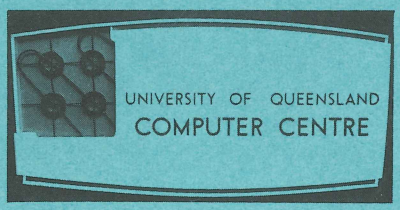
UNIVERSITY OF QUEENSLAND

COMPUTER CENTRE



SECOND ANNUAL REPORT

1st January to 31st December 1963

UNIVERSITY OF QUEENSLAND

COMPUTER CENTRE

SECOND ANNUAL REPORT

1ST JANUARY TO 31ST DECEMBER, 1963.

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PREFACE

The University of Queensland Computer Centre has been planned on a co-operative basis, the cost of equipment, the building, and all ancillary services, being financed by advance contributions from prospective users. These include Commonwealth and State Government Departments, Local Authorities and Industry. The University has also contributed to the capital and in addition, provided an annual grant for salaries paid to Computer Centre staff. Contributors are entitled to computer services at reduced rates, the number of hours of computer time to which they are entitled being in proportion to their contribution. This commitment has been intentionally limited to approximately 500 hours per year for the period 1962-1967 and therefore will not restrict appreciably University use of the computer.

The Computer Centre is predominently concerned with scientific and engineering work rather than commercial and accounting work, but the training courses cover all aspects of automatic computing and data processing.

Technical details of the computer equipment and general information on programming are given in an "Information Manual", which is available from the Computer Centre without charge.

Computer Centre Executive Committee 1963

Professor S.A. Prentice, B.Sc., M.E.E., MIE(Aust)., MIEE	(Chairman) Professor of Electrical Engineering
Professor H.C. Webster, CMG, Ph.D, D.Sc., F.InstP.	(Deputy Chairman) Professor of Physics
Professor J.H. Lavery, B.Sc., M.E., AMICE, MIE(Aust).	(President, Professorial Board) Professor of Civil Engineering
Professor C.S. Davis, D.F.C., M.Sc., Ph.D.	Professor of Mathematics
Professor D.F. Dowling, B.VSc., B.Sc., Ph.D.	Professor of Animal Husbandry
Dr. S.A. Rayner, M.Ed., Ed.D., M.A.	Deputy Registrar
Mr. D.L. Overheu, B.Sc.	(Officer-in-Charge), Reader in Computing

Computer Centre Advisory Committee 1963

In addition to the above -

Mr. J.E. Kindler, M.E., M.I.E.(Aust.)	Co-ordinator General's Department
Mr. S. Schubert, B.E., A.M.I.E.(Aust.)	Main Roads Department
Mr. E.F. Fell, A.M.I.R.E.(Aust.)	Public Service Commissioner's Office
Mr. A.S. Faulkner, M.I.E.(Aust.), M.I.E.E.	State Electricity Commission of Queensland and Regional Electricity Boards
Mr. J.E.G. Martin, C.B.E., D.S.O., B.E., A.M.I.E.(Aust.)	Southern Electric Authority of Queensland
Mr. G.W. Barlow, B.E., M.I.E.(Aust.)	Brisbane City Council
Mr. R.B. Menzies, B.E., A.M.I.E.(Aust.)	Mount Isa Mines Ltd.

Staff of the Computer Centre 1963

Officer-in-Charge and Reader in Computing:	*D.L. Overheu, B.Sc.*	
Lecturer in Computer Electronics:	*R.E. Kelly, B.E.*	
Senior Demonstrators (Programmers):	*E.J. Sokoll, B.E.*	
	I. Oliver, B.Sc.	(1)
Product Service Engineer:	*R.E. Cole*	(2)
Maintenance Technician:	*G.L. Jerrard*	(3)
Machine Operator:	*Anne McArthur*	
Data Preparation Assistants:	*Carol J. Baxter*	
	Patricia M. Short	
Clerk-Typist	*Ilse F. Gaylard*	(4)
	Carole L. Chapman	(5)

1. Appointed January, 1963.
2. Ceased duty on termination of contract 30th April, 1963.
3. Appointed January, 1963.
4. Resigned 11th April, 1963.
5. Appointed 7th May, 1963.

ANNUAL REPORT

INTRODUCTION

The period covered by the Second Report has seen a continuation in the growth of the use of the Computer Centre. University use appears to be developing at the rate of approximately 4% per month and Contributors' use at about 7% per month. Part of this development can be attributed to the installation of a high speed printer which considerably enhanced the application of the computer to many problems. Steps were also taken towards the acquisition of magnetic tape units to increase further the flexibility of the GE 225 system.

EXECUTIVE COMMITTEE

The Executive Committee met in April to ratify action taken with regard to the successful completion of the product service contract and the acceptance of the P.M.G.'s Dept. and C.S.I.R.O. as new Contributors. In addition, proposals concerning the hire of the on-line printer and the charges for its use were approved. The Committee also resolved to recommend approval in principle for the introduction of a Diploma in Automatic Computing. The Executive Committee met again in October to ratify action taken to purchase the on-line printer and to place with Australian General Electric a 'letter of intent' for the purchase of magnetic tape units in 1964. The Chairman tabled a statement of the financial position of the Computer Centre and the policy on overdue accounts was considered. At the close of this meeting Professor H.C. Webster was elected Chairman and Professor S.A. Prentice Deputy Chairman for 1964.

ADVISORY COMMITTEE

The Advisory Committee met in September to consider action taken by the Executive Committee in relation to the proposed purchase of the on-line high speed printer and the introduction of the Diploma in Automatic Computing. The Advisory Committee was also reconstituted on a recommendation of the Professorial Board to act as a Board of Studies for the Diploma course.

PREMISES OF THE COMPUTER CENTRE

Action has been taken to repair flooring in certain areas where shrinkage has caused sinking of the floor. Other minor repairs have also been carried out. Additional space has been requested in the present extension to the Main Engineering Building to accommodate Diploma students and facilities in future years.

Consequent upon the installation of the high speed printer, the Auxiliary Arithmetic Unit and certain peripheral equipments were relocated. The removable false floor in the computer room enabled this task to be carried out without difficulty.

The airconditioning equipment service contract expired in September and action was taken to review maintenance requirements. After consideration of recommendations made by the Commonwealth Dept. of Works, and Messrs. A.E. Axon and Associates, it was decided to continue a maintenance contract with Messrs. Frigrite, the original contractors for the plant. Action was also taken to check and recalibrate the controls and to check air-flows. The equipment has functioned reasonably well throughout the year, although water ingress to an external motor on the condenser unit caused some delay whilst a new motor and pump was fitted.

