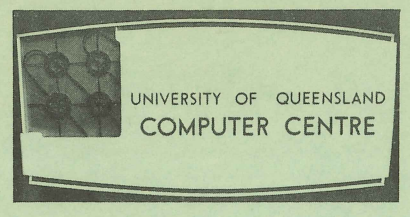
UNIVERSITY OF QUEENSLAND

COMPUTER CENTRE



FIRST ANNUAL REPORT

1st January to 31st December 1962

UNIVERSITY OF QUEENSLAND

COMPUTER CENTRE

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TABLE OF CONTENTS

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 a period of five years 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 1962

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 L.J.H. Teakle, B.Sc.Agric, MS, Ph.D, ARACI	(President, Professorial Board) Professor of Agricultural Science (ex officio)
Professor C.S. Davis, DFC, M.Sc., Ph.D.	Professor of Mathematics
Professor D.W. McElwain, MA, Ph.D, FBPsS.	Professor of Psychology
Dr. S.A. Rayner, M.Ed., Ed.D, MA.	Deputy Registrar
Mr. D.L. Overheu, B.Sc.	(Officer-in-Charge), Reader in Computing (ex officio)

Computer Centre Advisory Committee 1962

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. C.B. Mott, M.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 1962

Officer-in-Charge and Reader in Computing:	*D.L. Overheu, B.Sc.*	
Lecturer in Computer Electronics:	*R.E. Kelly, B.E.*	
Demonstrators (Programmers):	*E.J. Sokoll, B.E.*	
	D.R. Ross, B.Sc.	(1)
Applications Engineer: (2)	*W.H. Houssell, B.A.*	(3)
Product Service Engineer: (2)	*R.E. Cole*	
Machine Operator:	*Anne McArthur*	
Data Preparation Assistants:	*Carol J. Baxter*	(4)
	Patricia M. Short	(5)
Clerk-Typist	*Ilse F. Gaylard*	

1. Resigned 26th November.
2. Staff of Australian General Electric Co. Pty. Ltd.
3. Ceased duty on termination of contract, 11th September.
4. Appointed 14th May.
5. Appointed 1st October.

ANNUAL REPORT

The period covered by the First Report has seen the initial installation of the GE 225 automatic digital computer and a steady growth in its use by University Departments and Contributing Organisations. The most significant feature of this growth was the decision in September, to install a high speed on-line printer.

EXECUTIVE COMMITTEE

The Executive Committee met in May to ratify charges to be made by the Computer Centre for various classes of users and types of work. The Executive Committee also recommended approval of the budget for the Computer Centre for the triennium 1962 to 1964.

ADVISORY COMMITTEE

The Advisory Committee held meetings, on 6th April, 25th May, and 6th September. On 6th April, the scale of charges to be applied for the use of facilities by various classes of users was considered. The progress in the installation of the computer and action to finalise details of the acceptance tests were reported. It was explained that the staff would need to assist with a program for the final test since it had been impractical to complete this program elsewhere. A report was also given regarding the status on initial program development by Computer Centre Staff. On 25th May approval was given for the financial policy to be adopted in the operation of the Centre.

The Reader in Computing tabled a report on the acceptance tests which had been completed by 8th May. The meeting requested the Chairman to express the appreciation of the Committee to the Computer Centre Staff and representatives of Australian General Electric Pty. Ltd. for their efforts in ensuring that the Computer Centre had become operational in the minimum time.

Improvements in data preparation facilities were considered at the Centre on 6th September. The growth rate in the printing and punching loads indicated early saturation of the capacity of the Centre for this work. The Advisory Committee endorsed recommendations for the employment of a second Data Preparation Assistant, the hire of an additional card punching machine, and the hire of a high speed printer. The printer may be purchased when finances permit; meanwhile a hire arrangement would be entered into at a charge of £480 per month. The Advisory Committee requested that the Executive Committee should consider an equitable means of charging so that this cost could be recovered.

PREMISES OF THE COMPUTER CENTRE

The premises were completed on 1st March, 1962, just prior to the arrival of the computer. Professor Webster, Department of Physics, made available temporary quarters for Computer Centre Staff during January and February.

The air conditioning equipment was put into service - partly completed - about mid March. The equipment is in two parts. Plant A provides air to the computer and computer room while Plant B supplies the other rooms. A number of problems have arisen with both air conditioning plants throughout the year, the worst of these being a fire in Plant B. Fortunately, the damage was limited to the Plant Room. Plant B was finally brought fully into service after an additional booster fan had been installed to increase the airflows to values approximating the specified quantities. Plant A performed reasonably well at first, but later deteriorated in cooling capacity. By December, it was evident that this plant was not maintaining the specified temperature and humidity values. The correction of these deficiencies is in hand.

