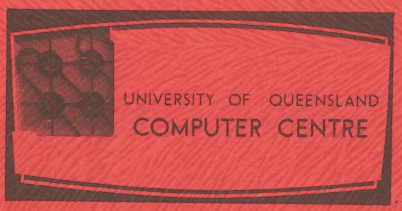
UNIVERSITY OF QUEENSLAND

COMPUTER CENTRE



EIGHTH ANNUAL REPORT

1st January to 31st December 1969

UNIVERSITY OF QUEENSLAND

COMPUTER CENTRE

SEVENTH ANNUAL REPORT

1st January to 31st December, 1968

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FOREWORD

This seventh annual report records two most significant events in the development of the academic and service bureau aspects of the Computer Centre. These are the appointment of a Professor of Computer Science and the installation of a large dual-processor multiprogrammed computer, with remote terminals. Both events are a consequence of the rapid rise in demand for teaching and research in the field of Computer Science and for more extensive computing services.

As Chairman of the Executive Committee, I wish to record my personal thanks to staff of the Computer Centre, and in particular Mr. R.E. Kelly, for their contribution to the present stage of academic development and also for their part in establishing excellent relationships with users of all categories.

S.A. Prentice
Chairman
Computer Centre Executive Committee

April, 1969.

COMPUTER CENTRE EXECUTIVE COMMITTEE 1968

Professor S.A. Prentice, B.Sc., M.E.E., FIE(Aust.), FIEE	Professor of Electrical Engineering (Chairman)
Professor D.W. McElwain, M.A., Ph.D., F.BPsS	Professor of Psychology (Deputy Chairman)
Professor D. Mugglestone, B.Sc., Ph.D., FRAS, FIP, FAIP	Professor of Physics
Professor J.C. Mahoney, ED., B.Litt., M.A., B.A.	Professor of French (President, Professorial Board)
Professor C.S. Davis, D.F.C., M.Sc., Ph.D.	Professor of Mathematics
Professor R.G.H. Prince, B.E., B.Sc., Ph.D., AMIChemE	Professor of Chemical Engineering
Professor R.C. Gates, B.Com. (Tas)., M.A. (Oxon)	Professor of Economics
Professor S. Lipton, M.Sc.	Professor of Mathematics
Dr. S.A. Rayner, M.Ed., Ed.D., M.A.	Deputy Registrar
Mr. R.E. Kelly, B.E.	Senior Lecturer in Computing (Officer-in-Charge)
Mr. E.J. Sokoll, B.E.	Lecturer in Computer Electronics
Mr. E.D. Murray, M.C., B.E., FIE(Aust.), FIEE	Chairman, Computer Centre Advisory Committee, University College of Townsville
Mr. I.M. Hunter, B.Sc., MIE(Aust.), AMIMechE, MIEE.	Lecturer in Computing, University College of Townsville

STAFF OF THE COMPUTER CENTRE 1968

(at 31.12.68)

Officer-in-Charge and Senior Lecturer in Computing	*R.E. Kelly*, B.E.
Lecturers	*E.J. Sokoll*, B.E.
	I. Oliver, B.Sc., B.Econ., Dip.A.C.
	C.C. de Voil, B.E., M.Eng.Sc.
	J.D. Noad, B.Sc.
	R.N. Buchanan, B.Sc., Dip.Ed., Dip.A.C. (*Temp*)
Demonstrators (Programmers)	*J.S. Williams*, B.Sc., Dip.A.C.
	W.N. Fulton, B.Sc., Dip.A.C.
	L. Mor, B.E. (*Part Time*)
Administrative Officer	*J. Jauncey*
Maintenance Technicians	*G.L. Jerrard* *D. Brunner*
Computer Operators	*Pat Cusack* *Noela Leschke* *Pat Loder* *Pat Matthews* *Anne McArthur* *Helen Otte* *Diann Wilkins*
Data Preparation Assistants	*Diane Ball* *Angela Vidanovic*
Secretary	*Delphine Dare*

ANNUAL REPORT

INTRODUCTION

The continued demand by University Departments and Administration required full three-shift operation in 1968 and confirmed the need for making the new computer system fully operational as soon as possible.

The academic functions were further extended to meet demands for courses with consequent limitations on the research work of the staff. Further, a great deal of time has been devoted by all members of academic staff to details of the new computer system, particularly to preparation of software.

The rearrangement of facilities and installation of the new computer system also required a major contribution of time by Computer Centre staff.

EXECUTIVE COMMITTEE ACTIVITIES

A.U.C. Questionnaire on future needs

Unfortunately, it has not yet been possible to have any detailed discussions with the Australian Universities Commission on the proposals for development of the PDP 10 system. It is hoped that this can be arranged early in 1969.

Remote Terminal Priorities and Disposition

The Executive Committee have formulated criteria for the allocation of priorities for Remote Terminal installations and it is expected that 16 Remote Terminals will be installed in 1969. Of these, three or four will be for non-University users in the Brisbane Metropolitan area.

Functional Classification of Staff

Consideration was given to the creation of a new set of staff classifications more appropriate to the service bureau work of the Computer Centre. A sub-committee has been formed to develop a proposal in greater detail.

Charges for Administrative Type Work

The Executive Committee agreed that the charge of $40 per hour for University administrative type work on the GE 225 Computer System should be reduced to $20 per hour provided a special allocation towards salaries for future staff appointments could be made.

Review of Charges for PDP 10

A minor revision was made to charges for the PDP 10 computer system which will result in economies in large scale data processing work.

I.B.M. 1620 Computer System

The Committee recommended that the I.B.M. 1620 system be offered for sale to Townsville University College, instead of the present arrangement by which the system is on loan without charge.

STAFF CHANGES

New academic appointments

Lecturer in Systems Programming	-	C.C. de Voil, B.E., M.Eng.Sc. (formerly Senior Demonstrator)
Senior Demonstrator	-	J.S. Williams, B.Sc., Dip.A.C. (formerly Demonstrator)
Lecturer	-	J.D. Noad, B.Sc.
Demonstrator	-	W.N. Fulton, B.Sc., Dip.A.C.

Chair in Computer Science

Approval was obtained for the establishment of a Chair in Computer Science and Associate Professor G.A. Rose, University of New South Wales was appointed to take up duty early in 1969. The Computer Centre, previously attached to the Department of Electrical Engineering, has full departmental status from 1st January, 1969.

TEACHING AND LIAISON ACTIVITIES

General

The teaching activities were further augmented and a number of persons attended programming courses bringing the total since 1961 to approximately 2,330. In addition to the programming courses, staff gave over 600 lectures, conducted 150 tutorials and seminars while demonstrating and consulting services occupied a further 1100 contact hours.

Programming Courses and Postgraduate Courses

During 1968, six basic FORTRAN courses were given by the Computer Centre for which a total of 128 students enrolled. In addition to the "service" courses, undergraduate teaching of computer courses increased substantially.

Enrolments for the postgraduate Diploma in Automatic Computing increased to 18 (4 full-time, 14 part-time). The introduction of the new Diploma in Information Processing jointly by the Faculty of Commerce and Economics and the Computer Centre resulted in 11 enrolments (3 full-time, 8 part-time).

Computer Centre staff participated in a number of conferences and symposia and delivered lectures to various professional bodies, including the Australian Computer Society; the Operations Research Group of the Australian Computer Society; the Institution

of Engineers, Australia, Queensland Division; a Vacation School on Mineral Processing; and a Winter School in Power Systems Electrical Engineering.

The Officer-in-Charge of the Computer Centre, Mr. R.E. Kelly was Chairman of the Australian Computer Society, Queensland Branch, and delegate to the Federal Council of the A.C.S. for 1968. Mr. R.N. Buchanan delivered "careers lectures" at fifteen metropolitan high schools.

RESEARCH AND DEVELOPMENT

With the installation of the PDP 10 planned for mid 1968, it was necessary to curtail the development of programs for the GE 225. A number of FORTRAN IV subroutines were reprogrammed ready for use on the PDP 10 and a FORTRAN IV manual was produced for use with both computer systems.

Most of the effort of the staff was directed towards planning for the implementation of batch-processing and timesharing on the PDP 10. This has involved modifying and extending the facilities contained in the standard systems programs. In particular, the staff have worked on the command language, task control, file management, and accounting functions of the operating system. The major objective of this effort has been to produce a simple, reliable and consistent timesharing operating system to cater for the specific requirements of a university environment. Much of the work has been original and should result in a number of publications in the future.

An extensive publication programme has been undertaken during the year and has resulted in the issue of a number of manuals and technical memoranda. These are listed in Appendix I. The regular publication of a Computer Centre Bulletin was commenced. This Bulletin contains announcements, programming advice and articles of general interest which attempt to maintain communication between the staff and users of the computer facilities. It is proposed in the future to issue Technical and Research Reports on various aspects of computing.

COMPUTER USE

The distribution of computer time (GE 225) is illustrated in Figure 1 which shows the proportion of time used by various functions.

The total switched-on time for the year was 4,860 hours with a total usetime of 4,195 hours. This latter figure should be compared with a scheduled availability of 5,196 hours.

Appendices III and IV show the distribution of computer time used by University Departments and non-University organizations, respectively. The computer time shown as 'Computer Centre' is significantly greater than other users, this time being distributed between development projects, demonstrations and normal operating overheads. It should be noted, that use of the computer by University Departments is increasing rapidly, while external use is gradually falling off. Despite the installation of a number of other computer systems in Queensland during recent years, the use of the computer by external organizations continues to be significant.

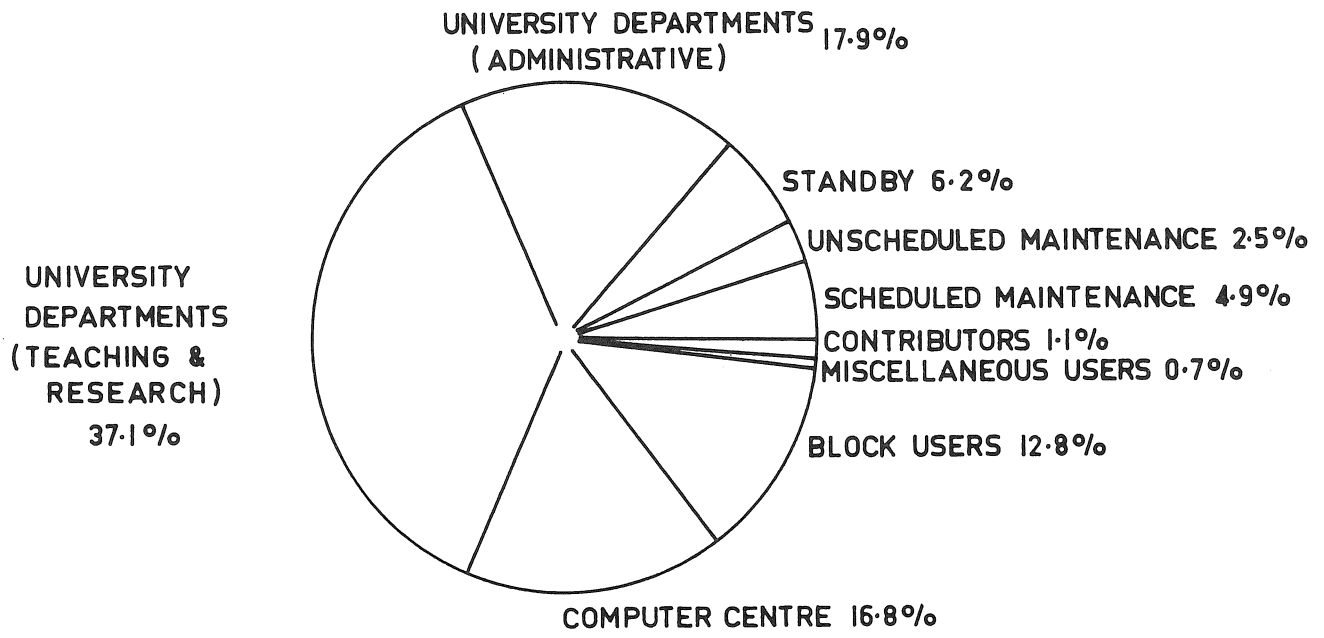

Fig. 1. *Distribution of Hours of Total Switched-on Time (4,860 hrs. = 100%)*

A graph of the growth of computer use since 1962 is shown in Figure 2. The continued upsurge in computer use for University purposes results from increasing requirements for undergraduate teaching and administration.

Most users of the computer facilities have provided a list of new programs developed during the year, and this information, edited for uniformity of presentation, is given in Appendix V. Attention is drawn to the very wide variety of computation and data processing work which has been carried out with the present facilities.

BUILDING AND AIR CONDITIONING MODIFICATIONS

Following the decision to instal a new computer system in 1968 while still retaining the GE 225 system, and agreement by the Faculty of Engineering to transfer the Applied Mechanics Laboratory to the Computer Centre, a major rearrangement of the building space and redesign of the air conditioning were found necessary. The Commonwealth Department of Works redesigned and constructed the air conditioning services while ensuring that the existing computer system continued in service. The complexity of the programme would have made it impractical to call tenders and the University is greatly indebted to personnel of the Department for excellent planning and the fullest possible cooperation.

Additional space has been provided for staff thus enabling a postgraduate room to be transferred to the Department of Chemical Engineering. Accommodation is however likely to be a limiting factor in staffing the Department of Computer Science after 1969.

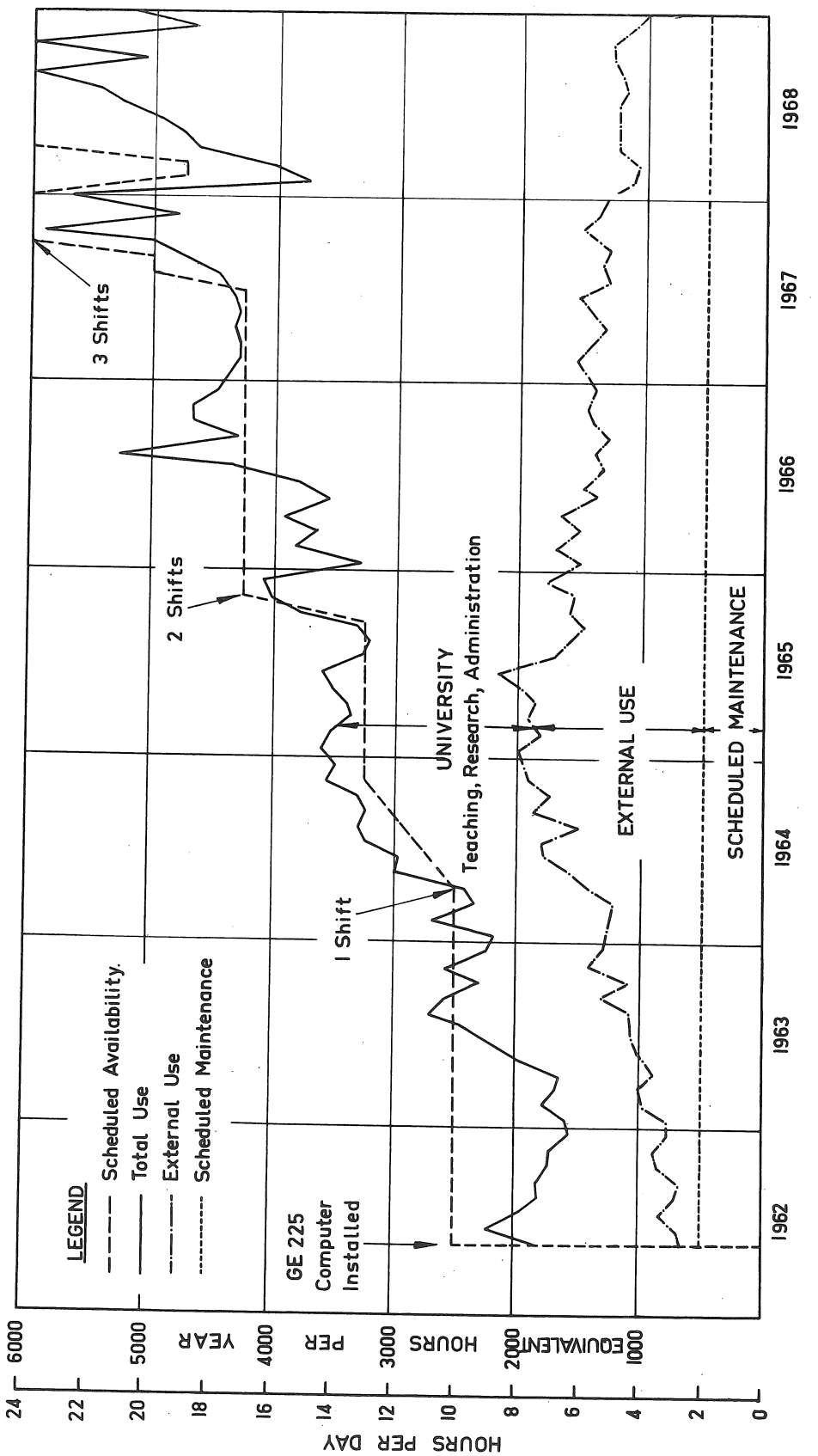

FIG. 2. GROWTH OF COMPUTER USE GE 225 SYSTEM 1962–1968

NEW COMPUTER SYSTEM

In October the University accepted the major part of the dual processor PDP 10 computer system, manufactured by Digital Equipment Corporation, Mass., U.S.A.,delivery of which commenced in April.