STAFF

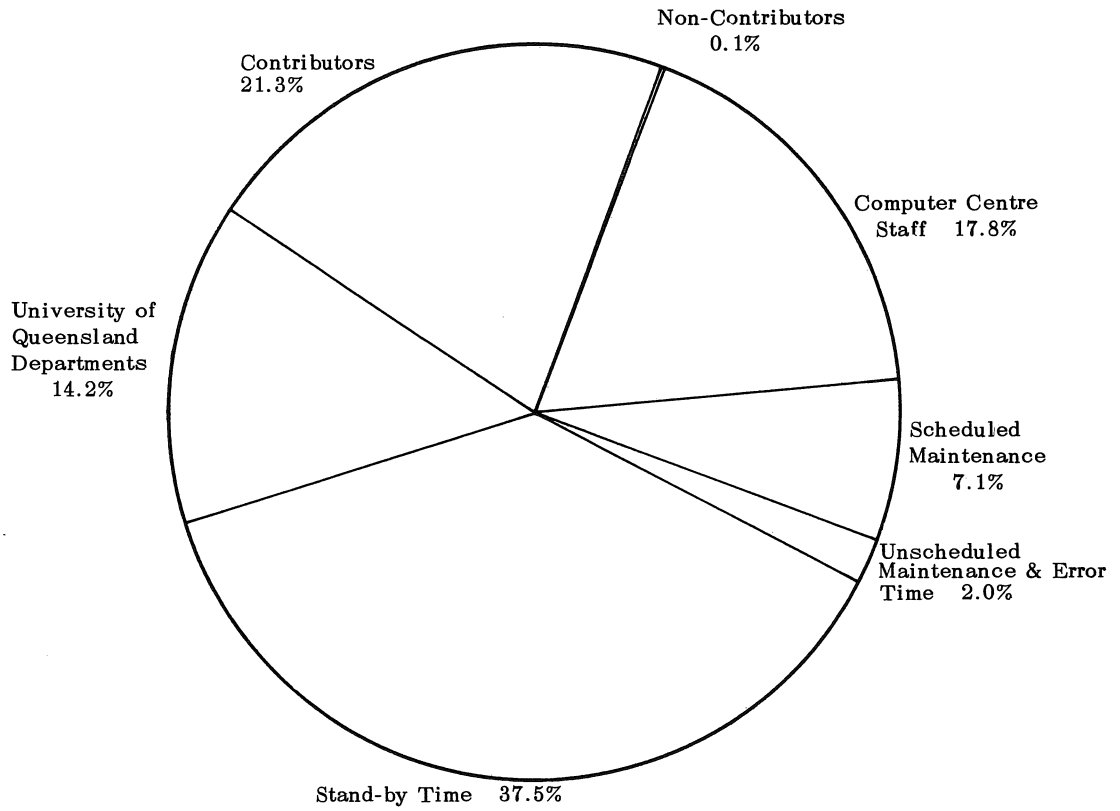
The staffing of the Centre has been relatively stable throughout the year. Mr. R. Cole of Australian General Electric returned to his Company in May after completion of the Product Service contract and the installation of the high speed printer. Mr. R.E. Kelly, Lecturer in Computer Electronics signified his intention to resign on 31st December, and Mr. E.J. Sokoll was subsequently appointed to fill this position in the coming year. In December the position of Demonstrator was advertised and Mr. G. Eberhardt was appointed to commence duty in January, 1964. Mr. G.L. Jerrard took up duty as Maintenance Technician in January.

TEACHING ACTIVITIES

A variety of teaching activities has been organized during the year. In addition to the WIZ and Elementary Programming courses which continued in high demand, the Department of Mathematics made Dr. L. Howard available for a series of courses in Computational .Analysis, and Dr. P. Claringbold of C.S.I.R.O. lectured on the use of computers for statistical analysis.

The following list shows the number enrolled for each course.

Period	Course	Number Enrolled
11th - 13th February	WIZ (Coding Course)	20
13th - 15th February	WIZ	19
18th - 29th March	Elementary Programming	20
1st - 3rd April	WIZ	10
8th - 10th April	WIZ	21
17th - 19th April	WIZ	21
17th - 19th April	Statistical Analysis	20
22nd - 3rd May	Elementary Programming	16
3rd - 5th June	WIZ	17
11th - 13th June	WIZ	15
13th June - 12th Sept.	Computational Analysis	40
8th - 19th July	Elementary Programming	22
22nd - 24th July	WIZ	22
12th - 15th August	WIZ	17
7th - 9th Oct.	Elementary Programming	18
11th - 13th Nov.	WIZ (Townsville)	28
26th - 29th Nov.	WIZ (Mt. Isa)	14
9th - 11th Dec.	WIZ (Engineering Students)	12
	Total	397



100% = 2664.3 hours

DISTRIBUTION OF HOURS OF TOTAL SWITCHED ON TIME

During 1964 it is proposed to offer a Diploma in Automatic Computing at post-graduate level. The Diploma will cover Programming Techniques, Logical Design, and Numerical Analysis, for graduates who have reached an appropriate standard in Mathematics and allied subjects.

OPERATING RECORD OF THE COMPUTER

The computer was running on problems for 57% of its scheduled on-time. Since the scheduled on-time exceeds the normal duration of a single shift, the above figure is equivalent to approximately 3/4 of a normal shift. Perusal of the monthly Total Use Time figures, however, indicates that in the second half of the year, monthly use was approximately one shift operation. In the coming year it will be necessary to consider extended shift working to absorb peak operating periods. For the year, the operating ratio was 0.98, unscheduled maintenance averaged 1.6% and scheduled maintenance was 7.1%. The very high figure in August for scheduled maintenance arose after a machine fault indicated a thorough check-out of the auxiliary arithmetic unit was required. As can be seen from the figures of the distribution of computer time in Appendix I, the installation of the on-line high speed printer in May caused no disturbance to the system. The figures for Total Use Time reflect the immediate increase in computer use as a result of this new equipment.

The total switched on time for the year was 2664.3 hours with a scheduled on-time of 2475.0 hours and a total use time of 2419.6 hours. Although these figures relate to a full year, the averages by month may be compared with those for the previous year and show an increase of 27.6 hours per month for total use time. The relevant comparison is shown below.

TABLE I: Extract from Distribution of Machine Time 1962 and 1963

Type of Work	Monthly Average 1962*	Monthly Average 1963
Total Use Time	90.8	118.4
Total Unused Time	110.9	83.3
Total Available Time	201.7	201.6
Scheduled On-Time	207.1	206.2
Total Switched on Time	224.2	222.0

*Based on 7 months operation

The use time for the computer was divided between production runs (501.2 hrs), development runs (894.7 hrs), and demonstrations (24.3 hrs). There has been a considerable increase in production time for the current year, reflecting the greater use of the computer for routine work.

The increase in production requirements has necessitated additional time being made available for this activity. Consequently, as well as the hour from 9.0 a.m. to 10.0 a.m. a period between 4.0 p.m. and 5.0 p.m. is now available for production. In addition, arrangements have been made with one of the major users to take the time between 1.0 p.m. and 2.0 p.m. for production running.

A separate record has been kept of the use of the on-line printer since its installation in May and the figures are shown in Appendix II.

USE OF THE COMPUTER

A record has been kept of the number of hours expended by University users, Contributors' staff, and by staff of other organizations. University Departments used a total of 377.1 hours, (average of 31.4 hours per month). Contributors' staff used a total of 567.3 hours (average 47.3 hours per month). Of the total of 944.4 hours from these two sources, University Departments were therefore responsible for 39.9% and contributors' staff for 60.1%. In addition there were 3.3 hours of non-contributor use which was less than in the previous year. The overall average for other than Computer Centre Staff was therefore 79.0 hours per month or nearly twice the figure for the previous year. The remaining 475.8 hours (average of 39.6 hours per month) of use-time were expended by the Computer Centre Staff for a wide range of activities in program maintenance and development. In particular, the installation of the high-speed printer required numerous modifications to existing programs, and the development of a completely new processing system for the Monthly Invoices. As a result, of this latter work, invoicing and collection of statistics on computer use are now carried out automatically. Course attendees have also shown greater interest in trial course problems. However, there was a considerable decrease in monthly average use by Computer Centre staff over that for the previous year. Nevertheless, programming activity remained at a high level, and major programs for a symbolic input processor and a matrix arithmetic compiler were completed.

During the year the number of University Departments who made some use of the Computer Centre facilities increased to 28. The largest user was again Physics Department with 131.9 hours, which is almost double the previous year's figure, and the second largest user was Department of Animal Husbandry which had over three times the use of the previous year. Education Department were also substantial users at 35.2 hours, or approximately 10 times that for 1962. 'Computer Research' represents time expended on agreed research projects by Computer Centre staff. The various Engineering Departments showed no substantial changes on the previous year's use. Altogether, nine users were responsible for 346.9 hours of the 377.1 hours used by University Departments, thus indicating not only increased use by University Departments, but also a wider range of users.

Amongst the Contributors, Main Roads Department with 221.5 hours use, or 39% of the total for Contributors, had the major share of the activity. The Irrigation and Water Supply Commission were again the second largest user at 71.3 hours, or nearly double the time for the previous year. Five contributors in all exceeded 40 hours use, and seven exceeded 30 hours use and accounted for 493.5 hours of the 567.3 hours used by contributors. The 5.5 hours against 'Forestry Dept. Contract' refers to special card conversion work carried out to translate 65 column Powers-Samas cards to 80 column IBM cards. Modifications were carried out to the card reader of the GE 225 by the Computer Centre Staff, in order to provide this service.

