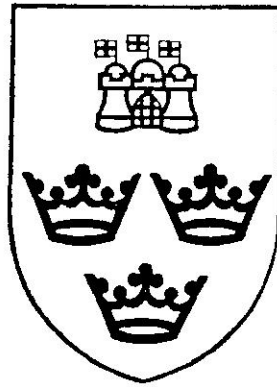


# University of East Anglia



## Computing Centre

### ANNUAL REPORT, 1975-1976

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## 1. GENERAL REPORT

By the start of the year, the 1903T with its associated George 3 operating system, was fully established and accepted, as was the budgeting system which had been introduced the previous year. The principle activity of 1975-76 can be identified as being that of continuing the distribution of user access points to the Computing Service. The remote link from Block V in the University Village was operational throughout the year though in the first six months, software and hardware problems made the performance less than satisfactory and, although this improved, for a time a fair amount of effort was still required to maintain the service.

During the year the provision of a second remote link from a station in the Arts building took place, and this link became operational at the beginning of the 1976-77 Academic Year. In that year, the 1905E is to be replaced by a 1903T and so there will again be considerable system work to be carried out at the centre of the installation.

It will be seen from the load figures that the increase in the number of jobs run continued and that the percentage of runs by undergraduate students also increased. In fact, 30% of the jobs run were submitted by undergraduates. It was this increase which necessitated the provision of the Annexe. It is a well-known, if not admitted, fact that students are inclined to delay course work until close to the closing date. It is an observable fact that in such circumstances, students are inclined to wait for the receipt of work at the collection points. The majority of the 30% of jobs are run during the day and during term time. If only a relatively small percentage of students wait for the return of work the congestion is appreciable.

During the year the only collection point was the small area of the Computing Centre Foyer. The Annexe is larger, with wide corridors, and from the start of term, 1976, the vast majority of students' jobs have been submitted from the Annexe. The success, or otherwise, of the scheme will no doubt form a major part of the next Annual Report.

Data preparation facilities have also been divided between the Centre proper and the Annexe. In both locations, the facilities are inadequate and if it is found possible to increase them, then further space will be required in the Annexe.

The general availability of computing resources during the year was such that at the outset they were adequate and by the end of the year came under pressure during the normal working day. One of the disadvantages of a budgeting scheme is that it must allocate resources for the full 16 hours of operation whilst users with 'money in their pocket' hope to be able to spend it all during prime shift. For this reason, the second shift operates at a reduced charging rate during times of low pressure but in the Spring Term demand was such that full rate expenditure was necessary to get work run. Clearly, as the load on the machine increases, there is little scope for cheap rate.

The/

## 1. GENERAL REPORT (continued)

The Report so far has concerned itself only with short jobs run on site requiring as rapid a turnaround as is possible. The users with a larger, less urgent requirement have been encouraged to use either Cambridge University or the Manchester Regional Centre by means of the remote links and have obtained a satisfactory service, since, in neither instance, was the time available exceeded. As the pressure of local jobs increases, so that spare capacity is available only outside normal working hours, the load on these two remote systems will increase. At present it looks as though the facilities provided will be adequate to meet this increase. That this is so is welcomed. The current budget available to the Computing Centre for 1976/77 is appreciably reduced in real terms and the Computer Board have gracefully apologised for the fact that it may well now be inadequate to cover the cost of two-shift operation, a status which they could at one time guarantee. At the same time, the University overall has been subjected to considerable loss of real income and for this reason the provision of a third shift which allows longer mill bound jobs to be run on site does not appear to be financially possible.

During the year it also became apparent that the proliferation of mini- or micro-processors, associated with the control of experiments or data recording, had reached East Anglia and that associated with it there was a need to improve the connection between these and the Centre computing system. The Centre was able to offer a limited amount of assistance and also attempted to encourage compatibility standards. The use of Maximop in connection with experimental work also increased rapidly towards the end of the year, which can be traced to the fact that it is now available throughout the 12-hour working day. As the Computer Consultative Council rightly surmised in CCC 13/3, the present problem of the University is not that of obtaining processing power, which is currently adequately available on larger remote systems; it is a problem of dealing with the large volume of comparatively small jobs which arise locally.

The programming advisory service was able to meet the need to cover information provision for a still wider range of systems, but growth at home and at the remote stations means more time spent simply in absorbing amendment notices. Despite this, it was possible to produce a new package to assist in the use and practical teaching of statistics.