A number of items including the core stores were supplied on a temporary basis until the items as ordered were delivered. The major problem has been the failure of the Contractor to supply adequate documentation although some improvement was evident late in 1968.

OVERSEAS VISITS

I. OLIVER

Arrangements were made for Mr. I. Oliver to extend his overseas leave by approximately twelve weeks from 22nd January to 10th April, 1968 at the head office of Digital Equipment Corporation to study programming of the PDP 10 and improve the lines of communication between Digital Equipment Corporation and the University. The people with whom contact was made were very helpful and have continued to supply information to supplement that required by the contract. Whilst in the U.S.A. Mr. Oliver also visited a number of other computer centres, in particular at Massachusetts Institute of Technology and Harvard University and a number of useful discussions were held.

R.E. KELLY

Mr. Kelly visited Digital Equipment Corporation in the U.S.A. in January, 1968. The purpose of this visit was to discuss technical details of the PDP 10 computer system with the suppliers and to visit a number of timesharing computer installations. Detailed discussions were held with a number of Digital Equipment Corporation personnel regarding the installation and design of the PDP 10 computer system. Visits were also made to the University of California, Dartmouth College, Massachusetts Institute of Technology and Applied Logic Corporation.

After visiting the U.S.A., Mr. Kelly travelled to the U.K. where he visited a number of computer installations including the Institute of Computer Science at London University, the Atomic Energy Authority and International Computers and Tabulators Limited.

E.J. SOKOLL

Mr. Sokoll visited the U.S.A. in August, 1968 primarily to attend a course on the maintenance of the PDP 10 computer system. The course of five weeks was conducted by the Field Service Training Department of Digital Equipment Corporation. A week was spent at the plant on technical details and other matters concerning the supply of the computer system. Mr. Sokoll also visited other computer installations in the U.S.A., in particular Massachusetts Institute of Technology where he obtained papers presented at a recently held conference on timesharing. These have proved to be very valuable in the development of the University's timesharing system. Discussions were held with Professor Gordon Brown of M.I.T. and Professor Glaser of the Jennings Computer Centre, Case-W.R.U., U.S.A.

POSTGRADUATE DIPLOMAS

Diploma of Automatic Computing

The Diploma in Automatic Computing was made available for the fifth successive year. The course comprises three computing subjects: Programming Techniques, Logical Design of Computing Devices, and Numerical Analysis. In addition, some specified mathematics subjects must be undertaken. Detailed descriptions of subjects and the rules relating to admission to the course are published in a separate brochure, obtainable from the Computer Centre.

Four full-time and fourteen part-time students enrolled in 1968 and four students completed the requirements for the Diploma.

The Programming Techniques projects completed by students during the year as listed in Appendix VI.

Diploma in Information Processing

The postgraduate Diploma in Information Processing was introduced by the University. This one-year full-time course is run within the Faculty of Commerce and Economics in conjunction with the Computer Centre.

The course is oriented towards the design and application of computer-based information processing systems and gives particular emphasis to electronic data processing systems and decision-making in the business and governmental fields. It covers the functions and use of data processing equipment, computer programming and programming techniques, some basic mathematics, the analysis and design of information processing systems, and the application of computers to economic information processing and managerial decision making. In addition to the basic theory of systems and programming, particular emphasis is placed upon the application of computers to the problems of business and industry.

Nine students enrolled in 1968; a considerable increase in numbers is expected in 1969.

Projects completed by the students during 1968 are listed in Appendix VI.

FINANCIAL POSITION

The financial position, shown in Appendix VII, is considered satisfactory. The salary payments of the members of staff are arranged thus:

University General Funds	11 staff
Computer Centre Operations Account	11 staff

Some rearrangement of funding of salaries is planned for 1969.

The Capital Equipment and Operations Accounts and the Sinking Fund are being used to assist with meeting the payments on the new system.

FUTURE NEEDS

In spite of the difficulties already encountered over the finance of the Stage 1 of the new system, plans for expansion of the system have been developed for the period 1969-1972. The additional needs will include a further number of remote terminal stations and file storage facilities.

Finance for these has been sought from the Australian Universities Commission.

As stated elsewhere, accommodation will be fully taken up in 1969 and the proposed future developments will be limited unless provision of several thousand sq.ft. can be made in an adjacent area.

APPENDIX I

DEVELOPMENT PROJECTS – COMPUTER CENTRE STAFF

The following programs have been developed by Computer Centre Staff members during 1968.

R.N. Buchanan	Conversion of subroutines HDIAG (eigenvalues and eigenvectors of a real symmetric matrix) and SIM (solution of simultaneous equations) to FORTRAN IV format.
	Revision of subroutine ROOTS (roots of a polynomial)
I. Oliver	Design of command language for PDP 10 operating system.
C.C. de Voil	A series of FORTRAN IV routines for the manipulation and checking of calendar dates.
	A program to prepare a table of dates vs working days, allowing for specified holidays and weekends.
	A program to create a BRIDGE compatible tape from magnetic tapes of various formats.
W.N. Fulton	Extension and improvements to the WISP compiler and operating system
	Incorporation into the system library of MACROGAP which allows macro facilities to be used within a GAP program.
	Modifications of CSIRO program EIGEN to ensure compatibility with the U.Q. system.
J.S. Williams	EIGN: A FORTRAN IV subroutine to compute the eigenvalues and eigenvectors of a real symmetric matrix.
	RGENMT: Generation of a real symmetric matrix with a determinant and inverse that can be calculated independently of the inversion process. The subroutine is written in FORTRAN IV
	A series of elementary matrix subroutines in FORTRAN IV

Note: A large proportion of the development work in 1968 has been concerned with the PDP 10 system.

APPENDIX II

PUBLICATIONS – COMPUTER CENTRE STAFF

I. Oliver	*Factorial Analysis of Variance.* Algorithm 330, Communications of the Association for Computing Machinery, Vol. 11, No. 6, June, 1968.
I. Oliver	*Tree Searching School Timetables.* The Australian Computer Journal, Vol. 1, No. 3, November, 1968.
C.C. de Voil	*A Digital Instrumentation System.* I.E.A., Qld. Division Technical Papers, Vol. 9, No. 6, June, 1968.

APPENDIX III

DISTRIBUTION OF COMPUTER TIME (HRS.) USED BY UNIVERSITY DEPARTMENTS

Code	Department / Month Ending / Working Days	Jan.19 14	Feb.16 19	Mar.22 25	Apr.19 18	May 24 23	Jun.21 19	Jul.19 20	Aug.23 24	Sep.20 20	Oct.18 20	Nov.22 25	Dec.24 22	1968 TOTALS	TOTAL TO DATE
	Teaching and Research														
001	Computer Centre	24.4	35.2	46.4	43.6	71.7	61.7	79.2	130.3	106.8	120.9	40.8	55.9	816.9	3,774.5
002	Civil Engineering	2.0	7.5	11.5	11.7	12.8	16.1	17.9	25.7	27.4	23.9	2.8	2.2	161.5	492.9
003	Economics				.2			.7	.3	1.2	4.3	.9		7.6	15.6
004	Physics	11.7	13.2	33.9	37.9	55.7	37.2	42.6	49.6	35.5	38.5	77.0	45.1	477.9	2,070.6
005	Psychology		1.1	1.3	3.4	2.5	2.1	5.0	4.2	4.5	8.9	8.2	3.7	44.9	315.0
006	Electrical Engineering	3.8	2.3	7.3	.5	3.0	4.3	4.2	9.7	25.2	21.9	11.3	3.5	97.0	411.9
007	Mechanical Engineering	9.1	3.5	8.5	4.7	4.3	3.9	7.3	9.9	8.8	5.7	3.2	8.6	77.5	412.1
008	Mathematics	1.5	1.4	.2	.3	1.6	1.2	1.9	2.2	3.8	5.5	5.9	1.8	27.3	181.9
009	Geology				.3				.2	.5	.2		.5	1.7	27.7
010	Animal Husbandry	.6	2.0	3.6	8.9	1.1	2.0	2.4	2.0	2.0	1.2	.6	.5	26.9	269.5
012	Agriculture	2.3	2.6	22.0	5.2	12.7	9.4	3.4	5.7	5.6	5.0	6.0	4.8	84.7	276.5
013	Education	.3	2.3	7.3	5.7	8.6	11.6	5.9	8.3	3.3	5.4	7.2	4.9	70.8	213.8
014	Mining and Metallurgy	1.9	4.3	6.0	5.7	12.7	7.7	6.1	5.3	9.7	15.5	1.2	5.4	81.5	279.8
015	Computer Research														33.7
016	Parasitology		.3	1.3	.1	.1	1.2	.1					.3	3.4	25.5
017	Veterinary Preventive Medicine														43.1
018	Surveying		.2				.1	.2				.6	.7	1.8	28.4
019	Veterinary Anatomy			.1										.1	17.2
020	English		1.0	1.6	.3		1.2		.1	2.6	.5	.4		7.7	31.1
021	Veterinary Clinical Studies						.1							.1	2.7
022	Remedial Education				.1	.1	.1			1.7	.6	.9	.5	4.0	13.0
023	Accountancy			.2		.1								.3	4.4
024	Microbiology	.6		.6				1.7	2.9	2.0	2.6	.5	2.2	13.1	66.4
025	Physiology		.1			1.5	.2	.2	1.1	.4	.7	2.4	2.3	8.9	20.4
026	Chemistry	2.8	6.6	12.2	11.9	12.8	6.3	12.4	10.4	8.5	3.6	5.3	5.4	98.2	238.3
027	Geography														12.6
028	Townsville University College														7.1
029	Child Health											.1	.5	.6	11.1
030	Social and Preventive Medicine	1.8	3.5	4.1	2.7	1.6	5.2	2.8	3.2	.4	.5	9.3	6.0	41.1	87.8
032	Botany		.2	1.9	1.3	1.2	6.7	1.6	.8	2.2	3.5	6.6	5.5	31.5	36.1
034	Chemical Engineering	3.9	13.5	9.7	14.3	17.2	15.6	20.7	18.7	17.8	16.6	10.3	7.3	165.6	410.3
035	History														2.0
037	Dentistry	9.7	17.0	14.2	13.3	7.2	1.1	1.1	.3	.3	.4	1.7	9.8	76.1	252.9
039	Surgery														18.0
041	Social Studies		.8			.1	.4	1.6	3.0	2.2	.7	3.5	.9	13.2	18.1
042	Anatomy														2.8
045	Neurology														2.5
046	Anthropology and Sociology	4.0	.6											4.6	24.7
047	Institute of Technology														0.2
048	Veterinary Science Faculty														2.1
049	Medicine (Medical School)		.5	1.2	.3	.1			.4		.2			2.7	6.9
050	Government	7.8	2.1	5.5	15.8	16.1	17.7	14.7	15.7	8.7	12.8	15.3	13.1	145.3	179.9
051	External Studies									2.8	1.1			3.9	28.6
052	Pharmacy			1.2	.5		.6	.3	3.3		1.6	1.1		8.6	12.3
053	Biochemistry			.8	.9	1.1			.1		.4		.1	3.4	3.4
054	Student Counselling				.3		.3	1.1	.7	.3	1.2	2.0		5.9	16.3
055	Medicine (P.A.H.)	.6												.6	.9
056	Entomology		.1	.1				.2		.2	.1	.3		1.0	1.6
057	Pathology														.8
059	Thatcher Library External Studies				.2							.2		.4	.4
060	Japanese												.1	.1	.1
062	Psychological Medicine								.4	.4	.3	.1		1.2	1.2
063	Zoology											.7		.7	.8
	SUB-TOTALS	88.8	121.9	202.7	190.1	245.8	212.9	236.4	314.6	284.8	304.3	226.4	191.6	2620.3	10,407.5
	Administrative														
306	Electrical Engineering	.4	.6	.5	.1	.4	.5	.5	.1	1.1	.9	1.3	.6	7.0	7.0
311	Data Processing	22.9	74.9	87.7	46.4	65.2	51.4	60.3	72.4	58.1	63.5	78.1	127.1	808.0	2,425.3
312	Agriculture			.8	.8	1.2	1.1	.5	1.4	.6	.9	.8	.8	8.9	8.9
331	Examinations Section														42.9
334	Chemical Engineering										.3			.3	.3
338	Administration														2.1
340	Photography	.8	1.0	1.4	1.2	1.5	1.4	1.9	1.6	1.5	1.4	2.0	1.3	17.0	54.1
343	King's College														.5
351	External Studies				.7									.7	.7
352	Pharmacy					.8	2.7	1.7	.3	.4	.9	.7	.4	7.9	7.9
354	Counselling Services				.4									.4	.4
358	Faculty of Engineering		2.0	1.5										3.5	3.5
359	Union Office			1.2		.9		.4						2.5	2.5
361	Bookshop						5.3	.3	2.1		.8	1.2		9.7	9.7
364	TALSA Credit Union										.7	.1	.3	1.1	1.1
	SUB-TOTALS	24.1	78.5	93.1	49.6	70.0	62.4	65.6	77.9	61.7	69.4	84.2	130.5	867.0	2,566.9
	TOTALS	112.9	200.4	295.8	239.7	315.8	275.3	302.0	392.5	346.5	373.7	310.6	322.1	3,487.3	12,974.4

