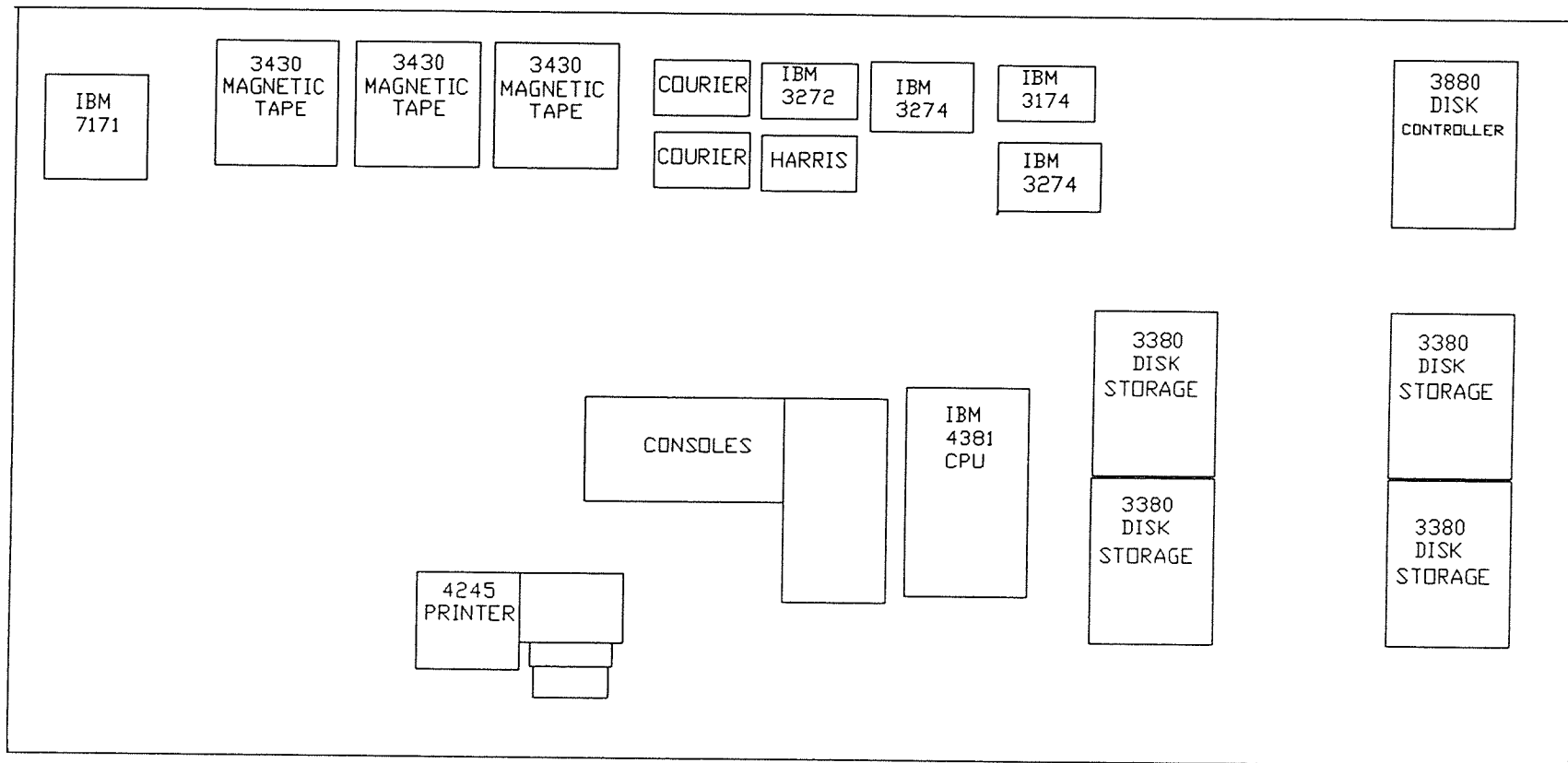


FIGURE 12

2-47

# Pittsburg