Looking ahead, the problems of the Computing Centre can be seen to be associated with maintaining an effective turnaround during peak periods by the provision of distributed effective input points and an improved provision for data preparation, word processing, data processing, and simple graphic facilities. These problems are associated with those tasks which a user wishes to perform locally, quickly, and at short notice. Data preparation by students is a particular problem, since the conventional rugged minimum-priced card punch is disappearing from the market and involves fairly high maintenance costs. There is no doubt that, ultimately, it must be replaced by a direct input system using video terminals. It is also true that the research users at East/

## 1.0 GENERAL REPORT: (continued)

Anglia are not provided with word processing facilities comparable with those in the United States and in Europe. Modern methods of publication increasingly require the preparation of typescript by the originator which can be photo-offset by the printer without modification. At the same time, secretarial effort for the preparation of conventional documents is reduced. It is important, therefore, that in the future, account is taken of the possible provision of computing facilities which make possible and simplify the preparation of documentation by the author himself. Such facilities must rank alongside sheer number crunching because for many research workers documentation absorbs a significant fraction of the available time.

## 2.0 ORGANISATION AND STAFFING

### 2.1 Computing Centre Committee of Senate

The University Senate is advised on policy by its Computing Centre Committee, membership of which corresponds to the principal user departments within the University. Membership for the Academic Year 1975-76 was as follows:-

Ex-officio: The Vice-Chancellor  
 The Pro-Vice-Chancellors  
 The Director of the Computing Centre (Professor P.M. Stocker)  
 The Assistant Director of the Computing Centre (Mr. J.P.G. Roper)  
 The Registrar and Secretary (or his representative)  
 The Librarian (or his representative) (Dr. C.J. Aslin)  
 A representative of the Computing Centre Senior Staff  
 (Dr. C.J. Higley to April, 1976,  
 Mr. R.A. Jenyon from May, 1976)

#### Two members appointed by the Senate:

Professor N. Riley (1976) (Chairman)  
 Dr. A. Parikh (1978)

#### A member from each user School appointed by their Boards:

Dr. D.P. Aikman (1976) (School of Biological Sciences)  
 Dr. T.P. Hunter (Vice-Chairman) (School of Chemical Sciences)  
 to March, 1976  
 Dr. R.K. Harris (School of Chemical Sciences) from March, 1976  
 Dr. P.A. Dearnley (School of Computing Studies)  
 Mr. I. Gillespie (School of Development Studies)  
 Mr. V. Morgan (English & American Studies)  
 Dr. C.E. Vincent (School of Environmental Sciences)  
 Dr. R.G. Ross (School of Mathematics and Physics)  
 Mr. C.L.F. Attfield (1978) (School of Social Studies)

One member appointed by the Students Council: Mr. F.J. Scrutton

One member appointed by the Graduate Student Association: Mr. M. Beer

### 2.2 University Users Committee:/

## 2.2 University Users Committee

This is a Users Committee through which the various user groups can communicate their views to the management of the Centre and which may also bring matters to the attention of the Computing Centre Committee. It is a less formal Committee consisting of one member of faculty and one graduate student representative from each User School or Department. The prime purpose of the Committee is to match short-term policy and services to user requirements.

## 2.3 Staff Structure

This is represented in Figure 1 (Page 5)

The Staff in post over the year were as follows:

|                       |  |
|-----------------------|--|
| Director:             | Professor P.M. Stocker, MSc, FIMA, FBCS.   |
| Asst. Director:       | J.P.G. Roper, BSc, MBCS.   |
| Sr. Programmers:      | G.F. Charles, CEng, MIERE, MBCS.<br>O. Treutler, BSc, PhD.<br>K.L. Woods, BSc.   |
| Programmers:          | L.S. Benfield, BA.<br>M.C. Bristow, BSc.<br>C.J. Higley, MA, PhD. (to April, 1976)<br>R.A. Jenyon, BSc.<br>Mrs. M.O. Mutch, MA, MBCS. (from July, 1976)<br>Mrs. E. Phillips, BSc, MSc.<br>K.M. Worvill, BA, PhD. |
| Operations<br>Manager | A.J. Coombe, LBCS, AMDPMA.   |
| Shift Leaders:        | J.F. Bailey<br>Mrs. A. Saunders  |