APPENDIX IV

DISTRIBUTION OF COMPUTER TIME (HRS.) USED BY EXTERNAL ORGANIZATIONS

Code	Organisation	Month Ending / Working Days	Jan.19 / 14	Feb.16 / 19	Mar.22 / 25	Apr.19 / 18	May 24 / 23	Jun.21 / 19	Jul.19 / 20	Aug.23 / 24	Sep.20 / 20	Oct.18 / 20	Nov.22 / 25	Dec.24 / 22	1968 TOTALS	TOTAL TO DATE
Contributors																
101	Main Roads Department	*														1,046.2
102	Southern Electric Authority	*														204.0
103	Primary Industries Department	*														120.9
104	Irrigation & Water Supply Commission	*														266.7
105	Co-ordinator General's Dept.	*														141.7
106	Forestry Department	*														157.2
107	Survey Office	*														105.4
108) 109) 110)	Brisbane City Council	*														157.1
111	Aust. General Electric	ϕ														9.0
112	Queensland Govt. Railways	*														52.2
113	P.M.G. Department	*														61.6
114	C.S.I.R.O.	*														148.0
115	State Electricity Comm. of Queensland	*														26.9
116	Mt. Isa Mines Ltd.	Θ										.1			.1	167.9
117	Wide Bay-Burnett R.E.B.	Θ	3.1	.1				4.1	2.3						9.6	30.2
118	Capricornia R.E.B.	Θ	3.0		.3		.2	6.8							10.3	50.9
119	Cardno and Davies	Θ								.9		.2	1.6		2.7	50.0
120	Townsville R.E.B.	Θ	.4		.6	5.8	3.7								10.5	56.2
121	Cairns R.E.B.	Θ		.3	6.7	1.5	1.1								9.6	46.4
122	Mackay R.E.B.	Θ			.3	.1	6.3	.5	1.8						9.0	12.1
	TOTAL CONTRIBUTORS		6.5	.4	7.9	7.4	11.3	11.4	4.1	.9		.3	1.6		51.8	2,910.6
Block Users																
401	Main Roads Department		.1	.1			.1							.1	.4	470.8
402	Southern Electric Authority		2.7	4.0	6.0	2.6	11.3	7.9	11.9	21.2	11.2	10.4	9.1	3.4	101.7	130.5
403	Primary Industries Department		4.2	2.8	9.9	3.1	7.1	5.2	9.1	5.9	5.3	4.9	7.6	4.1	69.2	140.2
404	Irrigation & Water Supply Commission		5.0	10.4	12.8	12.5	11.5	9.6	6.7	6.1	3.2	2.3	1.4	4.7	86.2	94.7
406	Forestry Department			.8	.4	.2			.1	.4			1.1	1.1	4.1	149.9
407	Survey Office		1.4	.5	2.8	1.9									6.6	117.3
408)	(Transport)															4.0
409)	Brisbane City Council (Works)				.4	.2	.8	.1		.5				.4	2.4	4.5
410)	(Elec.)		1.8	1.2	4.3	1.8	5.4	4.2	2.4	1.4	5.8	9.2	5.8	4.1	47.4	142.2
412	Queensland Govt. Railways						.6	.8	.2						1.6	23.9
413	P.M.G. Department		1.8	3.9	10.6	4.4	3.1	4.2	.8	2.0	1.2	2.4	3.0	.9	38.3	203.9
414	C.S.I.R.O.						1.3	.2						.8	2.3	185.2
415	State Electricity Comm. of Queensland		4.4	11.0	2.8		.1		7.9	10.9	12.8	9.6	9.0	7.6	76.1	193.6
423	Commonwealth Dept. of Works		5.8	8.7	15.3	16.7	14.0	12.6	9.5	14.5	19.0	19.7	12.2	11.0	159.0	397.1
424	Sugar Research Institute		.2	.2	.4	.3	3.4			.1	.5	.6	1.1		6.8	96.9
425	Computing Pty. Ltd.								.4	2.7	2.7	7.2	5.3	2.0	20.3	20.3
	TOTAL BLOCK USERS		27.4	43.6	65.7	43.7	58.7	44.8	49.0	65.7	61.7	66.3	55.6	40.2	622.4	2,375.0
	TOTAL MISCELLANEOUS USERS		2.8	2.2	1.4	3.3	2.4	1.5	2.5	2.8	2.0	3.6	5.7	3.4	33.6	340.4
	TOTALS		36.7	46.2	75.0	54.4	72.4	57.7	55.6	69.4	63.7	70.2	62.9	43.6	707.8	5,626.0

* Converted from Contributor to Block User status. ϕ Special contract now terminated. Θ Converted from Contributor to Miscellaneous User status.