At the end of this year, all users were requested to indicate the programs they had developed for the computer and the type of work carried out. From the returns received it is clear that there was considerable activity throughout the year. The relevant information has been edited and appears in Appendix V. It will be seen that engineering, and statistical problems were a major part of the work carried out on the computer.

OTHER ACTIVITIES

In February, the Reader in Computing and Lecturer in Computer Electronics attended the Computing Conference in Melbourne organized by the Australian Council for

Automatic Computing and Control, and were able to take part in a number of useful discussions.

From May to July the Chairman, Computer Centre Executive Committee, visited several Computer Centres in the United Kingdom and U.S.A. during a trip overseas. As a result of these visits he was able to obtain a considerable amount of information on Diploma courses.

In June an open evening was held at the Computer Centre for members of the Queensland Computer Society, when they were provided with demonstrations of the work done at the Computer Centre and the equipment available.

The Computer Centre, in conjunction with the Queensland Computer Society sponsored two visiting lecturers in September and November. The first visitor was Professor J. Robertson of the University of Illinois. Professor Robertson is responsible for the Engineering design of ILLIAC II and was currently visiting the Adolph Basser Computing Laboratory, University of Sydney as a Fulbright Scholar. He lectured to Electrical Engineering students and the Computer Society on 'Some Recent Trends in Computer Design'. The second visitor was Dr. E.B. Hunt late of Yale and currently a member of the Psychology Department, University of Sydney. Dr. Hunt is well known for his book 'Concept Learning' and lectured on 'The Use of Computers for Non-Numerical Problems".

In June, the Reader in Computing was invited to lecture at a Colloquia for the Adolph Basser Computing Laboratory Diploma course, and in December the Reader attended an informal meeting of Officers-in-Charge of University Computing Laboratories in Melbourne.

In November Professor J.M. Bennett was invited to visit the Computer Centre for discussions with the staff. Professor Bennett has not previously been able to see the outcome of the establishment of the Centre, although he was closely associated with much of the early planning.

PUBLICATIONS

Publications and reports on programming by Computer Centre staff have been mainly confined to brochures on systems made available for users. It is hoped that in the coming year there will be more time for the preparation of fuller reports on various activities which are reaching completion.

DATA PREPARATION

The only change made to the data preparation equipment throughout the year was the replacement of the ICT card punch by an IBM printing card punch in March. Discussions were also held with the Adolph Basser Laboratory regarding their possible purchase of the N.C.R. adder with paper tape output. This equipment is surplus to the Computer Centre requirements. A portable paper tape punch has also been hired to the Department of Physics for their convenience.

During the last week in December it was necessary to hire a temporary card punch operator in order to clear outstanding work before the end of the year.

There appears to have been a considerable reduction in use of punching facilities over the previous year on the monthly averages, and this has been largely due to Contributors installing their own data preparation equipment. However, University use was also lower, although the demand increased as the year advanced. The continued high use by the Computer Centre reflects the greater activity in the data preparation area for programming courses, and other work associated with record keeping. The average time per month used in card verifying was approximately the same as in the previous year. Appendix VII shows the monthly figures for the various data preparation equipments.

FUTURE DEVELOPMENTS

In September, 1963, a 'letter of intent' was placed with Australian General Electric Pty. Ltd. for the supply of four Magnetic Tape decks and a controller. The equipment will cost approximately £40,000 and will provide reading and writing speeds of 15,000 characters per second. The magnetic tape peripherals will make a much wider range of automatic programming aids available for users and will allow larger problems to be run on the computer. The purchase of the units will be assisted by a £30,000 grant from the Australian Universities Commission.

FINANCIAL POSITION

The financial position as shown in Appendix IX is considered satisfactory. The rate of use of time by contributors justifies the assumption that extensions to present contracts are likely. Additional amounts so received will be used to meet the balance of payments on the high speed printer and proposed magnetic tape equipment.

APPENDIX I

SUMMARY OF DISTRIBUTION OF COMPUTER TIME (JANUARY TO JUNE, 1963)

TYPE OF WORK	JAN		FEB		MAR		APRIL		MAY		JUNE	
	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.
PRODUCTION	16.2		38.2		39.2		35.7		53.2		30.7	
DEVELOPMENT	71.4		56.6		55.4		44.1		70.1		82.0	
DEMONSTRATION	0.1		5.5		0.7		3.0		0.8		3.3	
TOTAL USE TIME	87.7		100.3		95.3		82.8		124.1		116.0	
NORMAL DELAY	1.0		0.4		1.1		0.4		0.0		0.1	
STANDBY	138.3		106.9		98.5		117.0		114.0		108.2	
TOTAL UNUSED TIME	139.3		107.3		99.6		117.4		114.0		108.3	
TOTAL AVAILABLE TIME		227.0		207.6		194.9		200.2		238.1		224.3
OPERATOR ERROR	0.4		0.6		0.9		0.6		2.4		0.7	
UNSCHEDULED MAINTENANCE	5.3		0.5		0.3		1.6		15.7		0.3	
TOTAL ERROR TIME	5.7		1.1		1.2		2.2		18.1		1.0	
SCHEDULED ON TIME		232.7		208.7		196.1		202.4		256.2		225.3
ENGINEERING MAINTENANCE	24.8		15.8		11.0		18.3		17.4		9.5	
ENGINEERING DEVELOPMENT	0.0		0.0		0.0		0.0		0.0		0.0	
TOTAL SCHEDULED MAINTENANCE	24.8		15.8		11.0		18.3		17.4		9.5	
TOTAL SWITCHED ON TIME		257.5		224.5		207.1		220.7		273.6		234.8

APPENDIX I

SUMMARY OF DISTRIBUTION OF COMPUTER TIME (JULY TO DECEMBER, 1963)

TYPE OF WORK	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL FOR YEAR	MONTHLY AVERAGE
	hrs. hrs.	hrs. hrs.	hrs. hrs.	hrs. hrs.	hrs. hrs.	hrs. hrs.	hrs. hrs.	hrs. hrs.
PRODUCTION	48.8	48.4	52.4	49.1	58.5	30.8	501.2	41.76
DEVELOPMENT	101.7	77.4	90.4	87.0	89.8	68.8	894.7	74.56
DEMONSTRATION	3.8	2.6	1.6	1.6	1.0	0.3	24.3	2.02
TOTAL USE TIME	154.3	128.4	144.4	137.7	149.3	99.9	1420.2	118.35
NORMAL DELAY	0.4	0.7	0.9	1.3	1.4	0.8	7.2	0.60
STANDBY	111.0	101.7	71.5	101.0	77.0	50.7	992.2	82.68
TOTAL UNUSED TIME	111.4	102.4	72.4	102.3	78.4	51.5	999.4	83.28
TOTAL AVAILABLE TIME	265.7	230.8	216.8	240.0	227.7	151.4	2419.6	201.63
OPERATOR ERROR	1.5	1.5	3.4	4.9	2.5	1.6	16.1	1.34
UNSCHEDULED MAINTENANCE	3.7	4.6	6.6	0.9	0.3	0.4	39.3	3.28
TOTAL ERROR TIME	5.2	6.1	10.0	5.8	2.8	2.0	55.4	4.61
SCHEDULED ON TIME	270.9	236.9	226.8	245.8	230.5	153.4	2475.0	206.24
ENGINEERING MAINTENANCE	9.0	45.8	14.3	16.0	16.0	5.0	186.9	15.58
ENGINEERING DEVELOPMENT	0.0	0.0	0.5	0.0	1.9	0.0	2.4	0.20
TOTAL SCHEDULED MAINTENANCE	9.0	45.8	14.8	16.0	17.9		189.3	15.78
TOTAL SWITCHED ON TIME	279.9	282.7	241.6	261.8	248.4	158.4	2664.3	222.02