State University Information Systems Equipment

As of June 30, 1990

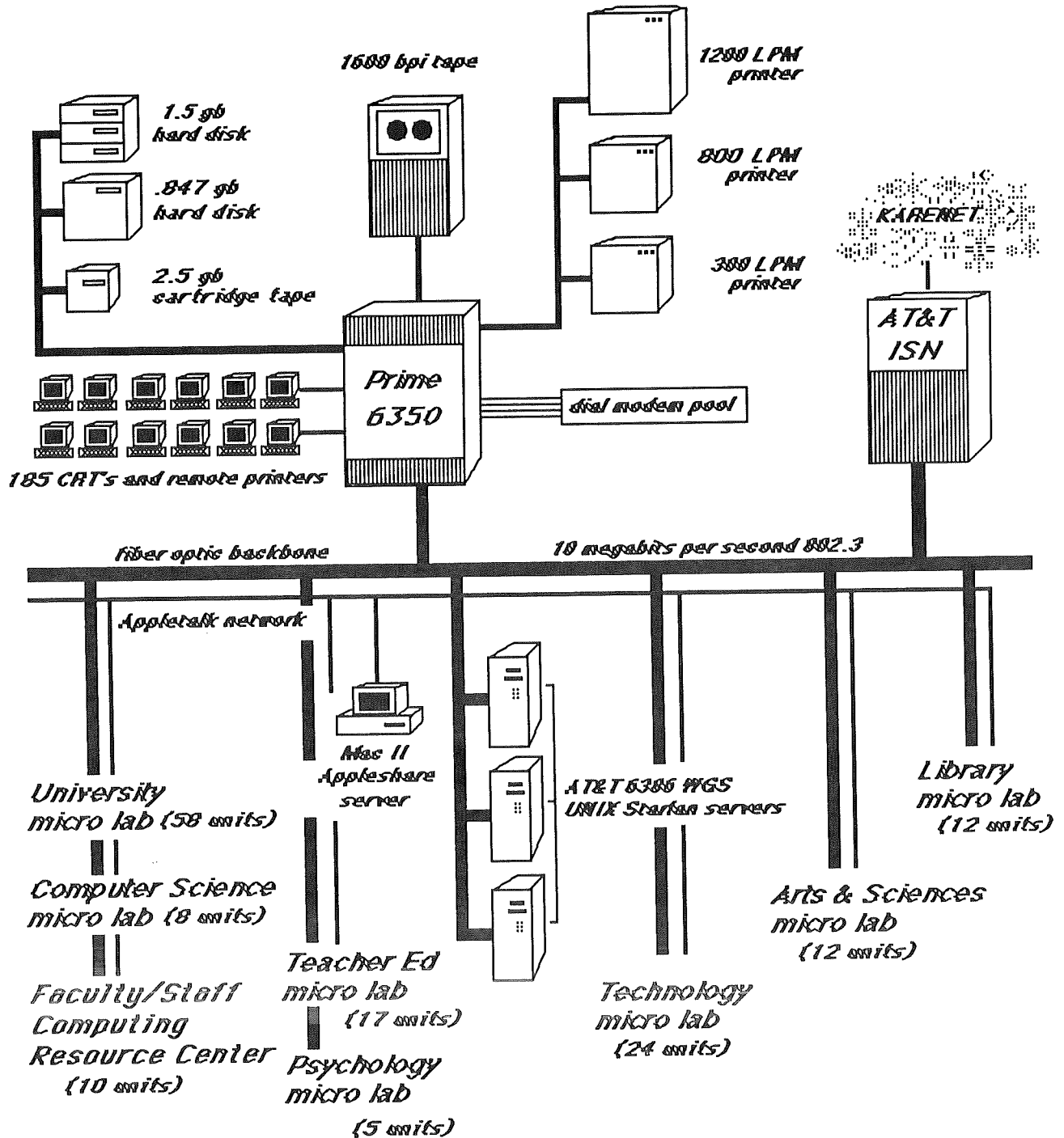
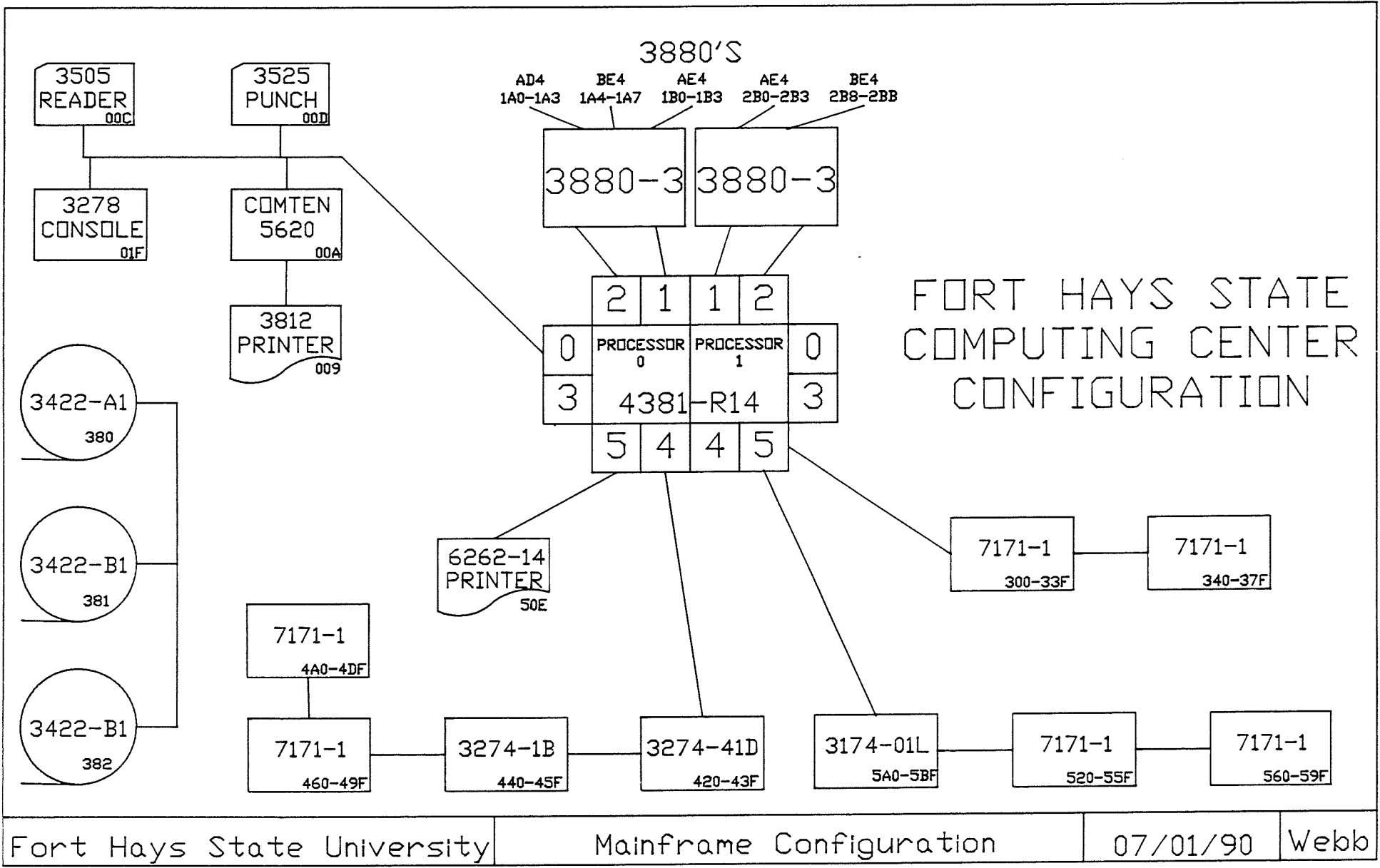