APPENDIX V

SOME WORK CARRIED OUT BY USERS OF THE GE 225 COMPUTER IN 1968

Dept. No.	Department	Work carried out on Computer
002	CIVIL ENGINEERING:	
	J.L. Meek	Finite-element Analysis of Elasto-Plastic Axisymmetric Solids
		Contour Plots based on Linear Interpolation over triangles
		Elementary Structure Cutter Program
	D. Sewell *J.L. Meek*	Analysis of Determinate Planar Frames
	W. Stitz *J.L. Meek*	Frame Analysis, including Large Displacements and Plastic Strains
	J. Gralton *J.L. Meek*	Analysis of Plate Structures by Finite Elements
	L.T. Isaacs	FEFLUIDS 1 - Solves Laplace equation for two dimensional and axisymmetric irrotational incompressible ideal fluid flows
	A.L. Brown	CIVCOM 3 - Backwater curves: adoption of Townsville University College program for backwater curves in natural streams using standard slip method
	M.J. Abbott *J.E. Behan*	CIVCOM 4 - Pipe network solution: adoption of Townsville University College program.
	B.E. McKay *J.E. Behan*	CIVCOM 6-Solution of three-dimensional determinate truss.
	P.D. Wruck *J.E. Behan*	CIVCOM 7 - Estimation of depth of flow in natural stream cross section referenced by coordinates
	G.S. Davidson *J.E. Behan*	CIVCOM 8 - Frocht's shear difference technique for obtaining stresses from photoelastic analyses
	J.G. Keays *J.E. Behan*	COVCOM 12 - Obtains principal axes and section properties for irregular sections, defined by co-ordinates of perimeter.
	A.T. Philbrick *K.B. Davidson*	COVCOM 22 - Highway 1. Calculation of Optimum signal settings and the resultant delays at intersections
	B.C. Davis *K.B. Davidson*	CIVCOM 23 - Highway 2. Estimation of traffic on alternative routes.
	B.W. MacFarlane *K.B. Davidson*	Highway 3. Estimation of traffic given trip ends using, (a) gravity method; (b) Furness method.
003	ECONOMICS:	
	A. Fitzgibbons	Econometric study of the Australian capital market.
	N. Podder	Analysis of Consumers Behaviour
	P. Cassidy	Compiling Monte Carlo Simulation Program to be used on Sensitivity Testing of Benefit/Cost Analysis.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
004	PHYSICS:	
	G. Bowman	Calculations of directions of arrival of ionospheric signals.
	M.J. Burke	Least square fit and error analysis of linear and non-linear equations.
	J.R. Catchpoole	Further programs relating to the electric field precipitation of magnetospheric electrons.
	A. Doobov	Analysis of quasi-sinusoidal, heavily damped variations in the earth's magnetic field. Filter and fourier transform programs.
	E.W. Dearden	Further tracing of rays in variable ionospheric models.
	L. Dryburgh	Simulation of operation of large aerial array for different conditions. Trials of various data processing techniques.
	R. Dunlop	Teaching and analysis of experimental data (Physics III and IIIH students).
	R.J. Dyne	Electron broadening and shift of spectral lines. Calculation of dipole matrix elements by solution of Schrödinger equation with Thomas-Fermi ion potential.
	G.D. Finn	An investigation into a numerical technique for inverting Fredholm integral equations of the first kind in the cases of noiseless and noisy data.
	M. Johnston	Statistical analysis of differential proton magnetometer results.
	K.L. Jones	Satellite tracking. Reduction of radio signal data from satellites. Statistical analysis of this data.
	E. Kantarizis	Model ionograms for tests of N(h) methods suitable for a Phase Ionosonde. Development of a polynomial method of reducing $\Phi(f)$ data to N(h) profiles.
	S. Khan	Direction of arrival: calculates zenith angle azimuth angle of ionospheric signals. Plotting of histograms and punching on cards. Fourier spectrum analysis: Determination of compotent of zenith angle, azimuth angle and microbarographic time series. Correlation: Auto and cross correlation of different time series. Plotter SKI: Memorizes 1500 points and plots in progressive order. Prints negative if 1500 th value is smaller than the first value.
	A.T. Linde	Harmonic analysis of geophysical data.
	K.J.W. Lynn	Derivation of sunrise and sunset times along great circle propagation paths. Computation of very low frequency radio mode conversion and propagation parameters.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
004	CONTD.	
	J.P. McGilvray	Routine use of existing programs in GAP and Card Fortran for x-ray and dosimetry problems. Two programs for use with problems in Cobalt-60 and Deep Therapy were written and are in the process of being tested. The programs for reconstruction of sealed source locations from stereo-radiographs, started in 1967, are complete and a program for the calculation of Strontium-90 dosages written and in use.
	L.F. McNamara	Preparation of data for use in programs run on the CSIRO CDC 3600 in Canberra.
	L.A. Meara	Great circle path geometry for points on earth's surface. Solar geometry - - sunrise and sunset times at ground and upper atmosphere. Non linear regression - - least squares parabola, cubic and sinusoid. Airy functions of complex argument. Solution of general (complex) modal resonance equation for VLF propagation Height gain functions for VLF modes. Scattering coefficients in mode conversion.
	A. Mir	Calculation of Backscatter coefficient.
	E.C. Morris	Data processing and integration.
	Z. Rahmani	Calculations of sunrise and sunset times at different ionospheric heights. Calculations of height gain functions, excitation factor and different mode parameter for L.F. Radiowave Calculations of hop structure for L.F. Radio Wave
	B. Rigby	Calculation of magnetosphere shape using Inouye-Lomax method.
	I. Shortt	Solution of the equation of radiative transfer applied to scattering of light in spherical dust nebulae.
	R.W. Simpson	Integral analysis: concerned with the computation of astrophysical parameters and quantities using Simpson's Rule, Gauss-Hermite, Third-Order Gauss and generalized Simpson's rule approaches.
	R.J. Stening	Calculation of height-integrated conductances in the ionosphere. Iterative calculation of ionospheric current systems by an equivalent circuit method.
	R.G.S. Taylor	Standard Deviation and Multiple Linear Regression; Investigation of correlation between Atmospheric and Soil Gas Radon concentration and meteorological factors.
	S.J. West	Numerical Filtering, Power Spectra, and Coherency analysis of the Micropulsation signal.. Unique determination of polarization by specifying (a) the degree of polarization (b) the orientation of the polarization illipse, (c) the sense of the polarisation.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
004	CONTD.	
	J.D. Whitehead	The gradient instability in plasma; Calculations have been made of the changes which occur in electron density when a perturbation is inserted in a plasma with a background gradient.
005	PSYCHOLOGY:	
	R.H. Foggitt	Analysis into differences in cognitive processes between two different ethnic groups.
006	ELECTRICAL ENGINEERING	
	L.V. Skattebol	Fourier spectrum analysis of experimental waveforms. Entropy calculations of homogeneous and first order Markoff stochastic processes.
	G.F. Shannon	Root Locus Plotting. Program reads number of and location of poles and zeros. Output consists of a tabulation of points on locus together with corresponding gain. Graphical output is also obtained through use of PLOTTER.
		Running averages of set of data with variable number of pieces of data per set.
	M. Darveniza	Prediction of the lightning performance of EHV transmission lines.
	R. Caldwell	Prediction of the effect of non-standard waveshapes on the impulse strength of HV insulation
		Calculation of surge voltage waveshapes at various points on a model power system using travelling wave theory. (Program supplied by Snowy Mountains Hydro Electric Authority.)
007	MECHANICAL ENGINEERING:	
	C.N. Jones *T. Walker*	Hovercraft fan selection by digital computer program.
	T.F. Leahy	Development of program for automatically fitting the best polynomial to a set of experimental results.
	M.F. Winders	Parametric studies of crossflow cooling tower designs. Determination of packing heights of crossflow and counterflow cooling towers.
	R.J. Hooker	Analysis and curve-fitting of results from experiments on damping properties of metals. Prediction of combined stress behaviour.
	G.E. Russell	Development and use of programs to predict the extraction performance of sugar cane crushing trains under steady-state conditions.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
007	CONTD.	
	G.E. Russell *W. McWhinney*	Development of DYSMIL, a program to simulate the dynamic extraction operation of sugar cane crushing trains.
	G.A. Foster *N.R. Hall*	Reduction and plotting of centrifugal fan test results.
	I.R. Barnett	Nonlinear dynamic simulation of a hovercraft travelling over random ground surface.
		Accounting program for Department of Mechanical Engineering.
	K. Bremhorst	Reduction of hot-wire anemometer data collected with the aid of the analogue computer to yield spectral and correlation data in isothermal and non-isothermal turbulent pipe flow.
		Calculation of correction factors to be applied to hot-wire anemometer data.
	G.L. McDonald	Program for analysis of tractor accident data.
	T.B. Walker	Analysis of power spectral data.
	G.F. Harvey	Program for the vibration analysis of a vehicle model with two identical, time delayed inputs.
		Subroutine for calculating natural frequencies and normal modes.
		Program to determine tractor dynamic properties from drop test data.
		Program for the reduction of B & K spectral density results.
		Analysis of ground spectra and cross spectra for two parallel tracks.
008	MATHEMATICS:	
	B.L. Adkins	Analysis of multifactor dental experiment.
	L. Bass	Computations of membrane potentials.
	N.S. Clarke	Effect of surface tension and viscosity on accelerating fluid jets.
	L.E. Howard	Earthquake location problems. Gravity interpretation.
	A.S. Jones	Calculations of blood flow.
	C.F. Lee	Computations of numerical solutions of some nonlinear differential equations.
	H. Rasmussen	Numerical solution of differential equations arising in viscous flow between rotating discs.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
012	AGRICULTURE:	
	I.F. Horton	Factorial Analysis Program, other special analytical programs for genetics experiments, programs for processing special data from dental experiments.
	M.C. Waldron	Development of programs for the study of the aspirations, attitudes and social structures of successful and less successful farmers' discussion groups.
013	EDUCATION:	
	M.A. Colston	Analysis of the Verbal Interaction in some Brisbane primary school classes.
		Hem analysis of attitude scales for primary school pupils.
	D.J. Drinkwater	Analysis of personality characteristics of Australian adolescents.
	J.M. Genn	Factorial and discriminant analyses in connection with a study being made of chemistry scholars in school and university contexts.
	R.D. Kitchen	Varimax factor analysis of the attitudinal components of student teachers based on the semantic differential.
		Examination of basic personality variables of student teachers and teacher role conceptualisation.
	R.V. McSweeney	Analysis of personal values of Queensland secondary school pupils.
	C.N. Power	Item analysis of science achievement tests.
		Analysis of variance of classes receiving or not receiving feedback from tests.
		Analysis of variance of groups receiving various amounts of feedback from teacher.
		Multiple discriminant analysis to determine differences of various groups of learners in classrooms.
014	MINING AND METALLURGICAL ENGINEERING:	
	J.E.M. Barnes *R.A. Slaughter*	Calculations related to optimising the transport of men into a mine.
	J.R. Braes	Programs for the simulation of complete flotation plants.
	P.T. Isles	Reduction of data from and simulation of beach sand concentrations.
		Calculation of the flow in ore storage bins.
	A.F. Luscombe *N.W. Johnson*	Reduction of data from froth and flotation tests.
	M.J. Lees	Reduction of data from hydrocyclone tests.
	H. Petrie	Reduction of data from sieve bend tests.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
014	CONTD.	
	W.J. Whiten	Programs for the simulation of industrial crushing, grinding, flotation and beach sand concentrations. General purpose programs for graph plotting, non-linear least squares, optimisations using spline interpolation functions, and calculation of zeros by inverse interpolation.
016	PARASITOLOGY:	
	R.W. Sutherst	Routine regression and covariance. Routine probit analyses. Factorial arrangements of probit data.
018	SURVEYING:	
	I.A. Harley	Camera resection in three dimensions. Partial calibration of close-range camera. Simple survey computations.
	P.C. Miller	General survey computations.
	S.J. Broughton	Vertical photogrammetric control by tachymetric methods.
019	VETERINARY ANATOMY:	
	E.R. Johnson	Beef Research. The Applied Anatomy of Beef Cattle.
022	FRED AND ELEANOR SCHONELL EDUCATIONAL RESEARCH CENTRE:	
	J. Elkins	Auditory discrimination in children.
	J. Elkins	Hierarchical grouping of children into types.
	J. Elkins	Intercorrelation, factor analysis and canonical analysis of cognitive tests at Grade 4.
024	MICROBIOLOGY:	
	E. Szabo	Single-linkage cluster analysis of the Sneath type. Complete-linkage modification of the Sneath type of analysis. Sokal and Michener unweighted variable group average-linkage cluster analysis. Complete-linkage cluster analysis devised by Skerman and Szabo. Intra-cluster and inter-cluster similarity estimation. Printout of similarity matrix in triangular format. Median organism estimation, based on frequency of occurrence within a cluster of + characters, and of + and – characters. Listing of the departmental culture collection catalogue.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
024	CONTD.	
	G.H.G. Davis	Cluster analysis by the single linkage and complete linkage methods and similarity matrix printout as described by Szabo of an extensive range of Gram positive bacteria using taxonomic data collected over a three-year period.
	M.L. Jones	World microbiological culture collection catalogue.
	K.E. McNeil	Single linkage and complete linkage cluster analysis using quantitated data according to the Sokal and Sneath method.
025	PHYSIOLOGY:	
	A. Lipton	Programs for analysis of experimental results.
	G.J. Huxham	Ion determination in heart and uterus muscle.
	D. Hamilton	Specific ion electrode. Ion activities in solution.
		Marking and analysis of student examination results.
		Analysis of multiple choice questions.
	S.R. O'Donnell	Linear least squares regression for analysing dose-response relationships.
026	CHEMISTRY:	
	D.W. James	Calculation of magnetic susceptibility, taking into account spin orbit coupling and distortion from octahedral symmetry for electronic d^9 ions.
		Conversion of crystal magnetic susceptibilities to molecular susceptibilities.
		3 Simulation of e.s.r. hyperfine spectrum for NO_2/N_2O_4 system.
		Normal coordinate vibrational analysis for octahedral and pyramidal ions.
	E.C.M. Grigg	Isotope effects on reaction rates.
	T.E. Peacock	Molecular orbital calculations.
	J.H. O'Donnell	A double integration program was used to calculate radical concentrations in irradiated organic solids. Theoretical electron spin resonance spectra were obtained for a variety of different interaction parameters. Kinetics of radical reactions in the solid state were analysed.
	C.J. Hawkins	Conformational analysis of metal chelate rings systems: Geometrical details such as interatomic distances, bond angles and torsional angles are computed in order to calculate the various contributions to the conformational energy.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
026	CONTD.	
	C.J. Hawkins	Experimental absorption bands are analysed in terms of two Gaussian components. Equilibrium constants concerned with complex formation in solution are determined. These include the acid dissociation constants for the ligands and the stability constants for the complexes.
029	CHILD HEALTH:	
	H.M. Pavlin	Summation of data from ante-natal survey.
030	SOCIAL AND PREVENTIVE MEDICINE:	
	J.H.A. Cane	Development of programs for stepwise information analysis. Preliminary processing of chronic morbidity data. Applications of statistical routines to various medical research problems.
032	BOTANY:	
	H.T. Clifford	Testing of models for classifying sets of plant genera. Classification of groups of plant genera using established models.
	D.J. Connor	Routine analysis of neutron moisture meter data. Development of models to describe light penetration and photosynthetic response of plant communities.
034	CHEMICAL ENGINEERING:	
	D.B. Batstone	Computer-aided process design – Algorithms for partitioning, ordering and solution of systems of algebraic equations describing the steady state behaviour of chemical processes have been incorporated in a general simulation program.
	R.L. Muller	Solution of hyberbolic equations describing flow from a broken dam by numerical integration along the characteristics.
	D.J. McCann	Solution of equation describing bubble formation and weeping from a submerged orifice.
	G.E. Ho	The generalized plate efficiency for binary distillation systems.
	L.R. Flint	A relaxation technique for the solution of the Navier-Stokes equations is being developed.
	I.C. Sandford	Published data has been analysed by Golden Section Search techniques and also be simple iterative procedures.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
034	CONTD.	
	C.T. Kock	Two Phase Flow – Digital solution of laminar flow theory for annular flow to determine velocity profiles, interfacial shear stresses and relative velocities between liquid interface and gas.
		Iterative solution of turbulent flow theory of Calvert and Williams.
	R.N. Wensley	A program was developed to study the collision between a number of rigid particles in a vertically oscillating system with the aim of determining the type of patterns resulting.
	A.S. Anderssen	A direct technique of system identification using Laguerre functions as models has been developed.
		A weighted moments technique for the simulation of the parameters of models is being investigated.
	P.G. Wright	A mathematical model for the growth of sucrose crystals in a batch crystalliser.
	C. Misra	Crystallisation of alumina trihydrate.
	R.J. Batstone	Optimal control of chemical processes.
	J.R. Woodhead	Axial dispersion in a Tabular Reactor.
	A.J. Liem	Optimisation of the Ammonia Synthesis Loop.
	J. Hendry	Optimisation of an Ammonia Synthesis Loop Using Discrete Maximum Principle.
	B. O'Neill	Counter Current Tabular Reactors with Axial Dispersion.
037	DENTISTRY:	
	I.F. Horton *B.T. Homan*	A longitudinal study of dental health in 2,300 Brisbane children.
041	SOCIAL STUDIES:	
	F. Pavlin	Professional Identification Process Computation of statistical significances – correlations – factor analyses of data.
050	GOVERNMENT:	
	C.A. Hughes *J.S. Western*	Use of mass media by a national sample.
	J.S. Western	Professional education in Australian universities.
	J.S. Western *P.R. Wilson*	Political participation of a sample of Queensland voters.
	J.S. Western *P.R. Wilson*	Content analysis.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
050	CONTD.	
	J.S. Western *P.R. Wilson*	The Ashgrove electorate study.
	J.S. Western *P.R. Wilson*	The effect of a political message on different media.
	P.R. Wilson	Attitudes to abortion, homosexuality and prostitution.
	P.R. Wilson	Police-public relations.
	P.R. Wilson	Immigrant assimilation in relation to political behaviour.
052	PHARMACY	
	W. Owen	Analysis of variance in a five factor experiment using 7 x 7 orthogonal latin squares.
		Least squares curve fitting up to a tenth order polynomial using orthogonal functions.
		Fitting a recursive line, test for linearity and calculation of inverse fiducial elements.
		Analysis of DSC data to calculate purity values.
053	BIOCHEMISTRY:	
	E.C. Webb	Calculation of parameters for kinetics of enzymes not showing normal Michaelis-Menten behaviour.
054	COUNSELLING SERVICES:	
		Summary statistics for psychological survey and survey of destinations of graduates.
056	ENTOMOLOGY:	
	G.H.S. Hooper	Project Analysis of Toxicological Data.
059	THATCHER LIBRARY:	
	E.J. Row	A cataloguing system for produce cross-referenced catalogues in a form suitable for printing.
EXTERNAL ORGANIZATIONS		
119	CARDNO & DAVIES	
	L. Stanley	Computation of flows and pressures in pipe network for a town water supply reticulation system.
	S. Williams	Computation of stresses in prestressed concrete sections for a highway bridge.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
122	MACKAY REGIONAL ELECTRICITY BOARD:	
		Calculation of power system load flow.
208	PROVINCIAL TRADERS PTY. LTD.:	
	H.J. Hornbuckle	Calculation of least cost rations for livestock using linear programming techniques.
		Statistical analysis of data from research projects dealing with animal production.
210	NORTHERN ELECTRIC AUTHORITY:	
	F.C. Chase	Power system load flow and transient stability computations as part of system planning and development investigations.
212	TITLES OFFICE:	
		Processing of survey computations.
221	AUSTRALIAN MILITARY FORCES:	
	M.A. Colston	An analysis of the Eysench Personality Inventory using data obtained from Citizen Military Forces applicants.
235	NORTHERN RIVERS COUNTY COUNCIL:	
	R. Stillman	66 kV transmission system analysis.
237	CAIRNS REGIONAL ELECTRICITY BOARD:	
		Stringing chart calculations for overhead transmission lines.
		Power system fault calculations.
		Statistics from consumers' complaints.
402	SOUTHERN ELECTRIC AUTHORITY OF QUEENSLAND:	
	L. Olsen *P. Frangos*	Analysis of power system interruption records. Calculation of power system fault current distribution. Determination of fault location on a transmission system from readings of neutral current.
	L. Watts *D. Hill*	Analysis of power system load flow, fault level and transient stability.
	N. Galwey *J. Hamilton*	Calculation of coal consumption and energy generated at power stations. Determination of economic generation schedules for forward planning.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
402	CONTD.	
	B.C. Pyra	Survey calculations, profile plotting, and tower spotting for H.V. steel tower transmission lines.
	M. Belfield	Critical path analysis for Swanbank "B" Power Station.
403	DEPARTMENT OF PRIMARY INDUSTRIES:	
		Statistical analysis of data from an extensive range of research projects dealing with plant and animal performances in field and laboratory trials.
	B.R. Champ	Analyses of dosage mortality and other data associated with entomological experimentation.
404	IRRIGATION AND WATER SUPPLY COMMISSION:	
	H. Griffith	GAP program to produce discharges from paper-tape inputed information obtained from the translation of continuous stream gauge-height recorder plots.
		CARD FORTRAN programs outputting current meter rating tables (OTT and ALBERTA propellor-type meters).
		GAP program to event-record height-discharge information stored on tape.
		CARD FORTRAN program to punch discharge rating tables on cards.
		GAP program to produce periodic totals and rainfall intensities from paper-tape inputed information obtained from the translation of continuous pluviometer charts.
	A. Kinder	FORTRAN IV program to calculate afflux over a weir.
	D. Doran	FORTRAN IV programs to calculate probabilities from Bivariate Normal Distribution, array probabilities into a matrix suitable for storage probability analysis after Moran, and solve for stationary state probabilities using the Gauss Elimination method for simultaneous equations.
	P. Eden *D. Doran*	FORTRAN IV program to generate a time-series of a set of mutually correlated random variables artificially; while maintaining the basic parameters (mean, variance, serial correlation, cross-correlation) of the original time series.
406	DEPARTMENT OF FORESTRY:	
	N.B. Henry	Plantation Register data processing.
		Preparation of card key for identification of rain forest species (preliminary version for field testing).

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
409	B.C.C. WATER SUPPLY AND SEWERAGE DEPARTMENT:	
	J. Clerke	Computation of flows into and out of lake storage. Computation of river flows from river height information.
410	B.C.C. ELECTRICITY DEPARTMENT:	
	P.A. Clappison	Development of a system for recording and analysing consumer complaints. Further development of a system for distribution transformer load records. Forecasting of loads and growth rates for 33kV zone substations. Load flow and short circuit studies on existing and proposed distribution systems.
	J.S. Lyall	Preparation of transformer tender price schedules.
413	POSTMASTER-GENERALS DEPARTMENT:	
	L.L. Birch	Aerial and transmission line calculations. General network analysis and synthesis. Radio propagation calculations.
	J.F. Connors	Fault analysis of carrier telegraph equipment. Calculation of mean and standard deviation of measurements on trunk telephone circuits.
	J. Fursdon	Respacing of pole routes to reduce 'K' factor to the predetermined limit.
	G.R.M. Grant	Characteristic impedance of coplanar transmission lines. Coincidences of broadcasting skywave coverage. Calculation of field intensity produced by current in a loop.
	P.J. Kitchen	Traffic dispersion measurements to produce collated traffic dispersion percentages. Composite growth factor calculations. Design of crossbar GV stage for production of trunking diagrams. Preparation of metropolitan exchange junction records.
415	STATE ELECTRICITY COMMISSION:	
	G. Billard	Calculation of periodic growth rates and analysis of statistics.
	K.J. Freier *J. O'Regan* *M. Sargent*	Network analysis, and transmission system design.
	L.G. Pane	Load analysis and forecasting. Economic comparisons of generation developments.
	A.L. Hoi	Load Flow studies.
	S.J. Lange	Temperature - demand correlation.

APPENDIX V - Continued.

Dept. No.	Department	Work carried out on Computer
424	SUGAR RESEARCH INSTITUTE:	
	E.E. Shepherd	Further use of the system of programs for the analysis of the results of cane transport studies. The system has been successfully applied to road and Government Railway transport as well as mill tramway operations.
425	COMPUTING PTY. LTD.:	
	H. Went	A system of programs for the compilation and editing of technical specifications and other reports.
	H. Went	Subroutines for magnetic tape input/output for Fortran 4, using upper memory for buffer areas.
	D. Muirhead	Preliminary study of system for total energy calculations.

APPENDIX VI

POST-GRADUATE STUDENT PROJECTS – 1968

DIPLOMA IN AUTOMATIC COMPUTING

PROJECT	STUDENT	SUPERVISOR
Fortran IV Bridge compatible tapes (i) Alterations to the Fortran IV monitor to allow source programs to be compiled from a Bridge compatible tape. (ii) Alterations to the monitor to allow the execution of Fortran IV relocatable programs from a Bridge compatible tape.	*A. Kinder*	*W.N. Fulton*
Specify a Fortran style WIZOR (integers, characters, relocatable S/R's) and give a list of compiled instructions corresponding to the specified statements.	*E. Melville*	*R.E. Kelly*
Specifications for the implementation of a general purpose graphic language.	*A. Duus*	*J.D. Noad*
PDP 8 assembler for the GE 225.	*D. Clark*	*J.S. Williams*
Assemble and Go (GAP) with slip and GAL	*H. Griffiths*	*W.N. Fulton*
Specifications for a simple simulation language on the GE 225.	*T. Power*	*R.N. Buchanan*
Design a logic simulator/compiler for testing the design of logic circuits.	*J. Connor*	*E.J. Sokoll*
Design and implement a program for scheduling University Course Examinations.	*K. Loong*	*J.S. Williams*
Design an Abstract Retrieval System suitable for Computer Science references.	*D. Doran*	*I. Oliver*
Specifications for the implementation of an algebraic manipulation language.	*R. Warren*	*J.S. Williams*
Design and implement a program for symbolic differentiation.	*R. Buttsworth*	*R.N. Buchanan*
Disc service routine for PDP 8 (with queuing).	*J. Row*	*C.C. de Voil*
Executive System for GE 225 (re PDP 10 hook up). In testing use two tape units as PDP 10.	*J. Dauth*	*R.E. Kelly* *E.J. Sokoll*

DIPLOMA OF INFORMATION PROCESSING

Client Accounting System I	*W. Powell*	*J. Noad*
Client Accounting System II	*L. Taylor*	*J. Noad*

APPENDIX VI - Continued.