It has not been found necessary to alter significantly the layout of equipment in the Centre. However, the original position for the Library has been made available for long-term visitors to use as a working area, and the book collection has been accommodated at the rear of the Data Preparation room. Although some of the computer equipment will be re-located when the high speed printer is installed, no building changes are necessary, since the false floor in the computer room permits immediate repositioning of any equipment.

STAFF

A number of staff changes have taken place during the year. Mr. D.R. Ross resigned in November to join the staff of I.C.T. Australia, Mr. W.H. Houssell of A.G.E. completed his period of service on 11th September. Miss P. Short was appointed to a position of Data Preparation Assistant on 1st October.

Following the resignation of Mr. Ross, a new position of Senior Demonstrator was advertised and will be filled in February, 1963 by Mr. I. Oliver, B.Sc. He is at present with ICIANZ in Melbourne where he has had some experience with a Ferranti Sirius Computer and an I.C.T. 558 calculator. Mr. E.J. Sokoll has also accepted re-appointment for 1963 as a Senior Demonstrator. Mr. J.L. Jerrard has been appointed as Maintenance Technician and will commence duties in January, 1963.

TEACHING ACTIVITIES

The main teaching for the current year has been concerned with programming and coding courses. A special effort was made in July/August to provide coding courses for the WIZ automatic programming system when six courses were held sequentially. WIZ courses require three four hour sessions and Elementary Programming Courses take up ten four hour sessions. Courses are restricted to twenty students and take place at intervals of approximately six weeks.

The following list shows the numbers enrolled for each course.

Period	Course	Number Enrolled
15th - 26th January	Basic Programming (now discontinued)	45
8th - 18th May	Elementary Programming	19
21st May - 1st June	Elementary Programming	20
2nd - 13th July	Elementary Programming	18
23rd - 24th July	WIZ	18
26th - 27th July	WIZ	21
30th - 31st July	WIZ	23
2nd - 3rd August	WIZ	20
6th - 7th August	WIZ	14
8th - 9th August	WIZ	20
13th - 24th August	Elementary Programming	12
22nd - 24th October	WIZ	22
29th Oct. - 9th Nov.	Elementary Programming	21
12th - 14th Nov.	WIZ	16
3rd - 5th Dec.	WIZ	18
3rd - 11th Dec.	Undergraduate Programming	46
	Total	353

The attendees at the various courses were initially drawn from the University and Contributors' Staffs, but in the later courses it has been possible to include a higher proportion of staff from other interested organisations. During 1963 it is hoped to broaden the courses sponsored by the Centre, and in particular a number of University Departments will include instruction and use of the computer in their normal degree courses. Two symposia were held on the use of standard input, output, and debug packages.

In mid 1962, staff of the Computer Centre assisted in the formation of a Society known as the Computer Society of Queensland. This will encourage a further spread of knowledge relating to the use of computers. During 1963, members of the Staff will take part in a series of lectures sponsored by the Society on the application of computers to electronic data processing.

