COMPUTER LABORATORY

ANNUAL REPORT

1988/89

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Section 1 Introduction.

1988/89 was a particularly eventful and busy year for the Computer Laboratory. Highlights of the year include:

The move to new accommodation in the O'Reilly Institute.

The delivery of a new VAX6230 machine to replace the DECsystem-2060.

The installation of a new Microvax-3500 machine for student administration purposes.

The decision to provide a UNIX based service in place of the ICL VME facility.

The introduction of the recently installed Ethernet internal network into full operational use.

The continued growth of microcomputer usage in College and the consequential requirement for user support.

The implementation of the requirements of the Data Protection Act.

These developments, however, took place under conditions of continuing difficulty.

The main problem continues to be one of staff. Not only has the basic establishment failed to keep pace with the growth in demand but a high turnover of personnel in certain categories is constantly eroding the overall level of skill. This continued at an accelerated pace during 1988/89 due to the upsurge in external economic activity. All categories of user have suffered the effects of this problem which has resulted in long delays in responding to system problems and brought new administrative applications development to almost a standstill. One after the other, activities which are not absolutely essential to the immediate objective of keeping the service going are, of necessity, being dropped. The detailed recording and analysis of mainframe and network usage, the full documentation of programs and procedures, and the training of staff are some of the items which have suffered in this way. One consequence of this is an inability to realise the benefits which would stem from the implementation of new systems on the existing equipment.

The move of the Laboratory's Computer Services Group to the ORI, while providing excellent and badly needed accommodation, has caused considerable operational problems by separating the core of the department from the other two Groups and from the main terminal rooms, which remain in 200/201 Pearse Street and seem likely to do so for several years to come.

Major delays in the delivery of certain items forming part of the Library system prevented full implementation of the on-line library service during the year and created serious difficulties for the Laboratory, the Library, and readers.

Section 2 Use of Services

The principal services offered are again considered under the following categories:

Mainframe related services

Microcomputer related services.

Communications

The net running cost of the Laboratory has been apportioned to the first two of these and to the categories of user of each. Communications is seen as a third major service area and is the subject of a descriptive report but it has not been practicable to isolate it in the quantitative analysis. The basis of the costings is described in more detail in Appendix C.

It must be emphasised that most of this information is now based on estimates rather than on measurement as the diversion of key technical staff from essential service related work to the development of usage recording and analysis systems for the new VAX and ICL machines was not possible without severe delays and disruption of service.

The overall breakdown of Laboratory costs are shown in Tables 1 and 2.

Overall Cost of Services

User	Mainframe £	Micro. £	Total £
Academic	486991	95854	582844
Library	163245	22235	185480
Administration	97459	47457	144916
Total	747694	165546	913240

Table 1

Overall Usage
Percent of Total Laboratory Cost

User	Mainframe	Micro.	Total
Academic	53.3%	10.5%	63.8%
Library	17.9%	2.4%	20.3%
Administration	10.7%	5.2%	15.9%
Total	81.9%	18.1%	

Table 2

2.1 Mainframe Computing

The ICL Series 39 and the new VAX6230 carried the bulk of the academic mainframe workload during the year with the VAX8350 catering for the Library and the ICL processing most of the administrations mainframe work. The DECsystem-2060 remained in operation to the end of Michaelmas term and was finally withdrawn from service when the mainframe equipment was moved to the ORI. This move was a particularly complex operation which required very careful planning to minimise disruption to users. It began on 19th December and the machines were fully operational again before Christmas. The VAX6230 was installed at the beginning of October and went into service immediately. The new MicroVAX for student administration was delivered in February and was used for development for the remainder of the year.

Cost of Mainframe Related Services

User	Machine Usage £	General Support £	Total £
Academic	425694	61296	486991
Library	118727	44518	163245
Administration	55670	41789	97459
Total	600091	147604	747694

Table 3

Mainframe Use per Machine

Machine	User Category Library £	Academic £	Admin £	TOTAL £
VAX6230	0	182735	0	182735
2060	5293	13917	3644	22854
VAX8350	113434	15468	0	128903
VAX	0	21078	0	21078
ICL	0	192495	52026	244521
TOTAL	118727	425694	55670	600091

Table 4

Academic Mainframe Use

Faculty	DEC2060 £	VAX8350 £	VAX6230 £	VAX11/780 £	ICL £	TOTAL £
Arts (Humanities)	107	0	1399	0	373	1878
Arts (Letters)	162	0	2121	0	1	2284
Econ. & Social Studies	653	0	8573	0	2341	11566
Eng. & System Sciences	5581	7734	73284	21078	69929	177606
Health Sciences	408	0	5354	0	648	6410
Science	7007	7734	92005	0	119203	225949
	13917	15468	182735	21078	192495	425693