DIPLOMA OF INFORMATION PROCESSING – continued.

PROJECT	STUDENT	SUPERVISOR
Client Accounting System III	*F. Loosemore*	*J. Noad*
Inventory of Magnetic Tapes	*N. Tranberg*	*W.N. Fulton*
Flow-charting Program	*D. Abel*	*J. Williams*
Capital Investment Analysis	*D. Bargenquast*	*I. Oliver*
Labeling Program	*A. Manicaros*	*C.C. de Voil*
Text Editing Program	*C. Sharpe*	*R.E. Kelly*

APPENDIX VII

FINANCIAL STATEMENT TO 31.12.68

CAPITAL EQUIPMENT ACCOUNT – CUMULATIVE TO 31.12.68

RECEIPTS			PAYMENTS		
Receipts to 31.12.67			Payments to 31.12.67		
Contributor Donations	283,054.00		Purchase of GE 225	291,293.09[1]	
University of Queensland Grants	40,000.00		Purchase of IBM 1620	40,864.20[2]	
Transfers from Operations Account	15,825.33		Furnishings	5,058.77	
Miscellaneous	759.48		Equipment Hire	2,048.17	
AUC/State Government Grants	80,000.00		Miscellaneous	5,501.10	
		419,638.81	Auxiliary Equipment	37,678.27	
AUC/State Government Grant, 1968		160,000.00	Building Air Conditioning	65,530.47	
Department of Main Roads, 1968		60,000.00			447,974.07[1,2]
TUC - part payment IBM 1620, 1968		5,000.00	Part-purchase of PDP 10, 1968		445,398.21
Remote Terminal Fund (Univ. Depts.), 1968		17,852.24	Remote Terminal Equipment, 1968		640.97
Transfer from Operations Account, 1968		100,000.00	Building Air Conditioning, 1968		47,406.71
Transfer from Sinking Fund, 1968		213,771.71	Excess Receipts over Payments (cumulative to 31.12.68)		34,842.80
		$976,262.76			$976,262.76

(1) Not including $62,787.05 paid prior to 1968 from Operations Account for major equipment items.
(2) Not including $ 3,092.32 paid prior to 1968 from Operations Account for major equipment items.

OPERATIONS ACCOUNT – 1.1.68 TO 31.12.68

RECEIPTS			PAYMENTS		
Balance brought forward at 1.1.68		65,608.93			
Contributions by University to Recurrent Costs –			Contra to University Contributions to Recurrent Costs –		
Salaries	45,050.22		Salaries	45,050.22	
Maintenance	5,098.54		Maintenance	5,098.54	
Equipment	1,383.62		Equipment	1,383.62	
		51,532.38			51,532.38
Revenue from Operations			Salaries	35,060.48	
University Departments	78,892.52		Maintenance	3,332.00	
Other Users	81,758.69		Equipment	1,316.35	
		160,651.21	Travel	6,321.29	
			Electricity	6,090.89	
			Furniture and Fittings	1,403.01	
			Magnetic Tape	3,583.20	
			Equipment Rental	4,404.05	
			Stationery	12,336.17	
					73,847.44
			Transfer to Capital Equipment Account		100,000.00
			Excess of Receipts over Payments		52,412.70
		$277,792.52			$277,792.52

SINKING FUND – FOR PERIOD ENDING 31.12.68

RECEIPTS		PAYMENTS	
Balance brought forward at 1.1.68	207,404.31	Transfer to Capital Equipment Account	213,771.71
Interest received for the period	14,665.20	Excess of Receipts over Payments	8,297.80
	$222,069.51		$222,069.51

L.N. LIVINGSTON, F.A.S.A.
BURSAR

UNIVERSITY OF QUEENSLAND

COMPUTER CENTRE

EIGHTH ANNUAL REPORT

1st January to 31st December, 1969

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FOREWORD

During 1969 important changes have occurred in the organisation of the Computer Centre and this is reflected in the form of the Annual Report. The combined academic and service functions, previously the responsibility of the Department of Electrical Engineering became the responsibility of the Professor of Computer Science, Professor G.A. Rose; during the year the respective functions of the Department of Computer Science and Computer Centre were defined. Concurrently, a Systems Development Group was established with immediate benefit to the major task of development of the new facilities. However, without further finance for accommodation, equipment and staff, the planned increase in capacity of the system over the 1970-72 triennium will not be possible.

As Chairman of the Computer Centre Executive Committee, I record my appreciation of the dedicated work of Professor Rose and his staff during a year of unusually heavy commitments in all aspects of computing.

S.A. Prentice

July, 1970

COMPUTER CENTRE EXECUTIVE COMMITTEE 1969

Professor S.A. Prentice, B.Sc.,M.E.E., FIE(Aust.),FIEE	Professor of Electrical Engineering (Chairman)
Professor D.W. McElwain, M.A.,Ph.D., F.BPsS.	Professor of Psychology (Deputy Chairman)
Professor E.C. Webb, M.A.,Ph.D.Camb., FRACI	Professor of Biochemistry (President, Professorial Board)
Professor C.S. Davis, D.F.C.,M.Sc., Ph.D.	Professor of Mathematics
Professor R.C. Gates, B.Comm.(Tas)., M.A.(Oxon).	Professor of Economics
Mr. I.M. Hunter, B.Sc.,MIE(Aust)., AMIMechE,MIEE.	Lecturer in Computing, University College of Townsville.
Mr. R.E. Kelly, B.E.	Senior Lecturer in Computer Science
Professor S. Lipton, M.Sc.	Professor of Mathematics
Professor D. Mugglestone, B.Sc., Ph.D., FRAS,FIP,FAIP.	Professor of Physics
Mr. E.D. Murray, M.C.,B.E., FIE(Aust).,FIEE.	Chairman, Computer Centre Advisory Committee, University College of Townsville.
Professor R.G.H. Prince, B.E.,B.Sc., Ph.D.,AMIChemE.	Professor of Chemical Engineering (Resigned 1.6.69)
Dr. S.A. Rayner, M.Ed.,Ed.D.,M.A.	Deputy Registrar
Professor G.A. Rose, B.E.,MIEE.	Professor of Computer Science
Mr. E.J. Sokoll, B.E.	Lecturer in Computer Science

STAFF AS AT 31.12.69

COMPUTER CENTRE

Acting Director	*Professor G.A. Rose*, B.E., M.I.E.E.
Systems Analyst	*C.C. de Voil*, B.E., M.Eng.Sc.
Systems Programmer	*E.J. Row*, B.E., Dip.Aut.Comp.
Technical Writer	*H.L. Smythe*
Administrative Officer	*J.A. Jauncey*
Maintenance Technicians	*G.L. Jerrard* *D.B. Brunner*
Computer Operators	*Dianne Ball* *Pat Heathcote* *Julie Hislop* *Colleen Kelly* *Noela Leschke* *Anne McArthur* *Angela Vidanovic*
Data Preparation Assistants	*Heather Heydon* *Diann Munro*
Purchasing Officer	*Dal Anderson*
Female Assistant	*Barbara Farnsworth*

COMPUTER SCIENCE

Head of Department	*Professor G.A. Rose*, B.E., M.I.E.E.
Senior Lecturer	*R.E. Kelly*, B.E.
Lecturers	*J.D. Noad*, B.Sc. *E.J. Sokoll*, B.E.
Senior Demonstrators	*M.J. McLean*, M.Sc. *J.S. Williams*, B.Sc., Dip.Aut.Comp.
Secretary	*Judith Greenhill*

ANNUAL REPORT

INTRODUCTION

The principal features in 1969 were the organisational changes and the rapid growth of all activities. The major set-back in plans for development was the failure to obtain any financial support for 1970-72 from the Australian Universities Commission for development of the new PDP-10 system.

Delay in introducing batch processing using this system has caused disappointment to many users. The difficulties of adapting the manufacturer's software to the needs of users proved greater than predicted; similarly, the provision of a remote terminal service has been greatly delayed because of the slippage in production schedules for the disc storage system, delays in the supply of disc software and extensive modifications to this considered necessary by the Computer Centre staff.

EXECUTIVE COMMITTEE ACTIVITIES

A.U.C. Grant

A special meeting was held to consider the implications of the decision by the Australian Universities Commission that no money would be provided for capital equipment for 1970-72. An appeal against this decision was prepared by a sub-committee and, following approval by the Senate, was forwarded to the Commission.

Sub-Committee on Professional Systems Development Group

The sub-committee prepared guidelines to the conditions of appointment of this group and proposed a series of classifications and salaries. A number of appointments were made as stated under "Staff Changes".

Individual Programmers for Departments

The feasibility of giving greater programming assistance to Departments is still under consideration.

Remote Terminals

Policy on the allocation of and charges for remote terminals was determined. The first sixteen terminals will be distributed thus:

University Departments	8
Computer Centre	4
Non-University Departments	4

Further distribution to the planned maximum of 64 terminals is dependent on the provision by the A.U.C. of adequate finance for development of the system.

Revision of Charges

Following a previous resolution of the Executive Committee that the scale of charges for the PDP-10 system be reviewed before 31st December 1969, a full examination was made of the utilisation of equipment and costs. It was recommended that the ratios between the existing rates for different user groups should be reduced and that the central processor, core storage and card reader unit rates be increased. A further review is to be made in November 1970.

Undergraduate Teaching

Proposals for undergraduate courses in Computer Science were noted by the Executive. These were primarily academic matters.

Accounting System

A comprehensive accounting system which includes the automatic preparation of invoices was established.

Accommodation

The acute shortage of accommodation in the Department of Computer Science and the Computer Centre was discussed, and members supported Professor Rose's submission for allocation of more space for 1970 and longer term proposals for 1973-75.

I.B.M. 1620 System

The arrangements for sale of this system to Townsville were concluded. This computer system had been on loan to Townsville University College since 1965.

STAFF CHANGES

Messrs. M.J. McLean and J.S. Williams were appointed Senior Demonstrators.

The resignations of I. Oliver (Lecturer), R.N. Buchanan (Temporary Lecturer), W.N. Fulton (Demonstrator) and L. Mor (Demonstrator) were received with regret.

The appointment of a Technical Writer, Helen Smythe, greatly assisted in the preparation of the numerous technical documents necessary to define the status of the installations and software. Standard formats for technical documents were also established.

Mr. D. Anderson was appointed Purchasing Officer; this activity increased greatly in the latter half of the year when the building up of extensive spare-part stocks began.

TEACHING AND LIAISON ACTIVITIES

General

Programming courses were restricted by staff shortages, so that unfortunately many persons wishing to attend FORTRAN courses were disappointed.

Computer Centre Bulletin

The publication of the Computer Centre Bulletin at approximately monthly intervals, has provided a valuable service to users. It gives the current status of facilities and details of modifications to hardware and software. In particular it provides information on computer methods for a continually changing population of users, some of whom are beginners.

RESEARCH AND DEVELOPMENT

As in 1968, research work has been seriously limited by the need for staff to concentrate on the implementation of batch-processing and remote terminals on the PDP-10 System. It is becoming virtually impossible to mix long-term research with the ever-growing demands of systems development in the Computer Centre. A paper, "Command, file and task structure for a medium-sized, time-shared system", written by I. Oliver, was presented at the Fourth Australian Computer Society Conference in Adelaide, August 1969, and resulted in considerable discussion. The work described in this paper has provided valuable guide-lines for systems development.

The development of an extensive automatic accounting system for the PDP-10 was completed towards the end of the year. Charges are based on the actual utilization of memory, processor, card reader, etc., in conjunction with the costs of the various units. The system includes protection and recovery features, audit checks, invoice preparation, and statistics.

COMPUTER USE

The distribution of computer time for the GE225 is illustrated in Fig. 1. The total switched on time for the year for the GE225 was 4196 hours. Appendices I and II show the distribution of GE225 computer time used by University Departments and non-University Organisations respectively. A graph showing the growth in use of the GE225 since 1962 is shown in Fig. 2. The growth in use of the PDP-10 after the introduction of batch processing on the PDP-10 in May has made third shift operation of the GE225 infrequent. Reduction in use is appropriate as after several years' service extensive replacements of components has become necessary, and it cannot be expected that the high reliability of the system to date can be maintained beyond the next few years.

A statement on the distribution of usage of the PDP-10 computer is given in Appendix III. Usage is a complex concept in a time-shared computer because the system is committed to more than one user at a given time. Usage is a composite figure based on the utilization of the main components of the system, character transmission, etc. as reflected in the charge structure. A considerable proportion of the operating time of the PDP-10 system has been taken up with systems development; this time is not included in Appendix III.