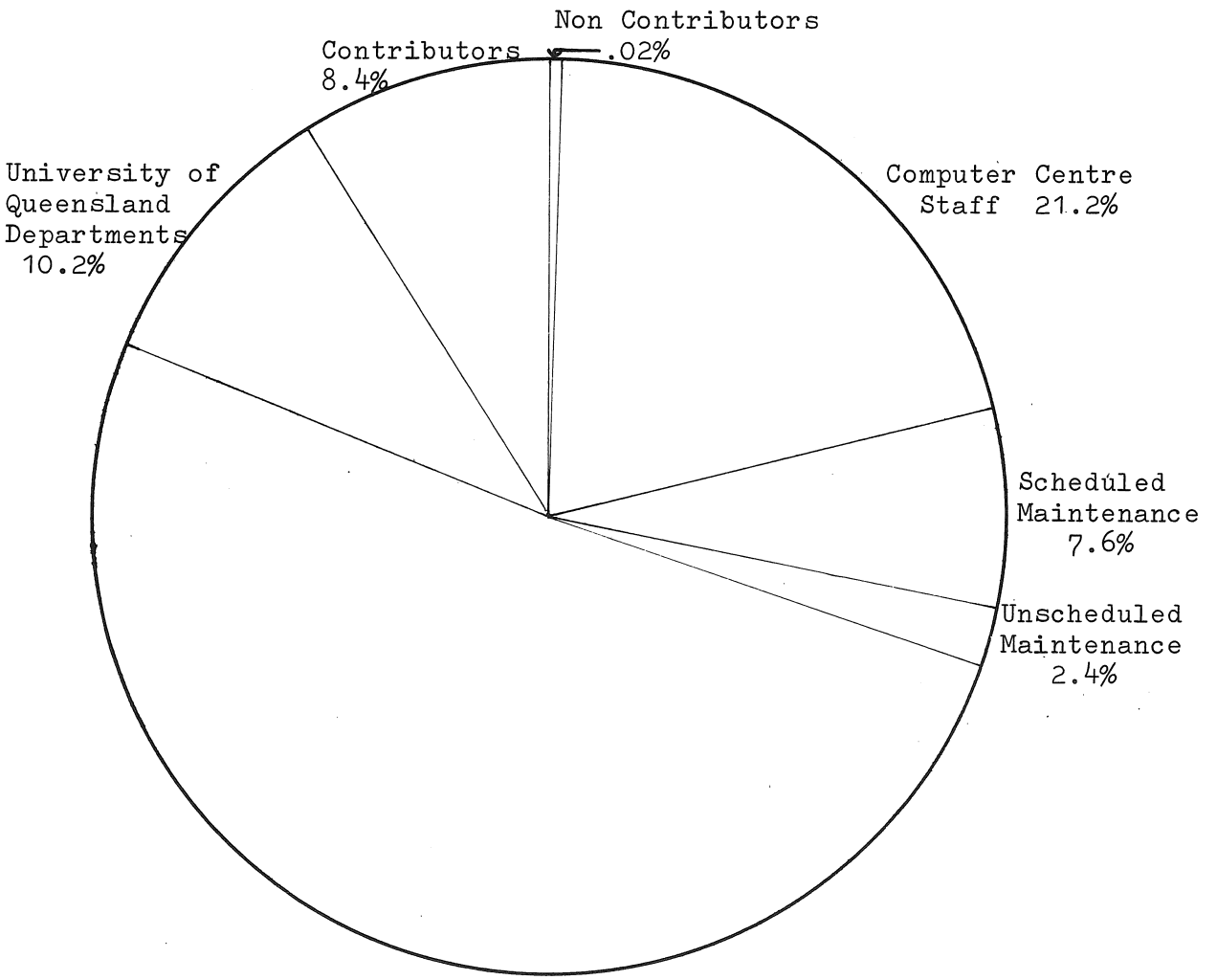
OPERATING RECORD OF THE COMPUTER

The computer was running on problems on the average for about 45% of its scheduled on-time, or just under half of a shift. The operating ratio, was .97, unscheduled maintenance averaged 2.4% of scheduled on-time, and scheduled maintenance averaged 7.6% of total switched on-time. These figures may be considered normal for the first year of use. The computer was brought into service on the 8th May, the installation phase running from the 14th March to this date. During this installation period, extensive acceptance tests were carried out, including a five day reliability run. Some initial set backs occurred with minor failures which invalidated acceptance tests so that, considering the stringent nature of the tests, the overall period for installation was, in general, quite satisfactory.

From May to December the switched-on time was 1793.8 hours, scheduled on-time was 1657.3 hours and total use-time was 726.8 hours. Use-time was divided between production runs (125.3 hrs.), development runs (579.8 hrs.) and demonstrations (20.7 hrs.). The production figures may not be a true indication of the amount of time spent on this activity, since the Centre provides an on-demand service for any run of less than 15 minutes. Hence, unless the user indicates to the operator that his work is production, it will be recorded as development time.

With increasing calls for longer production periods, the first hour of the day's operation is now made available for this work so that the production figure does reflect the amount of work done of this type. It is also to be expected that for some time after installation, development time will be very much greater than production time.

Further details of the distribution of computer time during 1962 are given in Appendix I. The falling off in use in November is due to University examination activity, and in this year there were only three working weeks in December before the annual shut down. Computer use is, however, rising and the average total use time per month for the year was 90.8 hrs.