Percent Use Time 57% Percent Unscheduled Maintenance 1.6% Operating Ratio 0.98 Percent Maintenance 7.1%

$$\text{Percent Use Time} = \frac{\text{Total Use Time}}{\text{Scheduled on-time}} \times 100$$

$$\text{Operating Ratio} = \frac{\text{Total Available Time}}{\text{Scheduled on-time}}$$

$$\text{Percent Unscheduled Maintenance} = \frac{\text{Unscheduled Maintenance}}{\text{Scheduled on-time}} \times 100$$

$$\text{Percent Scheduled Maintenance} = \frac{\text{Total Scheduled Maintenance}}{\text{Total Switched-on Time}} \times 100$$

APPENDIX II

USE TIME (hours) OF HIGH SPEED PRINTER FOR 1963

	1	2	3	4	5	6
MONTH	U. of Q.	Contrib.	Non-Contrib.	Total Cols. 1, 2, 3	Comp. Centre	Total All Users
April	3.0	2.7	-	5.7	2.1	7.8
May	19.2	30.8	-	50.0	28.0	78.0
June	36.0	30.2	-	66.2	23.3	89.5
July	23.1	41.6	0.4	65.1	50.2	115.3
August	29.9	47.3	0.3	77.5	45.7	123.2
September	26.6	65.8	0.9	93.3	54.2	147.5
October	36.5	56.2	0.3	93.0	51.3	144.3
November	37.1	73.2	0.7	111.0	33.4	144.4
December	26.1	49.9	0.3	76.3	33.9	110.2
TOTAL	237.5	397.7	2.9	638.1	322.1	960.2
AV/MONTH	19.8	33.1	0.2	53.2	26.8	80.0

APPENDIX III

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

1963

DEPT. NO.	NAME	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
002	Civil Engineering	3.0	1.0		0.4	1.2	1.3	0.8	0.8	0.9	4.2	2.1	3.2	18.9
003	Economics	.3	0.2			0.7	1.2	0.4						2.8
004	Physics	4.3	8.3	9.2	5.2	12.9	10.8	15.0	12.4	17.0	21.2	14.3	1.3	131.9
005	Psychology		0.5	0.1	0.2	0.7	0.8	1.8	1.7	1.5	0.2	12.5	0.5	20.5
006	Electrical Engineering	3.2	3.9	1.1	2.2	1.6	1.9	1.4	0.6	0.4	1.1	0.9	1.7	20.0
007	Mechanical Engineering	0.1	2.8	2.1	3.5	3.2	1.4	3.6	0.9	2.6	1.8	2.1	1.0	25.1
008	Mathematics	3.6	0.3	0.1	0.1	0.8			2.0			0.4	1.0	8.3
009	Geology					0.1				0.1				.2
010	Animal Husbandry	2.5	2.5	3.1	1.1	3.5	5.0	3.9	4.4	3.5	4.4	2.3	11.6	47.8
011	Statistics (Admin.)	0.3	0.2			0.1	0.7					0.1	0.9	2.3
012	Agriculture	2.1	1.3	6.9	0.6	1.5	0.5	0.8	1.1	0.8	0.4	0.6	1.8	18.4
013	Education	0.4	3.2	3.4	2.1	7.2	2.5	3.6	5.6		2.9	2.2	2.1	35.2
014	Mining & Metallurgy	0.4	2.4	0.9	0.2	0.6	0.2		0.7	1.2	0.1			6.7
015	Computer Research	3.0				3.7	19.6	2.8						29.1
016	Parasitology													
017	Preventive Medicine				0.2	0.1								0.3
018	Surveying				0.1									0.1
019	Veterinary Anatomy	0.4	0.5	0.1	1.0	0.4	0.2	0.3	0.1	0.		0.1	0.1	3.2
020	English													
021	Veterinary Clinical Studies	0.2							0.1		0.3			0.6
022	Remedial Education Centre	0.7	0.6				0.5							1.8
023	Accountancy													
024	Microbiology									0.4	1.0	0.3	0.5	2.2
025	Physiology							0.1					0.2	0.3
026	Chemistry							0.1	0.2					0.3
027	Geography											0.6		0.6
028	Townsville Univ. College												0.5	0.5
		24.5	27.7	27.0	16.9	38.3	46.6	34.6	30.6	28.4	37.6	38.5	26.4	377.1

APPENDIX IV

DISTRIBUTION OF COMPUTER TIME (Hours) USED BY CONTRIBUTORS

1963

DEPT. NO.		J	F	M	M	M	J	J	A	S	O	N	D	TOTAL	TOTAL 1962	TOTAL TO DATE
101	Main Roads Dept	2.7	4.2	10.3	11.2	14.0	16.0	27.2	22.5	40.9	26.7	28.0	17.8	221.5	51.9	273.4
102	Southern Elec. Authority	4.9	6.5	3.9	1.7	7.9	5.0	4.6	1.0	1.2	1.6	0.8	0.7	39.8	9.4	49.2
103	Agriculture & Stock Dept.	1.2	2.2	2.7	1.1	1.2	2.3	3.6	3.9	4.1	4.8	8.0	5.8	40.9	13.6	54.5
104	Irrigation & Water Supply	5.1	6.8	13.3	3.3	7.2	6.2	5.8	7.3	5.8	4.9	2.1	3.5	71.3	36.5	107.8
105	Co-ordinator General's Dept.			0.2	0.2	0.5	0.1		0.4	0.8	0.1	0.6		2.9	5.4	8.3
106	Forestry Dept.	2.1	2.0	2.0	2.1	3.2	2.4	4.4	3.8	4.5	5.3	6.5	3.9	42.2	18.6	60.8
107	Survey Office	1.8	2.1	0.7	0.4	1.8	2.1	2.7	2.5	1.8	1.8	1.6	1.4	20.7	14.1	34.8
108	B.C.C. Transport Dept.				0.2	0.2	0.1	0.1		0.1				0.7	0.4	1.1
109	B.C.C. Works Dept.														0.5	0.5
110	B.C.C. Electricity Dept.		0.1					0.2	0.2					0.5	0.7	1.2
111	Australian General Elec.	1.5	3.9			0.3	0.2							5.9	1.4	7.3
112	Qld. Gov. Railways		2.7	1.4	3.7	0.2	0.3	0.1	0.7		0.4	0.2		9.7	2.5	11.2
113	P.M.G. Dept.	1.4	1.1	2.5	0.4	1.2	1.9	0.9	3.0	3.7	1.2	1.7	1.0	20.0	3.6	23.6
114	C.S.I.R.O.	1.2	4.9	1.6	2.7	3.1	2.4	0.9	3.9	4.9	4.1	3.7	11.8	45.2		45.2
115	S.E.C. of Qld.		0.6	0.8	1.7	2.0	0.7	0.9				0.3	0.7	7.7		7.7
116	Mt. Isa Mines Ltd.			0.1		0.9		1.7	0.4		4.8	20.9	4.0	32.8		32.8
117	Wide-Bay Burnett Elec. Bd.															
118	Capricornia Regional Elec. Bd.															
501	Forestry Dept. Contract							5.5						5.5		
		21.9	37.1	39.5	28.7	43.7	39.7	53.1	49.6	67.8	55.7	74.4	50.6	567.3	158.6	725.9