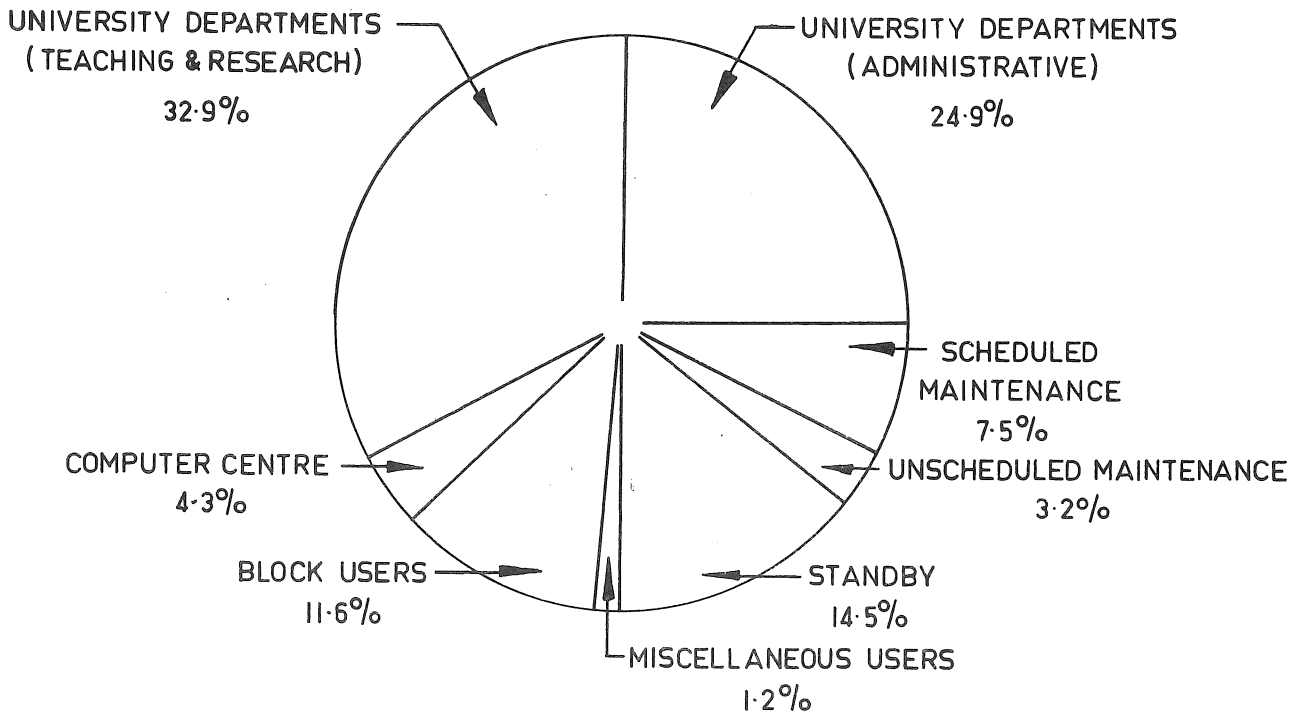
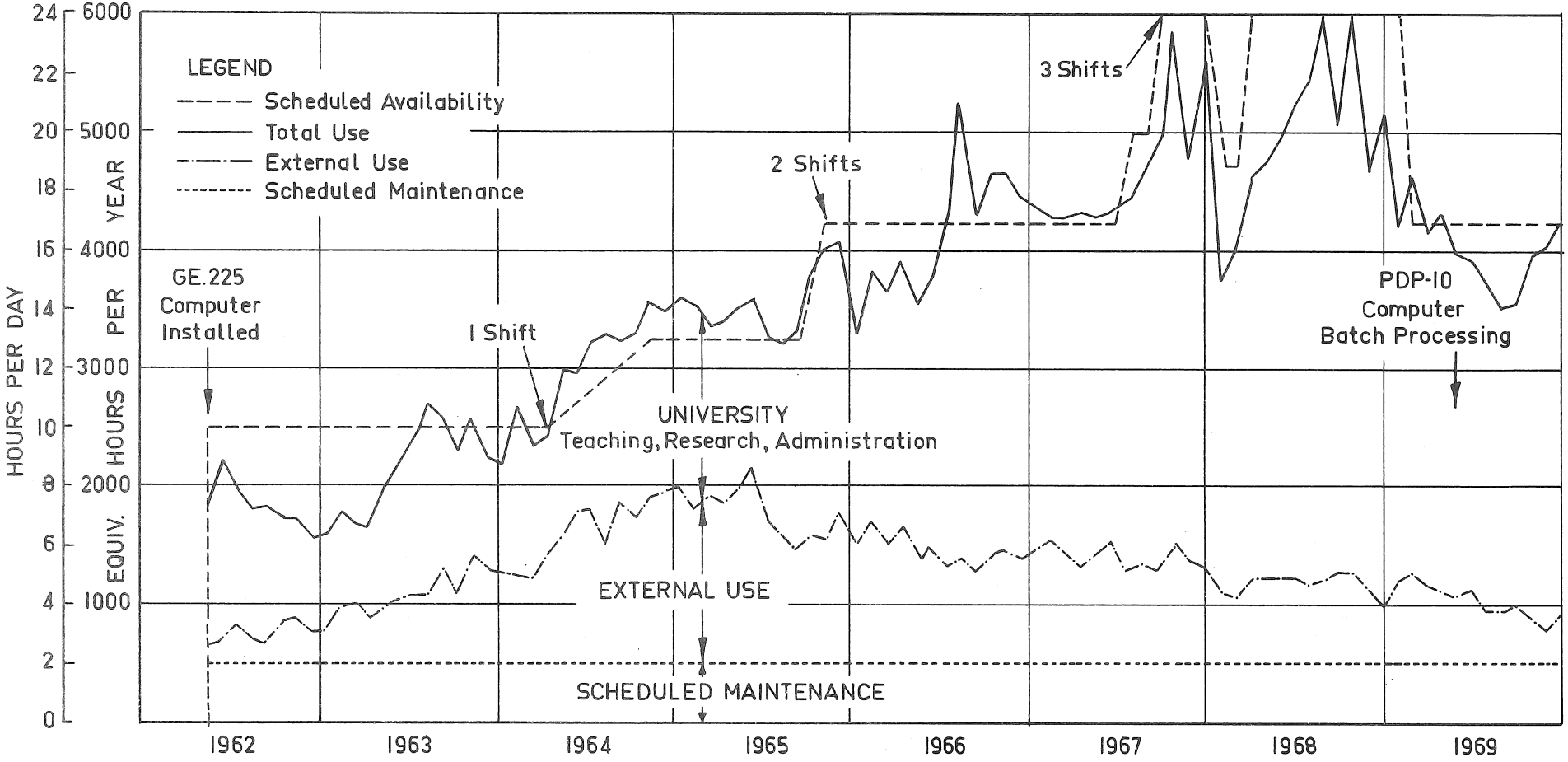


FIG.1. GE.225—DISTRIBUTION OF HOURS OF TOTAL SWITCHED-ON TIME (4196 HOURS = 100%)

The continued demand by non-University users is gratifying and has provided almost 50% of the income from computer operations.

Most users of the computer facilities have provided a list of new programs developed during the year, and this information edited for uniformity of presentation, is given in Appendix IV. Attention is drawn to the very wide variety of computation and data processing work which has been carried out with the present facilities.

FIG.2. GROWTH OF COMPUTER USE GE.225 SYSTEM 1962—1969



PDP-10 COMPUTER SYSTEM

The temporary core store units were replaced by higher-speed units, as originally ordered. The two disc drive units have been seriously delayed and may not be in operation before mid-1970.

A great deal of staff effort has been expended on acceptance test procedures and criteria. In several instances, the drafting of these was hindered by delays in the supply of adequate documentation by the Contractor.

A continuing difficulty is the difference in philosophy between the University and the Contractor; this may be summed up by stating that there is a difference of opinion as to the extent to which supporting systems software should be developed and proven before payment for items of equipment associated therewith.

Maintenance of the PDP-10 system was taken over by the Computer Centre after the expiry of the contract with the Contractor in October.

FINANCIAL POSITION

The income for 1969 from the GE225 system considerably exceeded the estimate, but that from the PDP-10 system was only about one-third of the estimate, for reasons stated in the Introduction. In particular, external use of the PDP-10 system was slight.

The financial position is shown in Appendix V. A Remote Terminal account is shown separately in the Financial Statement to record the amounts paid by Departments and Organisations and expended on remote terminal and related equipment.

Delays in the delivery of equipment, and consequently in the introduction of batch processing and remote terminal operation, have deferred the date of taking up the loan from the University for capital equipment purchases. The loan may be required for a longer period than was originally expected.

Staff salaries in the Computer Centre are a major component of operating costs. University General Funds provide approximately one-third of the annual amount.

INSURANCE

Insurance of the computer systems has been investigated and it is concluded that insurance against machinery breakdown is essential and can be effected at reasonable cost, but insurance against loss of information or loss of revenue consequential to machinery breakdown is impracticable because of difficulties of definition and high premiums.

FUTURE NEEDS

The most important future needs are adequate capital for development of the system, particularly further disc drives, and recurrent grants for salaries and operating expenses.

The present policy of making the Computer Centre largely self supporting requires that charges to users be maintained at a correspondingly high level, and that the staff adopt a commercial attitude towards all aspects of the operation of the Centre. It is hoped that in future years, the Australian Universities Commission will provide recurrent funds specifically for computing; this would greatly ameliorate present difficulties.

APPENDIX I

DISTRIBUTION OF COMPUTER TIME (HRS.) USED BY UNIVERSITY DEPARTMENTS - GE225

Code	Department / Month ending / Working Days	Jan.24 17	Feb.21 19	Mar.21 20	Apr.18 18	May23 23	Jun.20 19	July18 20	Aug.22 24	Sep.19 20	Oct.24 25	Nov.21 20	Dec.24 23	1969 TOTALS	TOTAL TO DATE
	Teaching and Research														
001	Computer Centre	26.1	13.6	17.3	17.2	16.9	19.1	10.2	14.4	10.2	17.4	8.6	10.3	181.3	3955.8
002	Civil Engineering	1.4	1.3	0.8	3.7	7.9	4.2	4.7	12.2	11.4	16.7	7.5	6.1	77.9	570.8
003	Economics	1.5	1.9	4.5	0.3	0.4	3.5	2.8	1.2	3.0	0.8	0.1	-	20.0	35.6
004	Physics	16.8	36.5	34.1	36.4	29.1	18.5	17.7	23.3	26.8	18.7	21.5	14.5	293.9	2364.5
005	Psychology	-	-	0.9	2.0	5.2	5.5	8.9	5.8	9.8	12.2	15.0	7.5	72.8	387.8
006	Electrical Engineering	0.7	1.3	3.0	3.3	10.9	1.7	7.3	11.1	1.0	6.1	0.3	3.6	50.3	462.2
007	Mechanical Engineering	5.2	4.3	4.0	2.9	3.4	1.4	1.3	1.0	0.5	1.9	1.7	2.8	30.4	442.5
008	Mathematics	0.7	0.4	0.3	-	0.7	2.6	4.2	2.5	4.3	4.7	2.6	0.7	23.7	205.6
009	Geology	0.1	0.4	0.2	0.2	-	-	-	1.1	0.5	0.2	1.2	0.6	4.5	32.2
010	Animal Husbandry	1.4	0.3	2.4	2.0	4.4	2.9	1.8	0.8	2.7	0.9	0.3	1.0	20.9	290.4
012	Agriculture	8.9	6.2	6.1	5.6	5.5	2.6	2.2	3.3	1.4	5.7	3.5	4.8	55.8	332.3
013	Education	0.2	1.4	-	0.9	0.7	0.8	0.9	2.1	0.8	1.9	1.5	3.9	15.1	228.9
014	Mining & Metallurgical Eng.	1.9	4.7	11.0	7.1	20.0	8.7	11.1	8.0	14.6	26.2	12.8	1.3	127.4	407.2
015	Computer Research	-	-	-	-	-	-	-	-	-	-	-	-	-	33.7
016	Parasitology	-	0.5	-	-	0.1	-	-	0.6	0.2	0.1	0.6	-	2.1	27.6
017	Veterinary Preventive Medicine	-	-	-	-	-	-	-	-	-	-	-	-	-	43.1
018	Surveying	-	-	-	-	-	-	0.2	0.1	-	-	0.5	-	0.8	29.2
019	Veterinary Anatomy	-	-	-	-	-	-	-	-	-	-	-	-	-	17.2
020	English	-	-	-	-	-	-	-	-	-	-	-	-	-	31.1
021	Veterinary Clinical Studies	-	-	-	-	1.9	1.4	0.7	1.4	5.7	0.9	3.2	3.7	18.9	21.6
022	Remedial Education	-	-	-	-	-	0.5	-	-	-	0.1	1.1	0.4	2.1	15.1
023	Accountancy	-	-	-	-	-	-	-	-	-	-	-	-	-	4.4
024	Microbiology	0.1	-	0.2	3.4	1.0	0.7	-	-	-	0.4	2.5	2.4	10.7	77.1
025	Physiology	-	0.5	0.6	0.3	4.2	1.9	0.2	0.5	0.9	1.2	0.4	2.0	12.7	33.1
026	Chemistry	0.7	5.5	5.3	8.9	11.8	7.1	8.1	9.7	8.1	26.7	7.4	10.1	109.4	347.7
027	Geography	-	-	-	-	-	-	-	-	0.6	0.6	0.9	1.4	3.5	16.1
028	Townsville University College	-	-	-	-	-	-	-	-	-	-	-	-	-	7.1
029	Child Health	-	-	0.3	-	0.4	0.1	0.1	-	0.3	-	-	0.1	1.3	12.4
030	Social & Preventive Medicine	12.1	5.9	7.7	3.4	2.2	2.9	4.3	16.7	2.9	3.3	7.8	12.6	81.8	169.6
032	Botany	0.8	2.1	3.1	9.7	4.5	0.9	1.0	0.9	0.4	0.8	0.5	0.5	25.2	61.3
034	Chemical Engineering	7.5	14.6	10.6	15.0	21.9	6.7	9.8	11.1	7.4	10.9	11.1	2.6	129.2	539.5
035	History	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0
037	Dentistry	-	0.1	0.3	0.3	-	1.1	3.3	1.9	2.3	0.7	10.3	3.4	23.7	276.6
039	Surgery	-	-	-	-	-	-	-	-	-	-	-	-	-	18.0
041	Social Studies	-	0.1	0.2	0.1	0.2	0.1	-	0.4	0.8	-	-	-	1.9	20.0
042	Anatomy	-	-	-	-	-	-	-	-	-	-	-	-	-	2.8
045	Neurology	-	-	-	-	-	-	-	-	-	-	-	-	-	2.5
046	Anthropology & Sociology	-	-	-	-	-	-	-	-	-	-	-	-	-	24.7
047	Institute of Technology	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
048	Veterinary Science Faculty	-	-	-	-	-	-	-	-	-	-	-	-	-	2.1
049	Medicine (Medical School)	0.1	-	-	-	-	-	-	-	-	-	-	-	0.1	7.0
050	Government	8.1	12.5	5.0	5.6	12.7	9.6	13.3	8.7	5.4	12.7	8.1	19.8	121.5	301.4
051	External Studies	-	-	1.2	1.5	-	-	-	-	-	-	-	-	2.7	31.3
052	Pharmacy	-	-	0.5	0.2	0.2	-	0.1	1.5	-	-	-	0.1	2.6	14.9
053	Biochemistry	-	-	0.1	0.3	0.1	0.5	0.5	0.2	-	-	0.2	-	1.9	5.3
054	Student Counselling	0.1	0.8	-	1.7	-	-	-	-	-	-	-	-	2.6	18.9
055	Medicine (P.A.H.)	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9
056	Entomology	-	-	-	-	0.1	0.1	0.2	-	-	-	-	0.1	0.5	2.1
057	Pathology	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8
059	Thatcher Library External Studies	3.3	0.8	2.4	1.9	-	0.2	2.0	0.2	0.5	-	-	4.1	15.4	15.8
060	Japanese	-	2.4	-	-	-	-	-	-	-	-	-	-	2.4	2.5
062	Psychological Medicine	-	-	-	-	-	0.3	-	-	-	-	-	-	0.3	1.5
063	Zoology	1.4	2.5	2.8	2.0	1.2	-	0.6	0.5	1.1	1.3	0.1	0.2	13.7	14.5
066	Architecture	-	-	-	0.1	-	-	-	-	-	-	-	1.0	1.1	1.1
	SUB-TOTALS	99.1	120.6	124.9	136.0	167.6	105.6	117.5	141.2	123.6	173.1	131.3	121.6	1562.1	11969.6
	Administrative														
306	Electrical Engineering	-	-	0.6	0.3	0.9	0.6	0.1	0.5	0.2	3.3	0.1	3.5	10.1	17.1
311	Data Processing	42.0	107.0	71.9	51.3	70.6	82.5	68.0	82.5	69.5	95.2	103.8	147.7	992.0	3417.3
312	Agriculture	0.3	0.1	1.3	0.7	-	-	-	-	-	-	-	-	2.4	11.3
331	Examination Section	-	-	-	-	-	-	-	-	-	-	-	-	-	42.9
334	Chemical Engineering	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3
338	Administration	-	-	-	-	-	-	-	-	-	-	-	0.4	0.4	2.5
340	Photography	0.8	0.8	1.6	1.3	1.7	2.2	2.2	2.6	0.7	1.8	1.0	2.3	19.0	73.1
343	King's College	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5
351	External Studies	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7
352	Pharmacy	-	0.6	-	-	-	1.3	0.5	0.4	0.3	0.8	0.4	0.3	4.6	12.5
354	Counselling Services	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4
358	Faculty of Engineering	-	-	-	-	-	-	-	-	-	-	-	-	-	3.5
361	Bookshop	-	-	-	-	-	-	1.9	-	-	2.2	-	-	4.1	13.8
364	TALSA Credit Union	0.2	1.5	0.7	0.2	0.9	0.7	0.4	0.8	0.4	1.0	0.4	0.3	7.5	8.6
365	University Union	-	-	-	1.0	-	-	1.5	-	-	-	0.5	-	3.0	5.5
	SUB-TOTALS	43.3	110.0	76.1	54.8	74.1	87.3	74.6	86.8	71.1	104.3	106.2	154.5	1043.1	3610.0
	TOTALS	142.4	230.6	201.0	190.8	241.7	192.9	192.1	228.0	194.7	277.4	237.5	276.1	2605.2	15579.6