Table 5

Number of Academic User Registrations

Faculty	VAX6230	VAX8350	ICL
Arts (Humanities)	16	0	12
Arts (Letters)	9	0	2
Bus., Econ. & Social	107	2	666
Eng. & Systems Sciences	690	81	1527
Health Sciences	20	1	26
Science	390	30	263
Total	1232	114	2496

Table 6

2.2 Microcomputer related Services

Microcomputer support continued to account for a substantial amount of the Laboratory's activity and the Arches Microcomputer facility was heavily used. During the year, more users replaced their early Shelton machines, which went into service in the early 1980s, with newer equipment and there are now very few of these early units remaining in operation.

User	Microcomputer Related Services		
	Machine Usage £	General Support £	Total £
Academic	48972	46882	95854
Library	3826	18409	22235
Administration	4317	43140	47457
Total	57115	108431	165546

Table 7

The sale of microcomputer equipment within College is mentioned in more detail in Section 3.1.

2.3 Communications

2.3.1 Internal Communications

The new Ethernet internal network, installed during the summer of 1988, was commissioned during Michaelmas term. Its initial use was the connection of the various Library locations to the mainframes and was also a key element in the move of the mainframe systems from Pearse Street to the O'Reilly Institute in December. It has relieved the pressure on the aging Gandalf

PACX which is being phased out of service and will be expanded to replace the existing radial network, currently converging on the Pearse Street site, when the latter is vacated in some years time.

2.3.2 External Networking

HEANET was again heavily used during the year. The traffic charges incurred by College decreased somewhat, due to increased use of a leased line connection to UCD rather than the more expensive EIRPAC link. These charges were again met, eventually, from HEANET central funds and amounted to £6299.

In recent years, the HEA's grant for networking has not kept pace with costs and the network is now drawing on a surplus accumulated in earlier years. When this is exhausted, probably in 1990, it is likely that the real cost must be covered by the users. These could amount to around £20,000 p.a. in Trinity's case.

Section 3. Other Activities

3.1 Sale of Equipment and Supplies

The Computer Laboratory shop had another very successful year and recorded gross sales of £586,000. It was necessary to appoint a second staff member to the unit to cope with the large volume of business. The shop, which aims to operate on a self-funding basis, acts as a central purchasing unit to channel the benefits of academic discounts and bulk purchasing to members of College. Microcomputers and related accessories and supplies constitute the bulk of the goods sold and the volume of business is an indication of the growth of personal and departmental computing in College.

3.2 Sale of Services

The sale of mainframe computer time continued to decline and would have recorded a major drop were it not for one short-term "windfall" sale in the last quarter of the year.

Section 4 Future Developments

The development element of the Laboratory's non-pay budget is fully committed to funding the acquisition of the two VAX systems and the backbone network for several years to come. The VAX systems will be obsolete well before repayment has been completed and, while they will be capable of providing service for several years, they will not be able to satisfy the legitimate needs of users after another year or so. Indeed, the Library application has already outgrown the disc storage capacity of its machine and the academic unit is beginning to show the first signs of overloading.

Some developments, however, do not require additional expenditure and one of these was initiated during the summer vacation when negotiations with ICL for the upgrading of the existing system to a configuration more suited to the needs of College were satisfactorily concluded. Under this arrangement, which is possible within the existing recurrent maintenance and software fees, a service using the widely used UNIX operating system will be provided in place of that based on the proprietary ICL VME product. The replacement equipment consisting of two ICL DRS500/75 machines was delivered in August and software implementation was commenced immediately to enable the service begin at the start of Michaelmas lecture term, 1989/90. It is believed that the availability of a central UNIX facility will be of great value to many academic users and will provide a high degree of compatibility with many departmental and outside systems. The assistance of the Computer Science Department which organised a UNIX training course for Laboratory staff was greatly appreciated.

One area in which the service offered by the Laboratory is seriously deficient, even by local standards, is provision of

microcomputer facilities for teaching and hands-on experience by students. Emerging graduates, especially in the professional areas, are expected to be familiar with the mainstream personal computer tools but adequate facilities to achieve this are not available in Trinity. Proposals to redress this deficiency are in course of preparation and must merit serious consideration.

In the area of administrative computing, where there is a growing need to replacing outdated software and develop new applications, the Laboratory's staffing problems are causing considerable difficulty because of the labour-intensive nature of the work. Lack of continuity means that so much time is needed to maintain existing complex applications that there is little capacity to respond to increasing user pressure for new development.