APPENDIX V

SOME WORK CARRIED OUT BY UNIVERSITY DEPARTMENTS AND OTHER USERS OF THE COMPUTER

DEPT. NO.	DEPARTMENT	WORK CARRIED OUT ON COMPUTER
002	Civil Engineering	
	Mr. J. Meek	Analysis of multistorey frames. Design of prestressed concrete beams for flexure. Calculation of euler loads for beam columns. Load-reflection curves for slender R.C. members. End rotation constants for non uniform beams. Regression analysis for Young's Modulus for prestressing cables. Processing concrete cylinder test results. Class problems for post-graduate students.
004	Physics	
	Mr. G.L. Goodwin	Fourier analysis of ionospheric wind data over 14 hours.
	Mr. B.A. McInnes	Ray tracing in the ionosphere. Lunar effects on the ionosphere.
	Mr. M.J. Burke	Correlation analysis of ionospheric fading records.
	Dr. J. Mainstone	Correlation analysis of geomagnetic micropulsations and ionospheric parameters.
	Mr. J. Crouchley	Statistical analysis of whistler data.
	Mr. P.E. Monro	Direction-of-arrival calculations of ionospheric reflections.
	Mr. M.J. Burke	Programming of examination material for the University Administration.
	Mr. B.J. O'Mara	Computation of Stark-Damping and other line broadening mechanisms. Equivalent widths of solar absorption lines as functions of element abundance.
	Dr. D. Mugglestone	Solar abundance of nitrogen and oxygen and the effects of saturation.
	Mr. G.D. Finn	Line profile analysis of strong solar absorption lines. Coherent and non-coherent scattering effects in the cores of strong lines. The H(a, v) function of line-profile analysis.
	Mr. A.R. Hyland	The effect of instrumental profile on the actual profiles of strong absorption lines. Analysis of the spectrum of the star procyon.
	Mr. C. Burton	Contribution of rotational levels to the widths of microwave spectral lines. Specialized curve-fitting.
	Mr. K. Jones	Satellite predictions and data processing.
005	Psychology	
	Mr. J.T. Damm	Correlations and factor analytic programmes applied to data on achievement motivation, studies being carried out as the thesis requirement for the degree of Ph.D.
	Mr. L.E. Enticknap	One large and a number of small studies. Large study continuing. Extensive analysis of perceptual data carried out. Programs written which will be of general use in Psychology - (1) Chi squared and tetrachoric correlation matrix from original responses or from totals and cross tallies; (2) Chi squared, tetrachoric correlation and direct probability from cell frequencies; (3) Rotation of pairs of orthogonal axes; (4) Analysis of variance. A program for normalizing distributions is being written.
	Dr. D.J. Tugby	St. Lucia Kinship Study - a large number of units of information was ordered by the computer ready for calculation of coefficients of association. A program for this purpose was written in WIZ language.

APPENDIX V - Continued

DEPT. NO.	DEPARTMENT	WORK CARRIED OUT ON COMPUTER
005	Psychology - continued	
	Mr. G.E. Kearney	General correlation matrix. Principal component (axes). Maximum likelihood factor analysis. Varimax rotations. Quartimax rotations.
006	Electrical Engineering	
	Mr. S.G. Fraser	Analysis of dynamic behaviour of electric arcs. Analysis of discharge conditions in constricted arcs by fitting a theoretical model to experimental data. Calculation of non dimensional temperature response of a flat slab to a thermal flux, $P = P_o \exp(-dt)$ Evaluation of integrals of form $I = \int \prod_{i=1}^{n} V_i(\lambda)\, d\lambda$ for calculation of response factors of a photoelectric cell and optical system from tabulated data of spectral responses.
	Dr. T.M. Parnell	Evaluation of time response of high voltage test circuits.
	Mr. G. Johnson	Evaluation of quotient of two rational, positive, real polynomials with complex roots, at specified intervals along the imaginary axis. Generation of phase response given a trapezoidal frequency response. The network is assumed minimum phase and the following integral is employed. $P(\mu) \int_{-\infty}^{\infty} \frac{d\,U(\mu)}{du} \log \coth \frac{\lvert\mu\rvert}{2}\, du$ Cauer synthesis of linear networks by repeated division by remainder of the quotient of two polynomials. Cauer Guillemin synthesis passive networks. Fourier series representation of even functions using Fischer Hinnon numerical methods. Also conversion from Fourier series coefficients to equivalent function.
007	Mechanical Engineering	
	Mr. W.R. Morrison	Data reduction for heat transfer research.
	Mr. T. Solomon and Mr. G. Russell	Transportation algorithm for Operations Research.
	Dr. K.J. Bullock	Autocorrelation program.
	Mr. T.F. Leahy	Three dimensional stress distribution in rotation cylinder. Three dimensional stress in hollow cylinder subjected to a band of pressure.
	Mr. B.M. Munro	Data processing program for incremental brix tests. Data processing program for certain Queensland Sugar Mill data. Program to predict the performance of a given Milling Train with certain input data.
	Dr. C. Murry and Mr. T. Solomon	Analysis of variance for factorial designs up to 5 factors with replications.
	Mr. B. Munro	Extensions to data processing programs for the experimental mill.
	Mr. T. Solomon	Extension to feed pressure calculation program.
	Dr. C. Murry and Mr. B. Munro	Line of regression in double precision fixed point arithmetic.

APPENDIX V - Continued

DEPT. NO.	DEPARTMENT	WORK CARRIED OUT ON COMPUTER
007	Mechanical Engineering - continued	
	Mr. T.J. Solomon Mr. W.D. Renew	Data card reproducer with 1. Strain gauge rosette program 2. Cubic root subroutine 3. Three dimensional principal stress program
	Mr. E.W. Grigg	Data reduction for tyre dynamics research. Matrix multiplication with WIZ.
008	Mathematics	
	Dr. L. Howard	Earthquake location calculations.
	Mr. R.S. Anderson	Partial elliptic differential equation calculations.
009	Geology	
	Dr. R. Kretz	Calculation of distribution coefficient from chemical analyses of minerals.
010	Animal Husbandry	
	Dr. G. McBride	Routine evaluation, correction and analysis of poultry records of growth from the Moggill Farm. Analysis of data arising from social behaviour studies in pigs, poultry and man.
	Mr. J.A. Springhall	Statistical analysis of results of several feeding trails using New Guinea materials for poultry. Statistical analysis of results obtained in the study of the growth rate of meat and egg strain chickens on varying protein levels.
	Mr. I.D. Smith	Analysis of variance. Effect of seasonal variations in bodyweight upon oestrous activity in Merino ewes.
	Mr. I Horton	1. Program Development (a) Multiple linear regression analysis (GAP) (b) Five stage hierarchal component analysis (WIZ) (c) 2^n factorial analyses with some missing values and compounding. (d) Analysis of chicken data for Dr. McBride. (This included a complete input-output routine.) (e) Analysis of chicken data for J.A. Springhall (In collaboration with I. Burgess.) (f) Analysis of sheep data and plotting of graphs for J.A. Milne. (g) Tables of significant values of the multiple co-relation co-efficient. (h) Sorting and general summarising of cattle data from Canobie.
012	Agriculture	
	Mr. F. From	Nitrogen uptake by a wheat crop. Examination of uptake by various parts of the wheat plant at various stages of growth. Analysis of variance.
	Mr. I. DeLacy	Preliminary compilation of data. Examination of factors affecting wheat yields on the Darling Downs, Qld.
	Mr. T.K. Achari	Cobb-Doublas production functions for determination of optimum resource allocation on sugar farms.
	Mr. J.R. Anderson	Profit maximizing fertilizer inputs for Atherton Tableland crops and pastures.
	Mr. D. Hibberd	Effect of varying levels of applied nitrogen and time of cutting on the yield and composition of Elephant grass.
	Mr. J.G. Wutoh	Breeding studies into Glycine javanica.
	Mr. D. Muspratt	A study of sex dimophism and the body weight of the fowl.

APPENDIX V - Continued

DEPT. NO.	DEPARTMENT	WORK CARRIED OUT ON COMPUTER
013	Education	
	Mr. G.T. Evans	Preparation of programs for factory analysis. Analysis of 1961-1962 data for research project "The Development of Mathematical Ability in Adolescents".
014	Mining & Metallurgy	
	Mr. G.D. Just	Calculation of the equilibrium temperature and composition of the reaction between a hydrocarbon fuel and oxygen. Different fuel-oxygen ratios, reaction pressures and fuel compositions were used. The results were used to compute the optimum exhaust nozzle size of the jet-piercing unit for various fuel-oxygen ratios and combustion chamber pressures.
	Mr. A.J. Lynch	An analysis of comminution systems for the treatment of metalliferous ores. A technique has been developed for expressing the performance of all units in terms of matrices and a program to simulate the operation of a system of any degree of complexity on the computer has been written.
	Mr. D.E. Moore	Preliminary calculations on the matrix analysis of breakage processes. The developed program calculated, by an approximation technique, the elements of both selection and breakage matrices (the limits of which were rigidly defined).
019	Veterinary Anatomy	
	Dr. R.M. Butterfield	A study of muscle-weight distribution of steer carcases.
021	Veterinary Clinical Studies	
	Mr. P.B. English	Regressions and correlations on experimental data on sheep.
022	Remedial Education Centre	
	Mr. J. McLeod	An analysis of covariance of sub-test scores on the Wechsler Intelligence Scale for children obtained by successful and unsuccessful readers.
024	Microbiology	
	Miss E. Szabo	Estimation of percentage similarities between strains of bacteria.
025	Physiology	
	Mr. Jaswant Singh	Analysis of variance.
	Professor O. Budtz-Olsen	Significance of rumsu water estimations.
026	Chemistry	
	Mr. G. Alcorn	Spectroscopy - conversion of absorbance to the logarithm of the extinction coefficient.
028	Townsville University College	
	Dr. E. Carman	Calculation of air glow data.