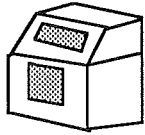
FIGURE 12



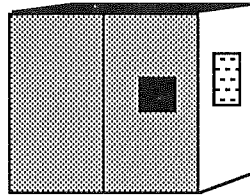
2-49

FIGURE 12

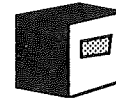
**FORT HAYS STATE UNIVERSITY  
CENTRAL COMPUTING CENTER CONFIGURATION**



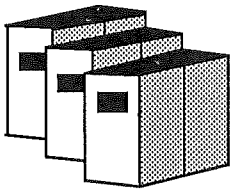
**IBM 3812  
LASER  
PRINTER**



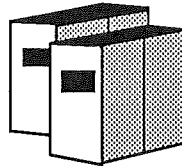
**IBM 4381-R14 PROCESSOR  
32 MEGABYTES**



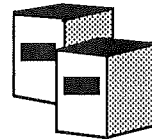
**COMTEN 5620 FEP  
COMMUNICATIONS  
CONTROLLER**



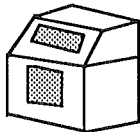
**IBM  
DISPLAY  
CONTROLLERS  
3274 41-D (1)  
3274-1B (1)  
3174-01L (1)**



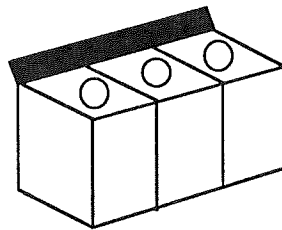
**IBM 3880-3 (2)  
DISK CONTROLLERS**



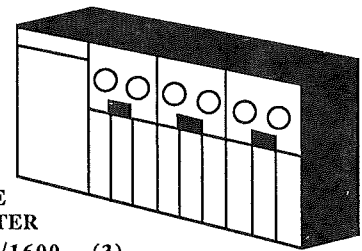
**IBM 7171-1  
COMMUNICATIONS  
CONTROLLERS (6)**



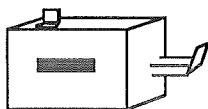
**6262-14  
PRINTER**



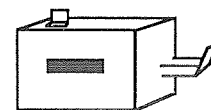
**IBM 3380  
DISK STORAGE  
23.4 GIGABYTES**