APPENDIX II

DISTRIBUTION OF COMPUTER TIME (HRS.) USED BY EXTERNAL ORGANISATIONS - GE225

Code	Department / Month Ending / Working Days	Jan.24 17	Feb.21 19	Mar.21 20	Apr.18 18	May23 23	Jun.20 19	July18 20	Aug.22 24	Sep.19 20	Oct.24 25	Nov.21 20	Dec.24 23	1969 TOTALS	TOTAL TO DATE
Contract Users															
401	Main Roads Department	-	-	-	-	-	-	-	-	-	-	-	-	-	1517.0
402	Southern Electric Authority	5.3	14.8	7.3	3.7	2.4	6.8	2.9	-	-	-	0.2	0.5	43.9	378.4
403	Primary Industries Department	5.5	6.9	7.6	6.5	5.9	9.7	8.9	7.9	7.3	8.5	7.2	8.5	90.4	351.5
404	Irrigation & Water Supply Comm.	3.8	3.7	4.7	4.2	3.4	1.9	2.0	5.1	2.9	3.0	2.1	2.1	38.9	400.3
406	Forestry Department	1.7	-	-	-	-	-	-	-	-	-	-	-	1.7	308.8
407	Survey Office	-	-	-	-	-	-	-	-	-	-	-	-	-	222.7
408)	(Transport)	-	-	-	-	-	-	-	-	-	-	-	-	-)	-
409)	Brisbane City Council (Works)	0.4	-	-	-	0.5	0.2	0.4	-	-	0.2	-	-	1.7)	362.7
410)	(Elec.)	4.1	3.1	2.1	3.9	5.0	3.8	4.3	3.4	7.6	3.9	7.0	5.0	53.2)	-
412	Queensland Govt. Railways	-	-	-	-	-	-	-	-	-	-	-	-	-	76.1
413	P.M.G. Department	3.0	4.9	6.7	3.9	5.4	0.9	2.7	2.1	1.0	5.5	1.5	2.8	40.4	305.9
414	C.S.I.R.O.	0.2	-	-	-	-	0.8	0.1	0.2	0.1	0.2	-	-	1.6	334.8
415	State Electricity Comm. Qld.	5.7	6.0	5.8	3.5	10.7	9.3	3.7	11.1	6.6	5.8	3.1	5.9	77.2	297.7
423	Commonwealth Dept. of Works	7.8	10.9	11.8	8.4	7.1	3.4	5.0	5.5	5.1	1.2	0.1	1.8	68.1	465.2
424	Sugar Research Institute	0.1	-	0.2	0.1	-	-	0.1	-	0.1	-	-	-	0.6	97.5
425	Computing Pty. Ltd.	2.0	1.9	5.4	5.9	8.1	5.9	4.1	5.6	5.9	8.2	4.3	9.1	66.4	86.7
426	Department of Air	-	-	-	-	0.6	0.5	-	-	-	-	-	-	1.1	1.1
105	Co-ordinator General's Dept.	-	-	-	-	-	-	-	-	-	-	-	-	-	141.7
111	Aust. General Electric	-	-	-	-	-	-	-	-	-	-	-	-	-	9.0
116	Mt. Isa Mines Ltd.	-	-	-	-	-	-	-	-	-	-	-	-	-	167.9
117	Wide Bay-Burnett R.E.B.	-	-	-	-	-	-	-	-	-	-	-	-	-	30.2
118	Capricornia R.E.B.	-	-	-	-	-	-	-	-	-	-	-	-	-	50.9
119	Cardno and Davies	-	-	-	-	-	-	-	-	-	-	-	-	-	50.0
120	Townsville R.E.B.	-	-	-	-	-	-	-	-	-	-	-	-	-	56.2
121	Cairns R.E.B.	-	-	-	-	-	-	-	-	-	-	-	-	-	46.4
122	Mackay R.E.B.	-	-	-	-	-	-	-	-	-	-	-	-	-	12.1
	TOTAL CONTRACT USERS	39.6	52.2	51.6	40.1	49.1	43.2	34.2	40.9	36.6	36.5	25.5	35.7	485.2	5770.8
	TOTAL MISCELLANEOUS USERS	6.8	5.9	4.0	4.0	5.7	4.4	4.3	4.4	3.9	3.0	1.9	2.0	50.3	390.7
	TOTALS	46.4	58.1	55.6	44.1	54.8	47.6	38.5	45.3	40.5	39.5	27.4	37.7	535.5	6161.5

APPENDIX III

DISTRIBUTION OF PDP-10 COMPUTER USAGE
(as a Percentage of Total Usage)

Department / Period	May thru Sept.	Oct.	Nov.	Dec.	1969 Usage
UNIVERSITY DEPARTMENTS:					
Agriculture	2.34	10.61	2.31	7.50	4.52
Animal Husbandry	0.10	0.10	0.04	-	0.09
Botany	2.95	1.63	10.91	3.91	3.32
Chemical Engineering	13.70	6.91	21.77	31.27	14.78
Chemistry	2.41	4.90	4.21	2.84	3.07
Child Health	1.17	0.67	-	0.32	0.90
Civil Engineering	3.58	3.55	2.79	5.62	3.74
Computer Centre	18.16	22.55	3.58	1.12	16.22
Dentistry	0.07	-	2.39	1.86	0.40
Economics	0.36	0.09	-	-	0.25
Education	0.01	-	-	0.66	0.08
Electrical Engineering	13.03	17.28	7.93	12.34	13.45
Geology	0.63	0.14	-	-	0.42
Government	0.09	-	-	-	0.06
Mining & Metallurgical Eng.	1.58	1.24	0.25	-	1.25
Pharmacy	0.08	0.31	1.68	1.17	0.35
Psychology	5.15	0.34	1.39	4.29	3.86
Physics	28.17	20.47	31.67	22.70	26.30
Physiology	0.03	0.96	3.19	-	0.42
Schonell Education Research	-	-	1.17	-	0.08
Social & Preventive Medicine	0.45	0.56	0.48	0.01	0.43
Social Studies	0.21	-	-	-	0.13
Surveying	-	-	-	0.62	0.07
Townsville University Coll.	0.46	1.00	0.42	0.06	0.52
University Union	0.09	-	-	-	0.06
Veterinary Clinical Studies	0.28	0.28	1.20	0.45	0.35
Zoology	0.58	0.12	0.13	0.07	0.41
Sub-totals	95.68	93.71	97.51	96.81	95.53
EXTERNAL DEPARTMENTS:					
Bureau of Sugar Expt. Stns.	0.29	0.05	1.32	0.26	0.40
Gunn Rural Management	0.84	3.77	-	0.32	1.31
I. Oliver & Associates	1.50	-	-	-	0.94
Irrigation & Water Supply	1.10	0.06	-	-	0.70
Main Roads Department	-	1.96	0.72	2.06	0.66
Other External Users	0.02	-	-	0.11	0.02
Primary Industries	0.13	-	0.45	0.44	0.16
State Elec. Comm. of Qld.	0.07	-	-	-	0.04
21 Psych. Unit, C.M.F.	0.37	-	-	-	0.24
Sub-totals	4.32	6.29	2.49	3.19	4.47
TOTAL	100.00				