APPENDIX V - Continued

DEPT. NO.	DEPARTMENT	WORK CARRIED OUT ON COMPUTER
101	Main Roads Dept.	
	Mr. C.G. Smith	Calculation of offsets from pegged circular curve to shift circular curve with non parallel tangents. Calculation of offsets from broken back curve to shift circular curve. Solution of simultaneous equations (Modified Gauss Method). Plot of mass diagram for earthworks volumes in road design. Calculation of offsets to new projection line from existing traverse.
	Mr. C.G. Smith and Miss C.D. Rudd	Analysis of data for number plate survey on Gold Coast.
	Mr. I. Moriarty Mr. G.J. Moxey and Mr. C.G. Smith	Computation of earthworks for dual lane rural roads.
	Mr. I. Moriarty and Mr. C.G. Smith	Check of data for earthworks program.
	Mr. G. Moxey	Analysis of data obtained from origin and destination surveys.
	Mr. N. Barron	Calculations for seismic refraction surveys.
	Mr. E. Whitchurch	Program to edit cards for input to I.C.T. 1500 computer in Sydney. Sundry programs generated with GE 225 card program generator. Programs used for road inventory and road statistics work.
	Mr. B.G. Cruse	Digital terrain model. Preparation of preliminary design data for road relocation.
	Mr. I. Moriarty	Comparison between estimated job costs, orders-in-council, and final job costs for review purposes. Conversion of terrain cross section data to standard co-ordinates for use in earthworks program.
102	S.E.A.Q.	
	Mr. P. Hoare	Transmission line survey calculations. A program to obtain progressive chainages and levels from surveyors' field book theodolite and chain survey measurements. Ground profile co-ordinates on punched cards are produced if required for profile plotting and tower positioning. Transmission line profile plot. A program to plot a continuous ground profile of a transmission line route. Transmission line tower positioning. A program to calculate the combination of tower heights which result in the most economic cost per mile over an input ground profile. Generating plant economic scheduling and loading. A program was developed to determine the most economic scheduling and loading of generating plant for South East Queensland.
	Mr. P. Hoare Mr. J. McClenahan	Power system load flow. The program developed can accommodate a system having a maximum of 50 buses (load or generation) and 100 lines, with provision for 10 on line tap changing transformers both in phase and quadrature. A complete print out of all system loadings and data is provided, together with grouping of system losses into a maximum of 6 areas. This program is in continuous use by the Authority for system analysis.
	Mr. P. Hoare, Mr. J. McClenahan, Mr. R. Waldie (S.E.C.Q.)	Power system transient stability. As a development of the load flow program a general system transient stability program is now available which will accommodate up to 10 generators. The print out includes all generator powers and angles, and also the current and apparent impedance for up to 10 feeders.
	Mr. L. Olsen	Power system fault study. A program to calculate 3 phase fault data for any system within the limits of 25 buses and 100 lines. The print out includes voltages on all busbars, currents and apparent impedance of all lines, and the total fault current.
	Mr. K. Hilless	Overcurrent relay setting. An introductory program to determine some of the problems in developing generalised procedure for computer relay setting in a power system.

APPENDIX V - Continued

DEPT. NO.	DEPARTMENT	WORK CARRIED OUT ON COMPUTER
102	S. E. A. Q. - continued	
	Mr. L. Olsen	System interruption data processing. Details of system faults and interruptions are recorded on punched cards and a series of programs sorts, totals, compacts and extracts required information.
	Mr. G. Boytell	Boiler efficiency calculations. A program to analyse steam boiler performance test data for acceptance tests and efficiency checks.
103	Dept. Primary Industries	
	Mr. P. McGovern	GAP Programs 1. Analysis of variance for orthogonal designs-randomised block, latin square, split plot, lattice square, square lattice, switch-back. Treatments systems can include repetition of sets and general factorial schemes up to 2^9, including some cases of total and partial confounding. The programs include a general calculation routine for carrying out a wide range of calculations on and transformations of input data, sampling error determination, missing value estimation, applications of F and L. S. D. tests controlled format output, and covariance analysis for the simpler designs. 2. Inverse, determinant, solution of simultaneous equations for symmetrical, positive, (semi-) definite matrix (square root method). 3. Non-orthogonal analysis of variance for "no-interaction" case (least squares solution). 4. Least squares curve fitting by orthogonal polynomials (general case). 5. Random selection of n things out of m. 6. Chi-squared for r x s table. WIZ Programs. 1. Probit analysis of mortality curves. 2. Analysis of variance for up to 3 factors (with sampling). 3. Correlation and linear regression.
104	Irrigation & Water Supply Commission	1. Quantities of fill in zoned embankments (a) Develop program (b) Compile bank quantities for proposed structures on Bowen River, Upper Burnett River, Macintyre Brook, Three Moon Creek, Baywulla Creek and The Millstream. 2. Backwater curve calculation for spillway approach channels. (a) Develop program (b) Complete curves and derive discharge coefficients at sites on the Burnett River, Three Moon Creek, Broken River, Baywulla Creek. 3. Slip circle stability analysis of earth and rockfill dams. (a) Develop program (b) Stability analysis of embankments at Coolmunda Dam site and Callide Dam site. 4. Non circular slip stability analysis for sloping earth core type dams. (a) Develop program (b) Stability analysis of Coolmunda Dam fuse plug. 5. Determination of most economical section for a stable mass gravity dam at a given site. (a) Develop program (b) Some program testing 6. Stage discharge relations at given stream cross sections. (a) Develop program (b) Determination of stream channel capacity of approx. 40 miles of Three Moon Creek. (c) Tail water curve calculations at dam sites on the Burnett River Broken River and Baywulla Creek.

APPENDIX V - Continued

DEPT. NO.	DEPARTMENT	WORK CARRIED OUT ON COMPUTER
104	Irrigation & Water Supply Commission - continued	7. Storage behaviour analysis, no restrictions, with D/S inflows, monthly analysis. (a) Program modifications (b) Behaviour analysis of storages on Cainbable Creek, Logan River, Burnett Creek, Broken River, Burnett River, and for Tinaroo Falls Dam. 8. Storage behaviour analysis, no restrictions, monthly analysis. (a) Develop program (b) Behaviour analysis of storages on Barron River, Cainbable Creek, Mt. Barney Creek, Broken River, MacIntyre Brook, Logan River, Burnett Creek and Callide Creek. 9. Storage behaviour analysis, no restrictions, without draft adjustment, monthly analysis. (a) Develop program (b) Behaviour analysis of storages on Callide Creek and Broken River. 10. Storage behaviour analysis, single restrictions, fixed draft, monthly analysis. (a) Develop program (b) Behaviour analysis of storages on Broken River. 11. Storage behaviour analysis, no restrictions, quarterly analysis. (a) Develop program (b) Behaviour analysis of storages on Three Moon Creek and Burnett River. 12. Current meter rating table. (a) Develop program 13. Storage behaviour analysis, single restrictions with D/S inflows, monthly analysis. (a) Program modification (b) Behaviour analysis of storages on Broken River, Cainbable Creek, Logan River, and Barron River. 14. Storage behaviour analysis, single restrictions, quarterly analysis. (a) Program modification (b) Behaviour analysis of storages on MacIntyre Brook. 15. Storage behaviour analysis, single restrictions, monthly analysis. (a) Program modifications (b) Behaviour analysis of storages on Broken River. 16. Unit hydrograph derivation. (a) Program development - further development and testing required. 17. Reservoir flood routing. (a) Program modification (b) Reservoir flood routing for structures at sites on Burnett River, Baywulla Creek, Three Moon Creek, Broken River. 18. Miscellaneous small programs for specific and "once only" calculation purposes.
105	Co-ordinator General's Dept.	
	Mr. W.H. Boyce	Capacity curves for reinforced concrete columns subjected to combined axial load and bending. (Rectangular and circular).
	Mr. C.J. McMonagle	Analysis of prestressed concrete beams (not yet completed).
	Mr. D.J. Stuart	Brisbane Port Development. Calculation of distances from two stations on shore for positioning a boat at a definite point in a channel by means of a Hydrodist.