100% = 1793.8 hours

Distribution of Hours of Total Switched-on Time

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 organisations. The University Departments had a total of 183.3 hrs. or an average of 22.9 hours per month during the year, with October being the most active month. Contributors' staff used a total of 158.6 hours (average 19.8 hours per month) for the year so that 53% of the machine time was used by University Departments and 45.9% by contributors out of the total of 345.8 hours used for other than Computer Centre Staff activities. In addition, there were 3.9 hours of non-contributor use or an average of 0.5 hours per month, giving an overall average of 42.35 hours per month for all other users. The remaining 381.0 hours of the 726.8 expended were used by the Computer Centre Staff for a wide range of activities in program development and use of the machine for the listing of program and data decks to paper tape from cards, in leiu of an off-line tabulator. The Centre averaged 47.25 hours per month or a little over 50% of the total time used. There was a marked decrease in time of use by the Computer Centre Staff over the eight month period as program development waned in favour of other research activities and the aiding of other users in their program developments. With the installation of a high speed printer, programs will be developed for error checking of program and data decks during the listing operation, in which case computer time will become chargeable to the user. Included in the Centre use-time is approximately two hours of computer time for the development of programs sponsored by the Centre.

During the year, nineteen University Departments used the Centre. The largest user was Physics Department with 79.3 hours. Four other Departments, Electrical Engineering, Mechanical Engineering, Civil Engineering, and Animal Husbandry used over ten hours each and together accounted for 65.0 hours. The remaining fourteen Departments varied from 0.4 to 7.9 hours each. Amongst contributors, the largest user was the Main Roads Department with 51.9 hours followed by the Irrigation & Water Supply Commission with 36.5 hours. Three other contributors accounted for 46.3 hours, so that five contributors together used 134.7 hours of the 158.6 hours total use from this source. The distribution of computer time used by University Departments is given in Appendix II, and of Contributors in Appendix III.

As shown in Appendix IV, the main areas of use have been in engineering problems, statistical analysis, and geophysical problems. The staff of the Computer Centre have also carried out research and development work on basic subroutines, assemblers and translators, and small data processing activities. In this latter field, programs have been developed to process automatically records of equipment use for both statistical analysis and invoicing. Projects developed, sponsored, or assisted by the Centre are listed in Appendix V.

OTHER ACTIVITIES

On 1st August, the Computer Centre was officially opened by Mr. D.W. Fraser, ISO, ASAA, AAUQ, State Public Service Commissioner in the presence of the Chancellor and Vice-Chancellor. This event was notable for the fact that the opening ceremony was aided by the use of closed circuit television to provide guests with a view of the activities in the computer room. Following the ceremony, guests inspected the installation in greater detail. The occasion has been marked by a plaque mounted on the wall of the Computer Centre lobby.

Staff from the Brisbane City Council Transport Department visited the Centre to discuss applications of digital computers in the engineering and commercial fields. In November, the Secretaries and Chief Engineers of a number of Sugar Mills visited the Centre during two mornings; also, students in the senior classes of the Indooroopilly High School visited the Centre on two afternoons and were given a short talk on the construction and use of digital computers.

Among other visitors to the Centre were members of the Australian Universities Commission, Professor F. Hoyle of Cambridge University, Professor C.F. Wrigley of the Michigan State University, U.S.A., and Mr. R.W. Boswell, Controller, Weapons Research Establishment, South Australia.

The Computer Centre is indebted to Dr. G.W. Hill, of the University of Melbourne Computing Laboratory for assistance with sub-routines for random number generation and Mr. B. Shanahan of the State Actuaries Office for assistance with programs for the calculation of present values of loans.

The Chairman of the Executive Committee assisted in the preparation of specifications for equipment to be ordered for the C.S.I.R.O. computer network.

PUBLICATIONS

Publications and reports on programming by Computer Centre Staff are listed in Appendix VII.

DATA PREPARATION

During the year several changes were made to the data preparation equipment. In March, the Centre had available one Creed interpreter-reproducer set, one I.B.M. 024 card punch, one I.C.T. card punch and one I.C.T. verifier. Since the normal reading mode for card input into the GE 225 computer does not suit the I.C.T. fifth zone symbol code, the I.C.T. verifier was replaced in September by an I.B.M. 054 verifier. It was also expected that use would be

made of fifth zone symbol printing on an I.C.T. 915 tabulator to be delivered later in the year to the University Hollerith Centre, but the use of paper tape output from the computer with a Creed teleprinter as an interpreter has been so successful that the contract for the fifth zone symbols was cancelled. In July, a second Creed interpreter-reproducer set was delivered, together with two Creed paper tape perforators and a Creed paper tape comparator. The second interpreter set considerably relieved the load on the existing interpreter. In September, a Creed paper tape verifier was received, thereby completing the initial order for paper tape equipments.