APPENDIX IV

SOME WORK CARRIED OUT BY USERS OF THE GE 225 AND PDP-10 COMPUTERS IN 1969

Dept. No.	Department	Work Carried Out
002	CIVIL ENGINEERING:	
	R. Nilsson	Bigframe:- Revision of the general 2D frame program to quadruple its capacity by using a solution technique that only stores the nonzero-blocks.
		Edit:- An interactive line editor for the PDP-10.
		Loader:- Modifications to the PDP-10 to give proper maps and to allow overlaying the symbol table with common.
	L. Isaacs	Program for solution of two dimensional seepage problems with or without a free surface. The position of the free surface and the pore pressures are calculated.
004	PHYSICS:	
	J.D. Argyros	Miscellaneous calculations associated with radiative transfer.
	G.G. Bowman	Compilation of statistical data on ionospheric irregularities.
	M.J. Burke	Routine work on least square and error analysis.
	D.R. Cameron	The use of the prony algorithm in inverting integral equations.
	A.L.M. Dooboy	Frequency analysis of Pi2 micropulsations using filter and Fourier transform methods.
	R.J. Dyne	Calculation of atomic wave functions and interatomic forces.
	G.D. Finn	Some integral equation inversion techniques.
		Numerical convolution.
		Computations of probability functions useful in scattering theory.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
004	CONTD.	
	D.E.W. Gillingham	Rock magnetism calculations.
	M.T. Gladwin	Digital ultrasonic velocity data.
	J.N. Holt	Solution of non-linear integral equations.
		Monte Carlo programs for radiation transport.
	M.J.S. Johnston	Processing digital magnetometer data.
	N. Kantarizis	Accurate phase measurements were worked out from ionospheric models suitable for tests of true-height techniques.
		A polynomial method of reducing phase vs. frequency data into true-height vs. frequency profiles was developed.
		A sharp deep-volley layer model was developed in order to compare with data observed using the Phase Ionosonde, from a sporadic E layer.
	M.S. Khan	Computation of the direction of arrival parameters of the radio waves reflected from the ionosphere.
		Fourier and spectrum analysis of the direction of arrival parameters, and barometric data.
		True-height analysis of the ionograms.
		Graphical representation of the shape of the ionospheric layers.
	B.W. Lucas	Studies of the relationship between the scattering of X-rays and the physical properties of crystalline solids.
	K.J.W. Lynn	Computation of VLF waveguide model parameters and regression line fitting to experimental data.
		Computation of sunrise, sunset and solar zenith angle parameters for great circle propagation paths.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
004	CONTD.	
	R.W. Parsons *J.C. Andrews* *F.P. Kelly* *R.J. Netterfield*	Computation of spectral line-shape functions, microwave absorption functions and parameters for the design of a microwave spectrometer.
	B.J. Rigby	Calculations of magnetosphere variables using a gas dynamic model.
	A.K. Saha	Computation of matrix elements and the reduction of ionospheric true heights, including a study of associated accuracies.
	I.R. Shortt	Computation of colours of reflection nebulae.
	R.W. Simpson	Calculations associated with curve of growth analysis.
	P.H. Spurling	Solution of the continuity equation for production and loss of ionization at F-region altitudes of the ionosphere.
		Prediction and tabulation of sunrise times at various heights and at varying latitudes using information from the Nautical Almanac.
		Data processing of results read from the polarimeter charts from Bribie Island.
	F.D. Stacey	Finite strain theory.
	G.J. Tuck	Fourier analysis of dielectric anisotropy
	S.J. West	Application of empirical methods of time series analysis to micropulsation signals.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
005	PSYCHOLOGY:	
	J.D. Bain	Marking and scaling of multiple choice statistics examination.
		Programs to evaluate ethnic attitudes. (Data obtained by D. Thomas).
	J.V. Bennett	Analysis of cognitive and motor processes in five-year old children.
	L.E. Enticknap	Investigation of the fakability of predictors of accident proneness.
	E. Harwood	Factor analysis of MMPI scale scores and theological belief measures (E. Drake and P. King).
		Development of a program to score the MMPI.
	M.C. Horan	Discriminant analysis and multivariate F-ratios on data from brain lesion samples.
	R.R. Johnstone	Basic statistical analysis of continuously recorded auditory threshold data.
	G.E. Kearney	Various projects using test analysis programs to examine the validity of items in the construction of psychological tests.
	H.G. Law	Development of a multiple scalogram analysis program.
		Adaptation of a number of general utility programs for use in the Department: (a) Principal component analysis on Varimax rotation. (b) Analysis of variance. (c) Discriminant analysis. (d) Hierarchical grouping. (e) Convergence analysis. (f) General test scoring program. (g) Program to score the various forms of the 16PF.
		Factor analysis of responses to a theological belief inventory.
		Computer scoring of questionnaires.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
005	CONTD.	
	J.G. O'Gorman	Data analysis of individual differences in psycho-physiological responsiveness and their personality correlates.
	A.R. Pike	Simulation of a stochastic model for decision behaviour.
	D.A.T. Siddle	Analysis of data relating to individual differences in the ability to concentrate attention.
	D.R. Thomas	Factor analysis of ethnic attitudes.
	K.D. White	Regression and factor analyses of physiological and personality variables.
	Animal Behaviour Unit	A study of the emergence of sex differences in the social and sexual behaviour of chickens.
		A study of interpersonal spacing.
006	ELECTRICAL ENGINEERING:	
	M. Darveniza	Lightning performance calculations on transmission lines.
	K. Watts	Lightning outage rate statistics.
	Liew Ah Choy	Detailed sensitivity analysis of lightning performance calculations.
	R.O. Caldwell	Analysis of the non-standard waveshapes on impulse strength of H.V. insulation.
	V.K. Sargeant	Prediction of noise and distortion in an audio P.C.M. system with digital companding.
	D. Mackerras *A. Mortimer*	Processing of lightning data recorded in computer-compatible format on an incremental magnetic tape recorder.
	R.K. Jarrott	Electrical network analysis.
	I.J. Albrey	Analysis of dielectrically loaded coaxial cables with a view to finding their attenuation and phase change parameters.
	D.J. Ellis	Design of microwave stripline circuits.
	J. Greig	Electrical network analysis.
	P.G. Rogers	Aerial design.
	M.A. Green	Analysis of Hall effect.
	I. Brown	Design of low noise amplifier.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
008	MATHEMATICS:	
	B.L. Adkins	Investigation of a statistical model for dental caries incidence.
	L. Bass *D. McIlroy*	Ion transport
	L. Howard	Earthquake location.
	R.C. Hughes	Data analysis.
	C.F. Lee	Computations of numerical solutions of some nonlinear differential equations.
	J.M. Skowronski *R. Stonier*	Technical problems in inverse delta method of solving differential equations.
012	AGRICULTURE:	
	I.F. Horton *W.L. Goodman*	Analysis and computation of a series of agricultural experiments covering growth rates, nett assimilation rates, analysis of variance etc. of plot and field trials.
		Lawes density trial experiments.
		New Guinea sugar cane stalk analysis.
		Computation of seed germination data.
		Computation and statistical analysis of growth analysis and seed yield data from a defoliation experiment with Townsville stylo.
		Calculations on frequency distributions of a survey of factors affecting dairy farmers' acceptance of the Dairy Pasture Subsidy Scheme.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
014	MINING AND METALLURGICAL ENGINEERING:	
	W.J. Whiten	Further development of simulation programs for analysis of crushing, grinding, and flotation processes.
		Programs to calculate and evaluate spline functions.
		Data analysis routines using spline functions.
		An integration routine for arbitary differential equations to a specified accuracy.
		Programs to solve a set of normal equations and to provide error estimates for regression problems using Cholesky's reduction.
		Non-linear least squares programs.
		Programs for plotting in Fortran IV.
	C.W. Bailey	A system of programs for steady state and dynamic simulation of flotation plants.
	J. O'Shea	Investigation of the design of flotation plants using linear programming.
		Simulation of the statistical behaviour of ore storage bins.
	G.D. Free	Development of a mathematical model of the sub-level caving mining system and the analysis of significant variables.
		Simulation and prediction of design parameters of a sub-level cave method by optimal model analysis.
		Linear and non-linear curve fitting of flow properties of broken ore.
	C.W. Bailey *M.J. Lees*	A set of programs for the analysis of X-ray fluorescence data.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
014	CONTD.	
	M.J. Lees	Non-linear least squares curve fitting with data adjustment and weighting of variables.
		Application of curve fitting to finding flowrates in metallurgical plant.
		The application of non-linear least squares techniques to the calculation of parameters of mathematical models.
		Steady-state and dynamic simulation of comminution-classification circuits including the simulation of wedge wire screens.
	N.W. Johnson	Analysis of flotation data.
016	PARASITOLOGY:	
	R.W. Sutherst	Analysis of mortality data on the cattle tick (BOOPHILUS MICROPLUS) and analysis of egg production data.
	I. Wright	Analysis of morphological data on Babesia Canis, a blood parasite of dogs. To determine if differences occurred in the parasite from various sites in the body and on different days.
018	SURVEYING:	
	S.J. Broughton	Analysis of precision involved in tangential tachymetry.
		Development of standard routines for spatial coordinates in geodetic networks.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
021	VETERINARY CLINICAL STUDIES:	
	D.K. Amiel	Relationships between blood parameters in normal and abnormal cows (of differing conditions and body weights) and age, breed, season and climate, stages of lactation and pregnancy. Relationships between blood parameters and milk production, fertility and infection in dairy cows, using regressions and correlations.
	H. Novoa	Relationships between and within 14 different observations of 100 rams from Goondiwindi. (a) Regressions and correlations between Testes size, body weight, sperm mobility, sperm abnormalities and semen density, taken in pairs. (b) Regressions between these same observations at 3 different times of one year, and 6 characteristic measurements of wool clip taken at the end of that time.
024	MICROBIOLOGY:	
	E. Szabo	Numerical taxonomic studies using the following methods:- (a) Single-linkage cluster analysis. (b) Average-linkage cluster analysis. (c) Complete-linkage cluster analysis. (d) Median organism estimation. (e) Intra-group and inter-group similarity estimation. (f) Frequency of occurrence of characteristics in various states.
	L. Jones	Preparation of a microbial culture collection catalogue.
	G.H.G. Davis	Numerical taxonomy of bacteria.
	J.V. Kennedy	Systems analysis study of the administrative procedures of the Department performed by two students proceeding to a Diploma of Information Processing.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
025	PHYSIOLOGY:	
	A. Lipton *G.J. Huxham* *D. Hamilton*	Programs for analysis of experimental results. Ion determination in heart and uterus muscle. Specific ion electrodes. Ion activities in solution. Marking and analysis of student examination results. Analysis of multiple choice questions.
	S.R. O'Donnell	Linear least squares regression for analysing dose-response relationships.
026	CHEMISTRY:	
	D.M. Alexander *D.J.T. Hill*	Statistical analysis of thermodynamic functions.
	G.T. Barnes	Calculation of evaporation resistance of grape skins.
	C.J. Hawkins	Calculation of conformational energies of chelate ring systems. Calculation of stability constants for metal complexes.
	J.R. Hall	Force constant calculations in spectroscopy. Analysis of infra red band shapes.
	C.H.L. Kennard	Calculation of cell dimensions, for crystal structure analysis.
	L.E. Lyons	Calculation of polarization energies of inert gas crystals.
	T. Peacock	Quantum mechanics. Calculations on polyaromatic systems.
	T. Quickenden	Least squares treatment of data, calculation of micro-organism growth rate.
030	SOCIAL AND PREVENTIVE MEDICINE:	
	J.H.A. Searle	Processing of data on Tasmanian Asthma Survey (major programs developed by I. Oliver and Associates) Information analysis of Skin Cancer data.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
034	CHEMICAL ENGINEERING:	
	A.S. Anderssen	Parameter estimation from input-output data using weighted moments.
		Impulse response determination from input-output data by matrix inversion.
	R. Batstone	Parameter estimation in dynamic systems and calculation of optimal control.
	A.O. Converse	Examples in optimisation including dynamic programming.
	L.R. Flint	Using numerical techniques solved the Navier Stokes equations for low, non-zero Reynolds number flow about a sphere. Calculation of particle trajectories around spherical bubbles.
	G.E. Ho	Plate efficiency calculations in binary distillation.
	G.E. Kelly	Development of analytical procedures for assessment of properties of natural water.
	C. Koch	Extended calculations in the field of annular two-phase flow plotting shear stress against voidage curves.
	C. Misra	Simulation of the behaviour of industrial Bayer Process precipitation systems for the production of alumina.
	R. Muller	Solution of hyperbolic equations describing flow from a broken dam.
	F.K. Mak	Bubble velocities in fluidised beds.
	B.K. O'Neill	Counter current tabular reactors with axial dispersion.
	I.C. Sandford	Calculated average and mean through-flow velocities in bubbles in fluidised beds.
	G. Shellshear	Design procedure for a classifying crystallizer.
	H.H. Teo	A mathematical model for the rate aspects in the vertical tube evaporator.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
034	CONTD.	
	H.V. Tien	Correlation of results for power measurements on an oscillating agitator system.
	E.T. White	Conversion of normal size distributions by number to weight based distributions and calculations of parameters. Size dispersion model evaluations.
	I. Woodhead	Development and comparison of mathematical models of a tubular reactor.
	P.G. Wright	Verification of a mathematical model of batch sugar crystallizer using factory records.
036	ZOOLOGY:	
	W. Stephenson	Analysis of benthic associations.
	A. Jones	Analysis of trawled invertebrate associations.
	R. Bradbury	Analysis of trawled vertebrate associations.
	J. Greenwood	Analysis of plankton associations.
	J. Kikkawa	Card punching ecology of birds.
	D. Morris	Card punching - compilation of data on bird behaviour.
	D. Dow	Development of programs to interpret ecological data from 8 channel paper tape on GE 225.
037	DENTISTRY:	
	G. Brown *N.L. Ward*	Computation and comparison of anaesthetic properties of dental local anaesthetic solutions.
		Calculations of working characteristics in operative dentistry of dental students.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
037	CONTD.	
	T.J. Freer	Further development of systems for use in the investigation of indices of malocclusion.
		Correlation coefficients with special provision for missing and inapplicable data.
047	QUEENSLAND INSTITUTE OF TECHNOLOGY:	
	G.J. Francis	Power system load flow studies.
050	GOVERNMENT:	
	C.A. Hughes *J.S. Western* *C.C. William*	Extraction of scales related to media satisfaction and preference, using regression analysis to determine the factors contributing to these variables.
	J.S. Western *E.J. Daniell*	Study of factors affecting career decisions for engineering, law, medical and teaching students.
	J.S. Western *P.R. Wilson*	Study of effect of parental influences and socio-economic factors on voting behaviour.
	J.S. Western *P.R. Wilson*	Study of 'Courier Mail' and 'Australian' readers.
	J.S. Western *P.R. Wilson*	Study of readers' opinions of Brisbane's morning papers.
	P.R. Wilson *J.W. Brown*	Assimilation of Italian and British immigrants in relation to political behaviour.
	A.W. Pemberton	Anticipatory socialisation and recruitment into the architecture profession.
	C.A. Rootes	Australian student radicals - the nature and origins of dissent.
	I.S. Western *P.R. Wilson* *E.J. Daniell*	Study of attitudes towards aborigines.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
054	COUNSELLING SERVICES:	
	H.W. Thiele	Factor analysis of questionnaire responses.
	G.V. Hughes	Analysis of questionnaire responses.
311	DATA PROCESSING:	
	K. Alderslade	Building accommodation.
	H. Brownsdon	Degree Examinations.
	I. Pedler	Enrolments and enrolment statistics.
	J. Pieloor	Master student number index.
	A. Robson-Petch	Records section files.
	J. Wilson	Senior examination.
		Staff information.
		A/c charged master.
		Budget calculations.
		Outstanding orders.
		Premium payments.
		Salaries - monthly and fortnightly.
		Stationery and stores stock control.
		Student fees.
EXTERNAL ORGANISATIONS		
122	MACKAY REGIONAL ELECTRICITY BOARD:	
	-	Calculation of power system load flow.
201	BUREAU OF SUGAR EXPERIMENT STATIONS:	
	D.B. Batstone	Computer-aided design, modification and improvement of the evaporator stations in raw sugar factories.
	Various Officers	Analysis of field experiments.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
208	PROVINCIAL TRADERS PTY. LTD:	
	H.J. Hornbuckle	Calculation of least cost rations for live-stock using linear programming techniques.
		Statistical analysis of data from research projects dealing with animal production.
237	CAIRNS REGIONAL ELECTRICITY BOARD:	
	L.M. Pearson	Stringing chart calculations for overhead transmission lines. Statistics on consumers complaints.
401	MAIN ROADS DEPARTMENT:	
	B. Donaghey	Development of a conversational version of COGO, (Co-ordinate geometry problem orientated language).
402	THE SOUTHERN ELECTRIC AUTHORITY OF QUEENSLAND:	
	L. Olsen *P. Frangos*	Calculation of power system fault current distribution.
		Determination of fault location on a transmission system from readings on neutral current.
	L. Watts *D. Hill*	Analysis of power system load flow, fault level and transient stability.
	M. Belfield	Critical path analysis for Swanbank 'B' Power Station.
403	DEPARTMENT OF PRIMARY INDUSTRIES:	
	R.G. Winks	Analyses of dosage mortality and other data associated with entomological experimentation.
	R. Lutterell	Application of linear programming in optimisation of pig feeding rations.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
403	CONTD.	
	Biometry Branch	Statistical analysis of data from an extensive range of research projects dealing with plant and animal performances in field and laboratory trials. Many types of designs are used.
404	IRRIGATION AND WATER SUPPLY COMMISSION:	
	D.G. Doran	Development of Moran storage analysis (seasonal correlation) using statistics of inflows in single storage system. Intermediate and stationary state, probabilities of failure, filling and fullness may be computed. Development of multivariate simulation analysis using "Fiering" model to generate synthetic flow records preserving serial and cross correlation as well as means and variances. Production runs using Moran storage analysis.
	Various Officers	Production computations for the structural and hydraulic design of dams including:- (a) Stability analysis for gravity dams. (b) Slip circle stability analysis. (c) Reservoir routing. (d) Backwater calculation for spillway approach channels.
406	DEPARTMENT OF FORESTRY:	
	N.B. Henry	Plantation Register data processing.
409	B.C.C. WATER SUPPLY AND SEWERAGE DEPARTMENT:	
	J. Clarke	Computation of flows into and out of lake storage. Computation of river flows from river height information.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
410	B.C.C. ELECTRICITY DEPARTMENT:	
	P.A. Clappison	Modification of the system for recording and analysing consumer complaints.
		Modification of the system for distribution transformer load records.
		Forecasting of loads and growth rates for 33kV zone substations.
		Load flow and short circuit studies on existing and proposed distribution systems.
	J.S. Lyall	Preparation of transformer tender price schedules.
413	POSTMASTER-GENERAL'S DEPARTMENT:	
	L.L. Birch	Computation of horizontal radiation patterns for the proposed Julia Creek transmitting station.
		A program to compute the current distribution (including the feed current) in a vertical radiator.
	J. Fursdon	Respacing of pole routes to reduce 'K' factor to the predetermined limit.
	P.J. Kitchen	Traffic dispersion measurements to produce collated traffic dispersion percentages.
		Composite growth factor calculations.
		Design of crossbar GV stage for production of trunking diagrams.
		Preparation of metropolitan exchange junction records.
	J. Edmondson	Preparation of statistical returns based on the analysis of Trunk Operators Technical Assistance reports.
415	STATE ELECTRICITY COMMISSION OF QUEENSLAND:	
	G.J. Francis	Transmission system design and network analysis of 275kV systems. Technical problems associated with supply to large fluctuating loads.

APPENDIX IV - Continued

Dept. No.	Department	Work Carried Out
415	CONTD.	
	L.G. Pane	Calculation of costs associated with proposed power system developments. Load data analyses and production of load forecasts. Derivation of production costs for generating sets.
	M.A. Sargent	Statistical selection of insulation levels on transmission lines. Determination of transmission line costs.
	K.J. Freier	Derivation of optimum transmission system designs.
	A.L. Hoi	Temperature-demand correlation calculations. Technical problems associated with supply to high frequency fluctuating loads.
	J. Rockett	Network analysis and transmission system design. Development of a steady state stability program.
	L.K. Loh	Development of an Economic Despatch program to simulate power system operation. Load rejection studies.
	R. Hilko *J. O'Regan*	Load flow studies.
	G.G. Abbott	Calculation of periodic growth rates and analysis of statistics.
425	COMPUTING PTY. LTD:	
	H. Went	Further development of a system for establishment and maintenance of data banks for architects, engineers and lawyers. Preparation of technical specifications and design manuals for consulting architects and engineers.

APPENDIX V

FINANCIAL STATEMENT TO 31.12.69

CAPITAL EQUIPMENT ACCOUNT

RECEIPTS		PAYMENTS	
Excess Receipts over Payments B/F 1.1.69	$ 17,631.53	Building Air Conditioning 1968	$ 436.45
University College of Townsville	5,000.00	Equipment	198,863.38
Transfer from Operations Account	50,000.00	Interest on Loan	3,500.00
Transfer from Sinking Fund Account	8,000.00		
University of Queensland Loan	100,000.00		
Excess Payments over Receipts	22,168.30		
	$202,799.83		$202,799.83

REMOTE TERMINAL ACCOUNT

Balance B/F 1.1.69	$ 17,211.27	Equipment	$ 6,844.65
Remote Terminal Fund (University Departments) 1969	16,300.00	Excess Receipts over Payments	26,666.62
	$ 33,511.27		$ 33,511.27

OPERATIONS ACCOUNT

Balance B/F 1.1.69	$ 50,609.63			
		Contra to Recurrent Costs met by University (including academic activities) -		
		Equipment Special Vote	$ 1,000.00	
		Equipment	1,735.78	
		Maintenance	8,369.88	
		Salaries	60,752.27	
		Travel	242.00	
Contribution by University to Recurrent Costs (including academic activities) -	$ 72,099.93			$ 72,099.93
Revenue from Operations -		Other Costs -		
University Departments	70,336.29	Rental	$ 4,305.60	
Other Users	73,196.50	Electricity	8,927.58	
Miscellaneous Receipts	21.00	Furniture and Fittings	455.87	
		Magnetic Tapes	2,967.40	
		Equipment	4,016.69	
		Maintenance	28,135.65	
		Salaries	39,220.47	
		Payroll Tax	984.24	
		Travel	6.16 Cr.	
		Stationery	13,737.63	$102,744.97
		Transfer to Capital Equipment Account		50,000.00
		Excess Receipts over Payments		41,418.45
	$266,263.35			$266.263.35

SINKING FUND

Balance B/F 1.1.69	$ 8,297.80	Transfer to Capital Equipment Account	$ 8,000.00
Interest	1,045.91	Excess Receipts over Payments	1,343.71
	$ 9,343.71		$ 9,343.71

At 31st December, 1969, the Computer Centre was indebted to the University of Queensland to the extent of $100,000 in respect of a loan for the purchase of equipment.

L.N. LIVINGSTON
BURSAR