APPENDIX V - Continued

DEPT. NO.	DEPARTMENT	WORK CARRIED OUT ON COMPUTER
106	Forestry	
	Mr. N.B. Henry	1. GAP Programs STV III — Calculation of sample tree volumes and comparison with existing volume tables. VTRA — A special regression analysis program for volume table preparation using output from STV III. VTP — A series of programs for computation and printing of volume tables for use by various branches of the Department - (a) Predominant Height/cubic feet) for Research use. (b) Total Height/cubic feet Research use. (c) Predominant Height/super feet -for use in sales of plantation thinnings. (d) Merchantable Height - three versions for use by Research and Management. MVC — A program for comparison of methods of volume determination in terms of both field measurements and calculation methods (to be further developed). RAP-S15 — A modification to I.F. Horton's general regression analysis program for development of special high accuracy volume table models for research use. Cypress F.I.S. Card Conversion - 65 column cards to 80 column. 2. GAP subroutines for WIZ programs prepared by other officers of the Department. (a) A subroutine to read Cypress F.I.S. cards (as converted from old 65 column cards) and convert the 41 items of information to double length binary integers. Provision is also made for labels of up to 120 chrs. per line. (b) Subroutines for rapid sorting into girth classes (Cypress and Hardwoods). (c) Double length integer conversion for fixed point output of large numbers.
	Mr. J.W. Moore	1. GAP Programs BDTMSP — Calculates stem volumes and produces distributions of size by grade by girth - predominant height classes. Outputs corrected times (in man minutes) for the above batches. H.S.P. output. STEP — Calculates set-to-earn rates and volume ranges for cutting and snigging tasks, output on paper tape for cutting stencils on the teleprinter. VRTP — Calculates the information needed for the vehicle returns submitted to the Mines Department. VNREP — Calculates Van Neumans ratio for two variable linear regression. MVESP — Solves multivariate regression equations for a range of independent variables. 2. WIZ Programs PVP — Calculates the expected value of a Poisson variate for a range of mean values.
	Mr. J.A. Winn	I - IV — General F.I.S. and freeholding. VI - X — (a) Sorting into types. (b) Stand tables. (c) Volumations. (d) By species (in case of hardwood) V — Cutting and snigging tasks (simple arithmetic). XI - XIII — A series of analyses of the relationships between Gross and Nett volumes based on day labour sales. XIV - XVIII — Freeholding calculation, hardwood and cypress pine, also partly applicable to F.I.S. (a) 2 way stand tables. (b) Volumations. (c) Bringing to nett. (d) Volumes from G.B.H. to C.G. (e) Valuation. In programs XIV - XVIII G.A.P. Subroutines supplied by Mr. Henry were used.

APPENDIX V - Continued

DEPT. NO.	DEPARTMENT	WORK CARRIED OUT ON COMPUTER
106	Forestry - continued	
	Miss V. Beer	1. WIZ DAP Increments volume, graded recovery, total recovery and total time within girth classes. HVAP Calculates value arrays for 4 grades of hoop pine. TVAP Calculates value arrays for 5 grades of thinnings. C-DRP3 Calculates 3 variable Cobb-Douglas function. C-DEP Evaluates Cobb-Douglas functions over a specified range. C-DRP3 Calculates 4 variable Cobb-Douglas function.
107	Survey Office	
	Mr. A. Leatch	Geographical position (latitude and longitude) and map projection co-ordinates from spheroidal distances and observed angles. Plane co-ordinates from bearings and distances and thus any land survey or trigonometrical problem. Spheroidal distance at sea level from observations with tellurometer (electronic distance measuring device).
	Mr. M. Vandenbergh	Computation of airline distances from latitudes and longitudes.
108	B.C.C. Transport Dept.	
	Mr. D.H. Morgan	Production of economy of purchase tables.
	Mr. K.A. Taylor	Multiple regression analysis of origin and destination surveys materials.
	Mr. K.A. Taylor	Best fit polynomial.
	B.C.C. Electricity Dept.	
	Mr. F.C. Reed	Electricity tariffs calculations.
113	Postmaster General's Dept.	
	Mr. A. Cobcroft and Mr. N. Davis	Calculation of irregularity factor and layout of transposition sections on open wire routes.
	Mr. A. Cobcroft	Calculation of attenuation absorption peaks on open wire routes.
	Mr. N. Watson	Calculation of design data for operation of 300 kilocycles carrier system on open wire routes.
	Mr. K. Freeman	Traffic dispersion - process and compile. A.R.K. Exchanges - various traffic tables.
	Mr. J. Kitchen	Traffic dispersion prediction.
114	C.S.I.R.O. (Tropical Pastures)	
	Mr. K. Haydock	Analysis of variance of randomised block fitting $Y = A + B \text{ Exp } (cx)$ to data linear regression. Covariance analysis of simple classification.
	Mr. P. Ross	Calculation of activity coefficients, calculation of N^{15} enrichments, calculation of potential evapo-transpiration. Randomised block analysis and extensions for particular treatment effects.
	Mr. A.J. Pritchard	Analysis of variance and co-variance based on a randomised block design.
	Mr. J.C. Tothill	Calculation of standard deviations. Linear regression and correlation.
	Mr. J.S. Russell	Exponential regression analysis.

APPENDIX V - Continued

DEPT. NO.	DEPARTMENT	WORK CARRIED OUT ON COMPUTER
114	C.S.I.R.O. (Tropical Pastures) - continued	
	Mr. C. Gates	Calculation of regressions of leaf shape on leaf position - Phosedus Nitrogen trials. Calculation of regressions dry rot of whole plant on leaf area - Atriplex salinity trial. Sorting random weighings into array order and test of transporous Stylosauthes trial. Preparation of array orders for glasshouse trials. Analyses of variance-various trials.
	Mr. A. Howard	Extension of existing tables for calculating probability of finding M or more organisms in a sample which is a fraction $\propto$ of a culture containing N organisms. Modifications to MLRP (Multiple linear regression analysis) for increased number of variables without restriction on number of dependent and independent variables. Analysis of variance for factorial design with extension to covariance (WIZ). Reiterative solution of least squares fit of data to formula $Y = C + \exp(D-Kt)$ for application of viscosity measurements to a study of dynamics of enzymatic hydrolysis of gelatine.
115	S.E.C.Q.	
	Mr. W.C.E. Wager and Mr. G. Francis	Program to simulate electric power system operation for most economic generation.
	Mr. R.D. Waldie	Jointly with P. Hoare of Southern Electric Authority, program for analysing transient stability of transmission systems.
116	Mt. Isa Mines Ltd.	
	Mr. E. Gibbs	Simulation of the operation of Coal and Coke handling facilities at Railway Marshalling Yard.
	Mr. R. Andrew	Polynomial curve fitting of data from grinding ball testing to determine wear rates. To calculate ratios of element assays of core drill samples for up to 30 elements. Monte Carlo simulation of stope grades - from known tonnages extracted from each stope and the total metal content, the grade of each stope is determined by Monte Carlo methods. Scheduling of stope extraction.
201	Bureau of Sugar Experiment Stations	
	Mr. K.C. Leverington	Analysis of variances of fertility experiments with sugar cane. Computation of volumes and densities of sugar cane from stalk measurements.
203	Cameron & McNamara	Foundation Design. Portal Frames Design. Concrete Frames Design. Pile Foundations. Check Design. Bridge - prestressed beams.