At the time of delivery of an I.B.M. 024 card punch, an order was placed for an I.B.M. 026 printing card punch as a replacement; delivery of this equipment is expected in January, 1963. Later in September, an order was placed for a second I.B.M. 026 printing card punch to replace the I.C.T. punch in March, 1963; in the meantime I.C.T. have modified their punch to provide the card code required by the Centre. In July, a second I.C.T. mechanical punch was hired, to meet the demand by various users for corrections to card decks.

The number of hours of use of the various equipments is given in Appendix VI. At the present time, all users appear to prefer card input to the computer, except where data are recorded automatically on paper tape. There is a projected future use, by the Department of English, of paper tape equipment for the preparation of a large amount of data for a research project on a study of spoken English. The addition of a high speed printer will also relieve the interpreter sets for paper tape editing work. Excluding Computer Centre use, which is only logged for produced work, University Departments used 46.5% of the Creed interpreter time and Contributors 51.0%. Punching time used by University Departments was 57.8% and by Contributors 39.6% of the total used, again excluding Computer Centre use. For the four months in which the verifier was available, University Departments used 54.5 hours and Contributors 39.3 hours. There was no use by the Computer Centre or non-contributors.

FUTURE DEVELOPMENTS

The immediate future development is the hire of a high speed printer. This equipment has a printing speed of 900 lines per minute and is time shared with the central processor. The use of output facilities is now taking about 20% of computer time for University Departments and 30% of computer time for contributors. The computer time saving is not the only feature of importance to users, since the off-line use of teleprinters for printing is about ten times slower than the rate at which the computer punches paper tape, so that long delays occur for obtaining printed results. The high speed printer will enable users to obtain results directly from the computer without

this delay. In addition, it is possible to carry out graph plotting of results by the use of appropriate programming techniques, so that many engineering problems will benefit from an application of this facility.

Although the printer will be initially on hire, it is hoped that further contributors will be found to allow purchase of the equipment on terms over a five year period. More consideration can now be given to commercial work both for the University Administration and, to a limited extent, for other organisations.

APPENDIX I

SUMMARY OF DISTRIBUTION OF COMPUTER TIME (MAY to DECEMBER, 1962)

Type of Work	May	June	July	August	September	October	November	December
	hrs. hrs.	hrs. hrs.	hrs. hrs.	hrs. hrs.	hrs. hrs.	hrs. hrs.	hrs. hrs.	hrs. hrs.
Production	22.4	10.2	16.6	8.7	22.	20.4	23.1	2.9
Development	74.7	91.2	59.9	65.7	83.0	87.8	60.1	57.4
Demonstration	2.5	8.4	1.4	5.3		0.9	1.5	0.7
Total Use Time	99.6	109.8	77.9	79.7	105.0	109.1	84.7	61.0
Normal Delay	2.1		0.7	0.1	0.2	0.3		
Standby	88.5	114.8	140.4	112.7	120.9	117.5	104.2	84.6
Total Unused Time	90.6	114.8	141.1	112.7	121.0	117.7	104.5	84.6
Total Available Time	190.2	224.6	219.0	192.4	226.0	226.8	189.2	145.6
Operator Error	0.9	1.0	0.4	0.5	0.3	0.5	0.1	0.1
Unscheduled Maintenance	4.6	5.7	5.4	9.6	9.0	2.5	1.8	1.1
Total Error Time	5.5	6.7	5.8	10.1	9.3	3.0	1.9	1.2
Scheduled on-time	195.7	231.3	224.8	202.5	235.3	229.8	191.1	146.8
Engineering Maintenance	25.4	23.2	31.5	18.3	7.7	6.9	9.2	8.1
Engineering Development			2.0		1.0	2.0	0.2	1.0
Total Scheduled Maintenance	25.4	23.2	33.5	18.3	8.7	8.9	9.4	9.1
Total Switched on Time	221.1	254.5	258.3	220.8	244.0	238.7	200.5	155.9

TOTALS AND AVERAGES

Type of Work	Total for Year	Monthly Average	
	hrs. hrs.	hrs. hrs.	
Production	126.3	15.8	
Development	579.8	72.5	
Demonstration	20.7	2.5	
Total Use Time	726.8	90.8	Percent use time 45
Normal Delay	3.4	0.8	
Standby	883.6	110.4	
Total Unused Time	887.0	110.9	
Total Available Time	1613.8	201.7	
Operator Error	3.8	0.5	
Unscheduled Maintenance	39.7	4.9	Percent Unscheduled Maintenance 2.4
Total Error Time	43.4	5.4	
Scheduled on-time	1657.3	207.1	Operating Ratio 0.97
Engineering Maintenance	130.3	16.3	
Engineering Development	6.2	0.8	
Total Scheduled Maintenance	136.5	17.1	Percent Maintenance 7.6
Total Switched on Time	1793.8	224.2	