**IBM  
3422  
TAPE  
CENTER  
6250/1600 (3)**



**IBM 3505  
CARD READER**



**IBM 3525  
CARD PUNCH**

**FIGURE 12**

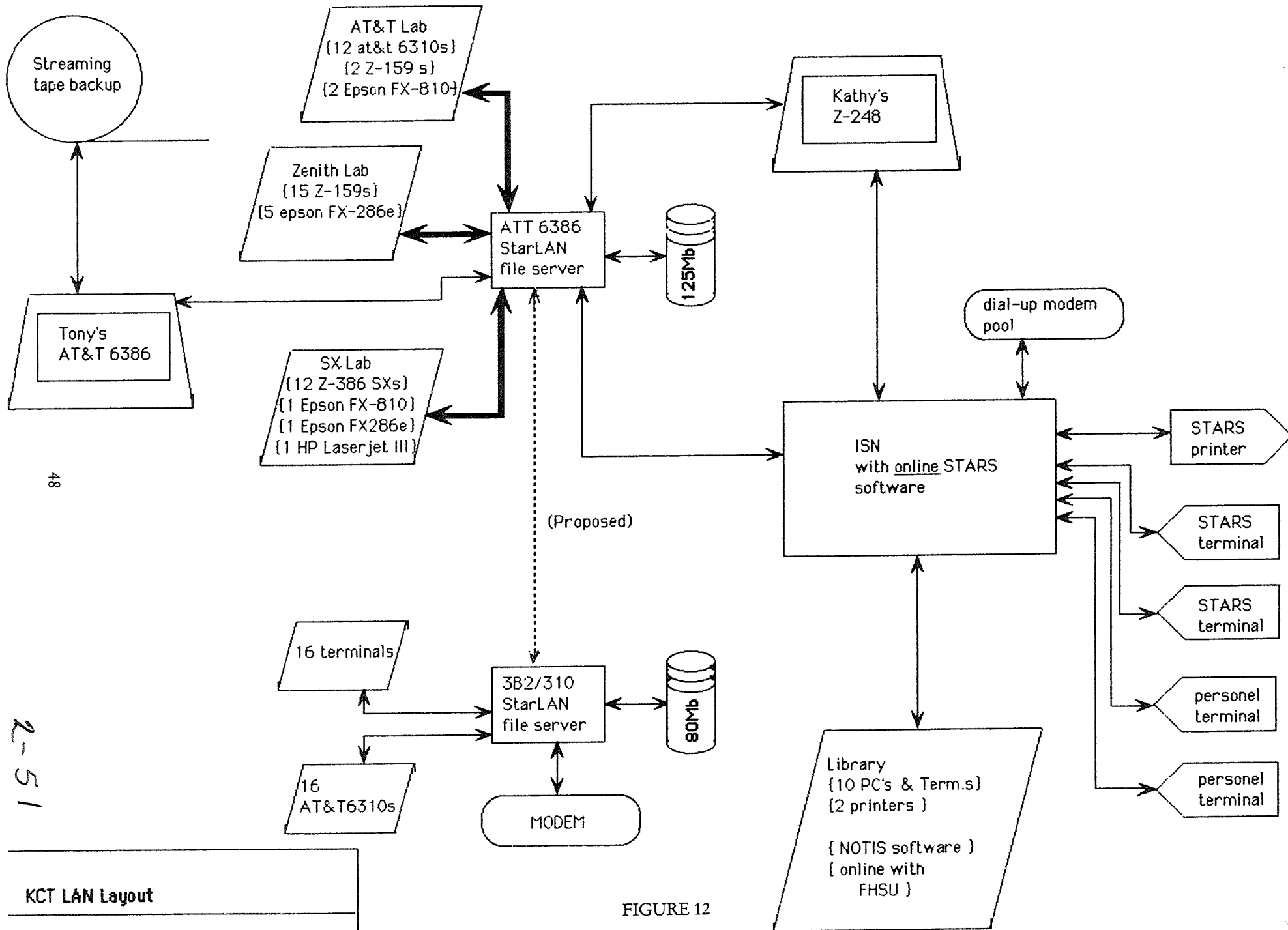


FIGURE 12