APPENDIX VI

PROJECTS AND UTILITY ROUTINES DEVELOPED, SPONSORED, OR ASSISTED BY THE COMPUTER CENTRE STAFF.

Author	Nature of Work
D. L. Overheu	A one pass relocatable assembler for a GAP type language (completed). A linear list processor based on ZOOM. A Multi-list processor based on ZOOM. Further modifications to ZOOM for card output of macro instructions.
R. E. Kelly E. J. Sokoll I. Oliver	A compiler for matrix algebra operations, MAC.
R. E. Kelly	SLIP - A symbolic label input routine.
E. J. Sokoll	Packed data input subroutine. A general purpose listing program WIZOR PAC, subroutines for operation with WIZOR compiled programs. Modifications to WIZ and WIZOR compilers for identification cards. Modifications to Standard Input/Output for printer operation. Modifications to Standard Input/Output for extra index register groups. Investigation of internal sorting techniques. A high speed internal sorting procedure.
I. Oliver	New Computer Centre invoicing and accounting routines, Compacted Account, Invoicing Run, Error Run. Floating Point Decimal Memory Dump. Five channel paper tape to printer lister. Solution of simultaneous equations subroutine for WIZ. Gamma Function subroutine. Error Function subroutine. Cumulative normal distribution subroutine. Solution of simultaneous equations, demonstration program. Sequence numbering reproducer for GECOM, WIZ, and WIZOR source cards. Double card to printer lister.

APPENDIX VII

USE OF DATA PREPARATION EQUIPMENT IN 1963

1. TELEPRINTERS

(Time in Hours)

	1	2	3	4	5	6
Month	U. of Q.	Contributors	Non-Contributors	Total Cols 1, 2, 3	Computer Centre	Total All Users
January	45.8	57.1		102.9	37.6	140.5
February	65.6	90.1		155.7	35.6	191.3
March	75.6	91.1	2.9	169.6	23.2	192.8
April	31.1	77.8		108.9	38.7	147.6
May	5.1	3.0		8.1	3.6	11.7
June	2.4	1.0		3.4	5.2	8.6
July	4.1	1.4		5.5	7.2	12.7
August	0.9	1.2		2.1	2.4	4.5
September	3.1	0.6		3.7	0.5	4.2
October	0.2	0.9		1.1		1.1
November	1.0			1.0		1.0
December		0.4		0.4		0.4
Total	234.9	324.6	2.9	562.4	154.0	716.4

2. CARD PUNCHES

(Time in Hours)

	1	2	3	4	5	6
Month	U. of Q.	Contributors	Non-Contributors	Total Cols 1, 2, 3	Computer Centre	Total All Users
January	23.3	25.6		48.9	9.6	58.5
February	20.9	14.8		35.7	12.9	48.6
March	7.0	26.0	1.8	34.8	9.5	44.3
April	23.1	15.4		38.5	22.5	61.0
May	27.5	23.8	0.5	51.8	28.5	80.3
June	19.1	16.2		45.3	19.5	64.8
July	19.4	25.4	8.2	53.0	63.5	116.5
August	26.6	32.2	4.1	62.9	25.0	87.8
September	46.0	28.5	8.9	83.4	49.6	133.0
October	63.7	17.6	2.1	83.4	50.2	133.6
November	51.5	13.7	1.5	66.7	47.7	114.4
December	33.2	12.6		45.8	17.9	63.7
Total	361.3	261.8	27.1	650.2	356.4	1006.6
AV/MONTH	30.1	21.8	2.3	54.2	29.7	83.9

APPENDIX VII (Cont.)

3. CARD VERIFYING

(Time in Hours)

	1	2	3	4	5	6
Month	U. of Q.	Contributors	Non-Contributors	Totals Cols 1, 2, 3	Computer Centre	Totals All Users
January	6.9	15.2		22.1	4.6	26.7
February	17.3	8.2		25.5	0.5	26.0
March	0.3	16.9	1.8	19.0		19.0
April	7.4	8.3		15.7		15.7
May	3.6	13.4		17.0		17.0
June	4.9	10.1		15.0		15.0
July	10.0	6.8	6.1	22.9	15.3	38.2
August	15.8	8.9	2.5	27.2	5.8	33.0
September	24.4	3.6	5.0	33.0	11.3	44.3
October	42.6	6.0	1.0	49.6	12.8	62.4
November	9.2	1.7	0.6	11.5	3.1	14.6
December	11.4	0.5		11.9	1.3	13.2
Total	153.8	99.6	17.0	270.4	54.7	325.1
AV/MONTH	12.8	8.3	1.4	22.5	4.6	27.1

APPENDIX VIII

COMPUTER CENTRE PUBLICATIONS 1963

Author	1. Memoranda and Programs
D.L. Overheu	Operating Memorandum No. IV Computing Request
	Cards for Deferred Running.
	Operating Memorandum No. V-Availability of the Computer.
R.E. Kelly	Sample WIZ Program Correlation Analysis.
R.E. Kelly I. Oliver	SLIP - Symbolic Label Input Routine.
E.J. Sokoll	Programming of Additional Features on GE 225.
	Standard Output Routines for the GE 225.
	Standard Mathematical subroutines for the GE 225 - 'Math-Pac'.

2. Service Reports

GE 225 Program Library Status Report - 1st September, 1963.

GET Program Library Status Report - 1st September, 1963.

GET Program Library Status Report - 1st November, 1963.

APPENDIX IX

PROVISIONAL FINANCIAL STATEMENT - COMPUTER CENTRE

for year ending 31.12.1963

Donations account

RECEIPTS		PAYMENTS	
Contributors donations (Note 1)			
To 31.12.1961	47,192. 6. 8.	Charges for computer time invoiced to contributors against entitlement :	
31.12.1962	31,167. 6. 8.	(to 31.12.62)	8,900.16. 7.
31.12.1963	34,167. 6. 8.	(1.1.63 - 31.12.63)	28,200. -. -.
		To Balance (value of computer time due to contributors) (Note 1)	75,426. 3. 5.
	112,527. -. -.		112,527. -. -.

Capital equipment account

Contributors donations to 31.12.63	112,527. -. -.	Payments to A.G.E. for GE 225 Computer system to 31.12.63	94,359. 6. 6.
U.Q. contribution to 31.12.63	20,055. -. -.	Auxiliary equipment	6,998.17. 4.
Miscellaneous credits	1,406.17. 8.	Building, including air conditioning	25,456. -. -.
		Furnishings and fittings	1,878. 8. 6.
		Equipment hire (debited to capital account for first year's operations)	1,024. 1. 8.
		Miscellaneous (travel, services, etc.)	2,774. 3. 8.
		To Balance (credit in account 31.12.63)	1,498. -. -.
	133,988.17. 8.		133,988.17. 8.

Operations account (1.1.63 - 31.12.63)

Carried forward	Credit balance 1962	1,999.14. 2.	Salaries (additional staff) (Note 2)	846.14. 9.
	Outstanding accounts 1962	1,141. -. -.	Equipment hire	506. 7. 6.
Computer charges (Note 3)			Stationery	1,951.14. 6.
	U.Q. Departments	3,771. -. -.	Printing	109.14. -.
	Non-contributors	330. -. -.	Purchase of H.S. Printer (part payment incl. initial rental)	5,905.10. -.
Miscellaneous computer services (Note 3)			Electricity	1,806.12. 9.
	U.Q. Departments	1,952.12. -.	Miscellaneous	1,219. 7. 2.
	Non-contributors	191.10. 2.		
	Contributors	7,201.10. 3.		12,346. -. 8.
			To Balance 31.12.63	
			In hand	1,107. 6. -.
			Outstanding invoices	3,133.19.11.
		16,587. 6. 7.		16,587. 6. 7.

NOTE 1: Guaranteed future contributions £5,500 with corresponding computer time entitlement.

NOTE 2: Salaries for eight appointments (£11,189) were paid from University General Funds.

NOTE 3: These are amounts invoiced for period 1.1.63. - 31.12.63.