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

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

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

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

APPENDIX II

DISTRIBUTION OF COMPUTER TIME (HOURS) USED BY UNIVERSITY DEPARTMENTS

Dept.No.	Name[ø]	M*	J	J	A	S	O	N	D	Total
002	Civil Engineering	6.8	2.0	1.0	1.0	0.2	0.2	0.1		11.3
003	Economics			0.1	0.5			0.1		0.7
004	Physics	2.9	6.0	9.4	6.6	17.2	14.1	15.4	7.7	79.3
005	Psychology						0.6	0.1	0.1	0.8
006	Electrical Engineering	2.3	0.3	0.1	2.3	5.3	4.2	4.5	3.5	22.5
007	Mechanical Engineering	1.5	3.5	3.5	1.0	1.9	3.4	1.2	0.5	16.5
008	Mathematics	2.0	2.0	0.2	0.7	1.6		0.6	0.7	7.8
009	Geology	0.5	2.1		0.2		1.1	0.3		4.2
010	Animal Husbandry				1.0	1.8	7.3	2.2	2.4	14.7
011	Statistics (admin.)				0.1	1.9	5.9			7.9
012	Agriculture				0.4	0.8	0.5	0.5	0.1	2.3
013	Education					1.1	1.7	0.6		3.4
014	Mining & Metallurgy					0.1			2.6	2.7
015	Computer Research							1.4	3.2	4.6
016	Parasitology						1.2			1.2
017	Preventive Medicine						1.2	0.1	0.1	1.4
018	Surveying									
019	Veterinary Anatomy						0.4	0.5	0.7	1.6
020	English								0.4	0.4
021	Veterinary Clinical Studies									
		16.0	15.9	14.3	13.8	31.9	41.8	27.6	22.0	183.3

ø In some cases Departments have used data preparation facilities only.

* First month of operation

APPENDIX III

DISTRIBUTION OF COMPUTER TIME (HOURS) USED BY CONTRIBUTORS

Dept.No.	Name	M	J	J	A	S	O	N	D	Total
101	Main Roads Department	8.6	3.4	6.0	3.5	4.2	13.8	8.4	4.0	51.9
102	Southern Electric Authority			6.3	1.2	0.3	1.1	0.1	0.4	9.4
103	Agriculture & Stock	1.0	1.2	0.2	2.1	1.1	2.8	2.3	2.9	13.6
104	Irrigation & Water Supply Commission	2.2	3.0	6.2	1.9	2.8	5.7	12.3	2.4	36.5
105	Co-ordinator General's Department	0.9	2.3	0.5	0.3	0.2	0.5	0.5	.2	5.4
106	Forestry Department		4.4	6.3	3.4	1.5	1.2	1.3	0.5	18.6
107	Survey Office		0.3	2.4	0.9	1.2	4.2	4.6	0.5	14.1
108	Brisbane City Council Transport Department					0.4				0.4
109	Brisbane City Council Works Department			0.2		0.3				0.5
110	Brisbane City Council Electricity Dept.		0.2	0.2		0.1		0.2		0.7
111	Australian General Electric			0.9			0.1		0.4	1.4
112	Queensland Government Railways				0.3			0.9	1.3	2.5
113	Post Master General's Department (i)							1.6	2.0	3.6
114	C.S.I.R.O. (ii)									
		12.7	14.8	29.2	13.6	12.1	29.4	32.2	14.6	158.6

(i) New Contributor, November, 1962.

(ii) New Contributor, December, 1962, Computer time used will appear in 1963.