KCT LAN Layout

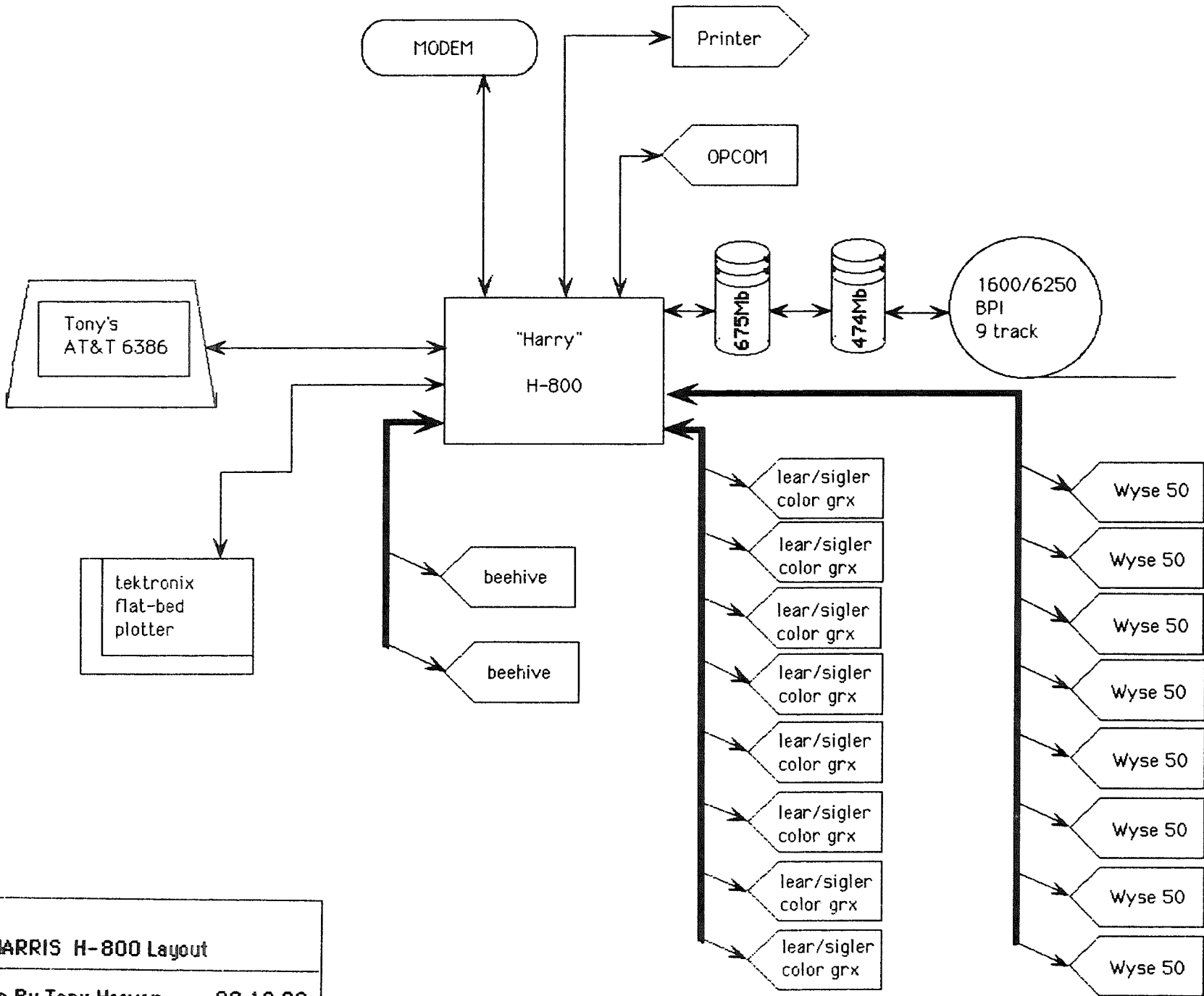
Drawn By Tony Hoover

09.19.90

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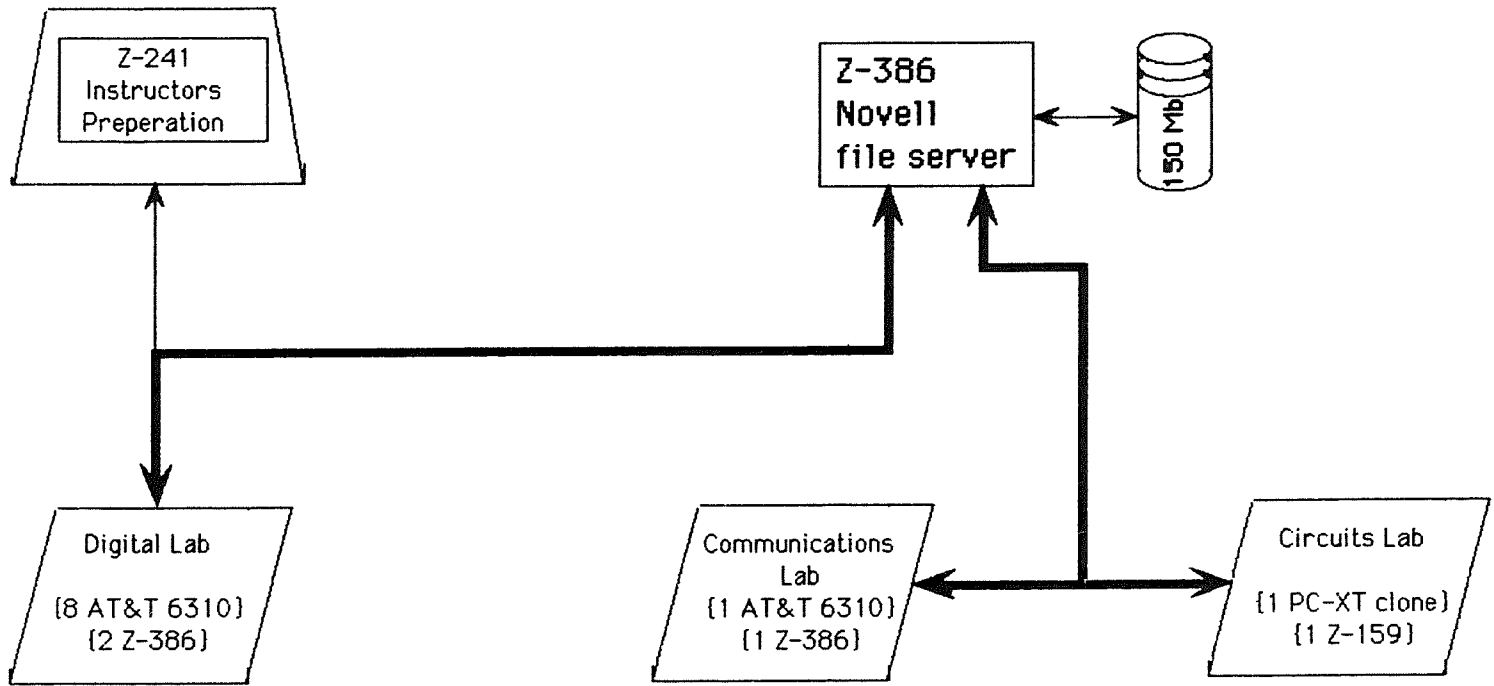