APPENDIX A

EQUIPMENT

The specifications of the equipment in service on September 30th, 1989 are as follows:

Digital VAX8350:

1 x VAX8350 CPU with 32 Mb of memory, an Ethernet port, an X-25 port, and an ULTIMATE co-processor running the PICK system.
1 x SA482 2.5 Gbyte disc storage unit
1 x RA60 203 Mb disc storage drive
1 x TA81 Magnetic Tape Drive
1 x LA100 Console printer

ICL Series 39 Level 80

1 x Series 39 Level 80 Node with 32Mb of memory and a Scientific unit and three Macrolan switches.
1 x FDS2500 2.5 Gb Disc Storage Unit.
1 x FDS640 640 Mb Disc storage Unit
1 x GCS 6250 bpi Magnetic Tape Unit
1 x ICL 1440 Line Printer
1 x DRS20 Operator Console

Digital VAX 6230:

1 x VAX6230 CPU with 32 Mb of memory, an Ethernet port.
1 x SA482 2.5 Gbyte disc storage unit
1 x RA82 600 Mb disc storage drive
1 x TA81 Magnetic Tape Drive
1 x LA100 Console printer
1 x Calcomp Model 81 Plotter
1 x Kaiser Optical Mark Reader

Digital VAX 11/780:

1 x VAX 11/780 system in the Department of Computer Science comprising the following:

- Central Processor with 8 Mbyte of memory
- 80 asynchronous lines
- 1 x LA120 Console

- 2 x RA81 456 Mbyte disc drives
- 1 x RM80 120 Mbyte disc drive
- 1 x RM03 67 Mbyte disc drive
- 1 x TS11 Magnetic tape drive

Communications

It is estimated that over 250 terminals or microcomputers, most of which belong to user departments, have access to the equipment. Many of these compete for the limited number of entry ports on the appropriate computer via a Gandalf PACX IV switching unit or the Ericsson MD110 exchange. Others, including the public terminals which may be booked in advance and are located in the Terminal Rooms of the Laboratory, are connected directly to the Ethernet via servers. The Laboratory is a node of HEANET which links the major HEA funded institutions and is connected to EIRPAC, Telecom Eireann's packet switched public network.