APPENDIX IV

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

Department and Originator	Work carried out on Computer
Animal Husbandry Department Dr. G. McBride	Partial regression. Correlation and regression. Tranquilizer experiment. Factorial analysis. Matrix check. Nearest neighbour analysis. Hierarchical analysis of variance. Discriminant function. Analysis of variance. Asymptotic regression. Scheffe multiple comparison test. Partial regression for 1st, 2nd and 3rd nearest neighbour. Non-orthogonal analysis of variance. Analysis of co-variance. Scheffe and Duncan multiple comparison tests. Scheffe multiple comparisons with Bartlett's test. Fisher's exact A method for 2 x 2 contingency tables. General Scheffe and Duncan. Partial regression - 3 independent variables. Partial regression - 4 independent variables. Pig 4 x Partial regression. 8 to 16 weeks pig analysis.
Civil Engineering Department Mr. J. Meek	Matrix inverse. Matrix multiply. Data transfer. Flexibility coefficients. Parabolic beam. Flexibility coefficients (haunched beam). Pile headstock analysis.
Dr. C. O'Connor	The buckling of a uniform beam under unequal end moments and thrust.
Mr. H. Milner	Stress waves.
Electrical Engineering Dept. Mr. J. Moore	Transistor class C (Design data). Transistor class C (Design).
Mr. G. Fraser	Fine bore tube data. Static characteristics of fine bore tubes based on black body radiation. Fine bore tube data.
Dr. T. Parnell	Dimensionless voltage curves. Voltage maxima.

APPENDIX IV - continued

Department and Originator	Work carried out on Computer
Education Department Mr. G. Evans	G2 G FCR1 Correlations.* Communality estimates. Data card conversion. B4 G SFR1 Square root of a number (AAU version)* F1 G FNN1 Matrix inversion.*
Geology Department Mr. J. Byerlee	The interpretation of magnetic anomalies over a dipping contact.
Mechanical Engineering Dept. Dr. C. Murry & Mr. B. Munro	Data card dens. First mill quantities. Press tests results. Mill feed pressure. Mill pressure curve.
Mr. W. Morrison	Auto-translation and cross translation functions. Paint factory problem.
Mr. K. Taylor	Permanent way. Transport problem (Linear).
Mr. W. Renew	Linear Programming.
Mr. R. Hooker	Linear Programming. Critical speeds.
Mathematics Department Mr. L. Howard	Minimization of a function of N variables. Earthquake location.
Mining & Metallurgical Engineering Department Mr. P. Noble	Trial problems sphere in an infinite stream.
Physics Department Mr. B. McInnes	The ground range, group range, signal strengths of oblique radio waves. To find signal strength of back scatter radio echoes as a function of group range.
Mr. G. Finn	Planck's function and Planck gradient. Gauss equal interval integration routine to three order differences. Absorption coefficients for spectral lines. Evaluating double barrel polynomials. Evaluating a certain function of two variables. Master routine for line profiles. Representation of a certain function in the machine.

APPENDIX IV - continued

Department and Originator	Work carried out on Computer
Physics Department - continued	
Dr. J. Thomas	Lunar tide. Auto correlation.
Mr. B. O'Mara	Least square polynomial fitting. Stark shifts in the light elements. Broadening ratios for the light elements. Solar abundances of the elements.
Mr. M. Burke	Correlation coefficients. Cross correlation and auto correlation. Power spectra. Paper tape input for binary information to floating point. Cosine function generator.
Mr. J. Crouchley	Spectral analysis.
Statistics Section Mr. D. Ferguson	Conversion of BTM code to ICT international code.
Irrigation & Water Supply Commission Mr. J. Morse	Reservoir routine single uncontrolled spilway (constant discharged coefficients).
Mr. R. Jarvis	Slip circle analysis for earth and rock fill dam.
Main Roads Department Mr. G. Smith	Quarterly Distribution of Collections under "The Roads (Contribution to Maintenance) Acts". Calculation of offsets from pegged circular curves with same tangent lines. Survey Traverse Computations. Calculations of offsets from pegged circular curves to shift circular curve with parallel shift of tangent lines.
Mr. R. Skeates	The compilation of road statistics. Future road construction program.
Mr. E. Whitchurch	Traffic data analysis.
Mr. I. Moriarty	Road grade profile program. Road plan status program.
Mr. G. Moxey	Computation of earth works.

APPENDIX IV - continued

Department and Originator	Work carried out on Computer
Post Master General's Department Mr. N. Davis	Telephone traffic dispersion recorder program. Telephone traffic future estimates program. Complex quantity subroutines. Transmission line characteristics.
Mr. N. Watson	Near end and far end cross talk coefficients for open wire route design. Near end type unbalanced tables for high frequency working on open wire routes.
Queensland Government Railways Mr. I. Nibloe	Most economic section for a pre-stressed girder.
Southern Electric Authority of Q'ld. Mr. P. Hoare	Stability study on the Wide Bay connection. Rationalized loading of Brisbane Power Station.
Survey Office Mr. A. Leatch	Adjust stereo triangulation. To convert geographical co-ordinates to transverse mercator projection co-ordinates.