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2-52

KCT HARRIS H-800 Layout	
Drawn By Tony Hoover	09.19.90

FIGURE 12

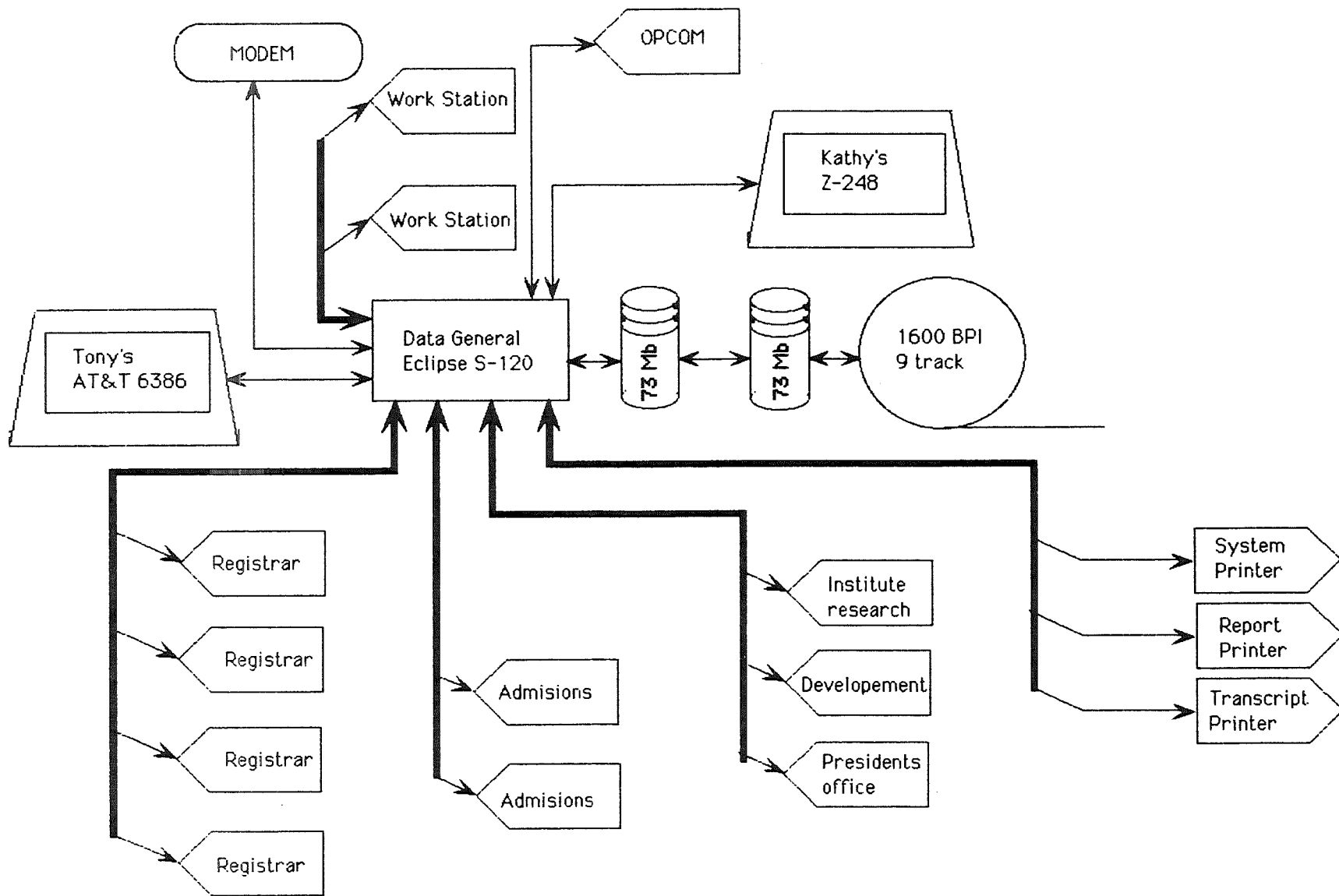


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2-53

KCT Electronics LAN (NOVELL) Layout	
Drawn By Tony Hoover	09.20.90

FIGURE 12



51

2-54

KCT Data General Layout	
Drawn By Tony Hoover	09.19.90

FIGURE 12