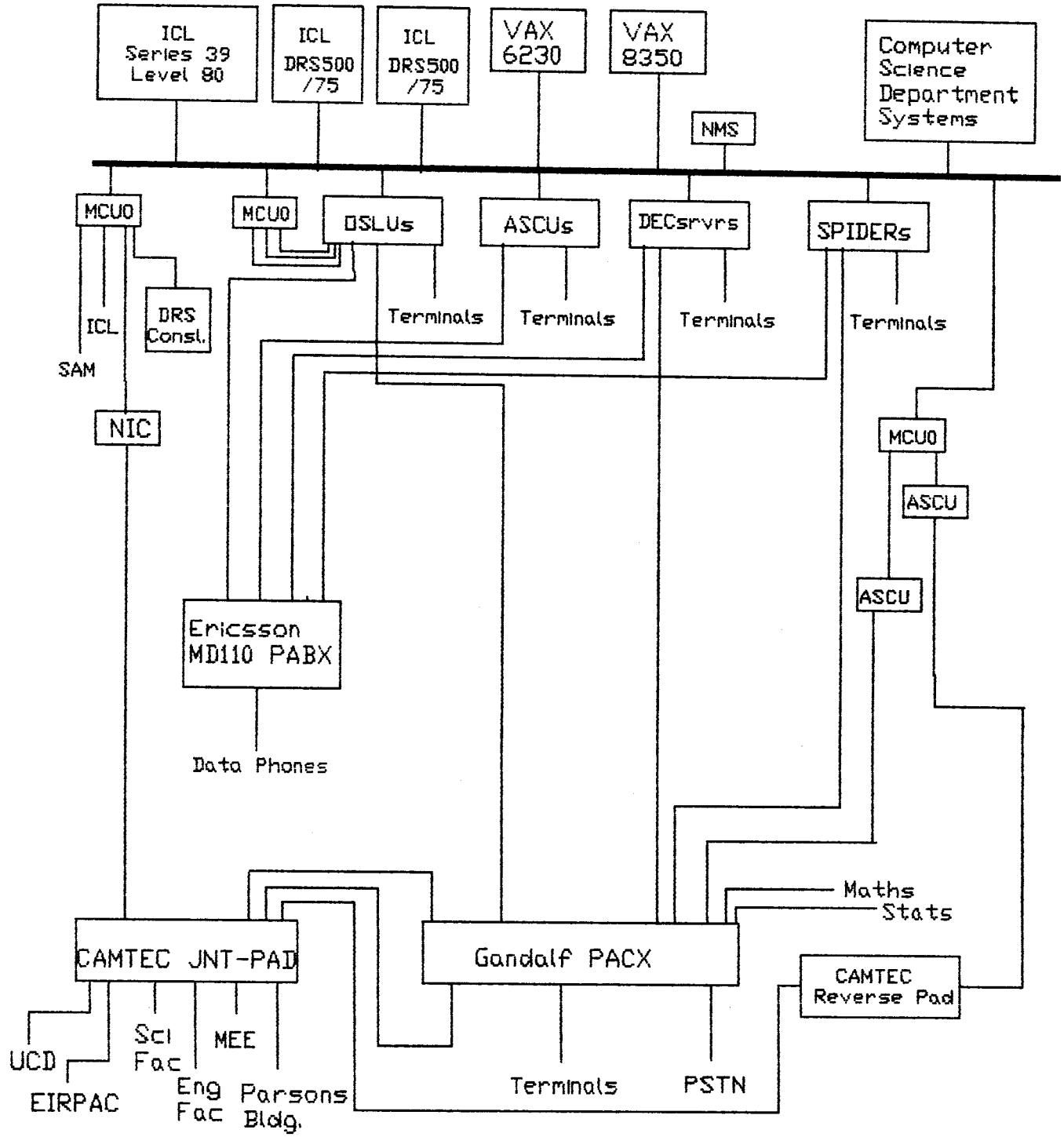
Microcomputers

A selection of microcomputers are available to users in the Laboratory at 200/201 Pearse Street. These include the following:

- 1 x BBC Microcomputer
- 2 x Apple Macintoshes
- 1 x Apple II
- 1 x Apple IIC
- 1 x IBM PC
- 1 x Amstrad PCW8256
- 2 x Apple Laserwriters
- 1 x QMS Laser printer
- 1 x Prompt PC with Braille printer and VOTRAX voice output unit.

A microcomputer laboratory, located under the railway arches near the parade ground has the following equipment:

- 16 x ERGO PCs
- 16 x Apple Macintoshes



COMPUTER LABORATORY

Central Equipment

Figure A.1

30-9-89

APPENDIX B

STAFF

The Laboratory staff is organised as shown in Figure B.1. The functions of the main groups are as follows:

ACADEMIC USER SERVICES GROUP

This Group, comprised of programming staff, provides assistance to computer users by means of:

- an advisory service
- courses for users
- publications such as the Users' Guide and Computer Laboratory Newsletter.