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* Indicates that the program has been adopted for the Computer Centre Program Library.

APPENDIX V

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 (continuing). Octal memory dump to paper tape. Standard binary absolute card conversion to full 40 word binary card. Modifications to ZOOM for card output using second pass.
R.E. Kelly	Standard Input Subroutine for the GE 224 (completed). A FORTRAN to WIZ translator (continuing). Stock control for a small store. Modifications to WIZ Compiler for paper tape output. Modifications to WIZ PAC. Modifications to WIZOR Compiler for paper tape output. Modifications to WIZOR PAC. Modifications to Linear Programming program for paper tape output. Modifications to Multiple Linear Regression Program for paper tape output. New WIZ loader. Upper memory binary loader with octal correction cards. Sequence numbering card reproducer. Checksum corrector.
P. Hunt & R.E. Kelly	Bridge Pile Analysis.
R.E. Kelly & W.H. Houssell	Modification to the GAP system for one pass and paper tape output operation.
W.H. Houssell	Standard Output Subroutine for the GE 225 (completed).
F.J. Sokoll	New mathematical package for WIZ (completed). A dynamic debug system (completed). Improvements and extensions to the standard output subroutines (completed). Multiple paper tape lister for card decks. Multiple card reproducer. Continuous read binary loader.
D.R. Ross	A mathematical package for GAP programs (completed). Computer Centre Machine Time Logging and Invoice Billing (completed).
G.T. Evans & D.R. Ross	Product Moment Correlations (completed).
B. Shanahan & D.R. Ross	A WIZ program for determining the present value of a loan (completed).

APPENDIX VI

USE OF DATA PREPARATION EQUIPMENT, 1962

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
May	18.5	12.9		31.4		31.4
June	36.3	30.6		66.9	14.7	81.6
July	41.0	41.6	1.0	83.6	31.5	115.1
August	31.5	38.7	0.6	70.8	26.0	96.8
September	49.0	39.3	12.3	100.6	31.9	132.5
October	65.3	86.0	1.9	153.2	18.5	171.7
November	47.3	72.1	1.1	120.5	35.5	156.0
December	45.6	46.1	0.6	92.3	30.2	122.5
Total for Year	334.5	367.3	17.5	719.3	188.3	907.6
Average/Month	41.8	45.9	2.2	89.9	23.5	113.4

2. CARD PUNCHES

(Time in hours)

Month	U. of Q.	Contributors	Non-Contributors	Total Cols 1,2,3	* Computer Centre	Total all users
May	29.1	4.0		33.1		33.1
June	14.7	19.0		33.7	10.3	44.0
July	22.1	12.6	1.0	35.7	18.5	54.2
August	28.9	30.5	0.3	59.7	9.1	68.8
September	32.7	27.0	4.5	64.2	7.3	71.5
October	27.5	10.4	2.0	39.9	5.5	45.4
November	31.8	27.7	1.5	61.0	21.5	82.5
December	18.7	9.3		28.0	7.7	35.7
Total for Year	205.5	140.5	9.3	355.3	79.9	435.2
Average/Month	25.7	17.6	1.2	44.4	10.0	54.4

* Production time only, for program maintenance work.

APPENDIX VI - continued

3. VERIFIER (i)

	1	2	3
Month	U. of Q.	Contributors	Total Cols. 1, 2
September	13.0	12.5	25.5
October	16.7	10.5	27.2
November	18.4	10.0	28.4
December	6.3	6.3	12.6
Total for Year	54.4	39.3	93.7
Average/Month	13.6	9.8	23.4

Note:-

(i) The verifier was available late in August, 1962. There was no use by non-contributors or the Computer Centre.

APPENDIX VII

PUBLICATIONS AND REPORTS ON PROGRAMMING BY COMPUTER CENTRE STAFF

Publications

D.L. Overheu — Data Processing of Instrumentation Recordings, Australian Journal of Instrument Technology Vol. 18 No. 2 May, 1962.

D.L. Overheu — University of Queensland Computer Centre, University Gazette, September, 1962.

Reports on Programming

D.L. Overheu — Programming Memorandum No. 2, Publication of Programs and Sub programs for the GE 225.

D.L. Overheu — Programming Memorandum No. 3, Guide to Abstracts of Programs for the GE 225.

D.L. Overheu — Programming Memorandum No. 4, Flow Diagrams.

R.E. Kelly — Notes on the WIZ system of programming.