COMPUTER SERVICES GROUP

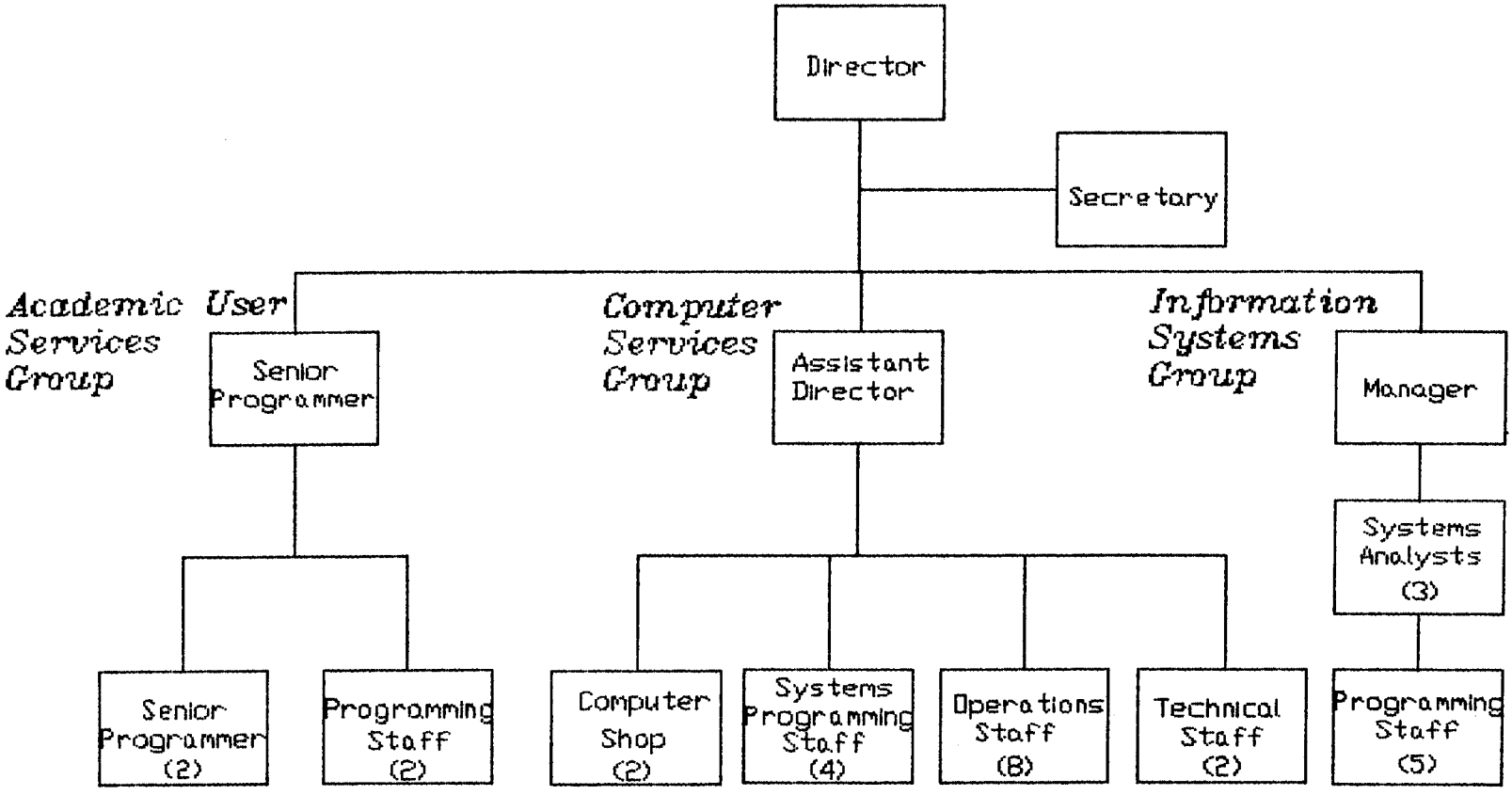
This Group is responsible for the running of the central computer equipment. It is staffed by operations personnel who look after the running of the machines and perform the associated ancillary functions, systems programmers who generate and maintain the central systems and network software, technicians, and janitors who are responsible for security. This Group is also responsible for the provision of specialised technical advice and support on both mainframe, microcomputer, and communications matters to the other two user oriented Groups in the Laboratory.

The sales unit which retails microcomputer equipment and supplies within College is also part of this Group.

INFORMATION SYSTEMS GROUP

This Group is responsible for the regular operation of existing administrative and Library mainframe computer applications and for the development of new ones.

Development of new projects is performed by Systems Analysts and Programmers who design the applications and perform an ongoing supervisory role in the running of the more complex systems.



COMPUTER LABORATORY ORGANISATION

(Including temporary appointments)

Figure B.1

30-9-1989

APPENDIX C

COSTS

The services provided by the Laboratory may be divided into those related to the central mainframe systems and those relating to microcomputers. Furthermore, for each category the Laboratory provides access to machine capacity and assorted support services of an advisory nature.

The total cost of running the Laboratory is shown in Table C.1 under the main expenditure headings used in the College accounts. The cost of providing each services mentioned above was estimated by analysing all the categories of expenditure shown in Table C.1 to estimate the fraction of each used to provide each service. For example, in the case of salaries the cost of Systems Analysts is charged partly to Mainframe Support and partly to Micro Support but not to machine service in either equipment category whereas operations staff are charged mainly to the cost of providing Mainframe and Micro machine service. The cost of others such as the Director is distributed over all categories in proportion to the estimated effort spent on each by the individuals concerned.

In the case of Mainframe Machine Service, the expenditure was further apportioned between the ICL system, the DECsystem-2060, and the VAXs.

COMPUTER LABORATORY

ACCOUNTS

Year Ended 30 September 1989

	Actual	Budget
	£	£
Income:		
Sale of Services	33222	5000
Net Sale of Goods	12523	5514
Miscellaneous Income	6550	4000
Underspending B/Forward	486	486
Total Income	45745	15000
Expenditure:		
Cost of Staff:		
- Salaries	504215	513400
- Wages	12449	12500
Total Pay Cost	516664	525900
Non-pay Cost:		
Rentals of Equipment	55902	40000
Purchase of Ancillary Equipment	251740	201715
Maintenance	83142	101000
Consumable Supplies	23510	34000
Cost of External Services	1315	2000
Insurance Charges	14341	8000
Telephone Charges	3351	5625
Miscellaneous Expenses	6893	10000
Total Non-Pay Cost	440194	402340
Total expenditure:	956858	928240
Net annual cost:	911113	913240
Underspending C/Forward	2127	0
Total Annual Cost:	913240	913240

Table C.1