## 3.0 EQUIPMENT

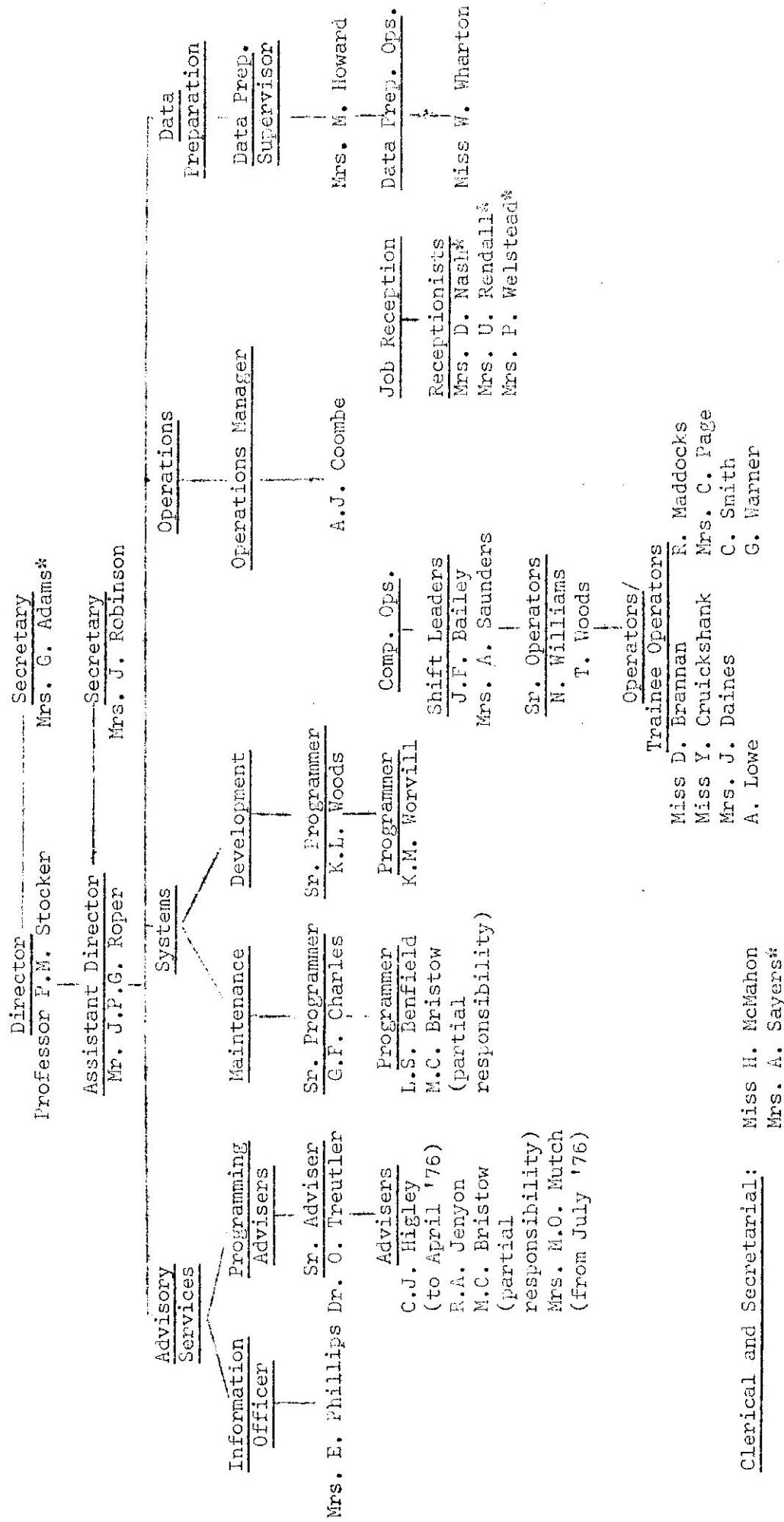
### 3.1 ICL 1903T and ICL 1905E

These processors comprise the heart of the main University Computing facility and share certain peripherals:

- 1 1903T CPU with 96K words of store
- 1 1905E CPU with 96K words of store
- 2 2812/3 EDS60 disc controllers
- 3 2801/0 EDS8 disc controllers
- 4 2815/1 EDS60 exchangeable disc transports
- 5 2801/3 EDS8 exchangeable disc transports
- 4 1971/3 20 Kc/s magnetic tape decks
- 4 2508/3 Kc/s magnetic tape decks
- 1 2101 2000 cpm card reader
- 1 1912/1 600 cpm card reader
- 1 1922/1 33 cpm card punch
- 1 1915/2 300 chps paper tape reader
- 1 1925 110 chps paper tape punch
- 1 2401/2 300 lpm line printer
- 1 1933 1350 lpm line printer
- 1 1934/6 graph plotter

Figure 1

Computing Centre Staff Structure, 1975-1976



\* Part-time

### 3.0 EQUIPMENT (continued)

#### 3.2 CTL Satellite One

The Computing Centre now has two Satellite One computer systems. They are designed to be operated as remote job entry devices to larger main frames.

One is used to access the computing facilities at Cambridge and Manchester and comprises:

- CPU with 16K words of fast store
- 400 cpm card reader
- 1000 chps paper tape reader
- 120 chps paper tape punch
- 225-1000 lpm line printer
- Communications multiplexor with synchronous data transmission ports

The other is situated in the University Village and enables users to access the Computing Centre's 1903T and comprises:

- CPU with 8K words of store
- 400 cpm card reader
- 225-1000 lpm line printer
- Single synchronous communications card

#### 3.3 Digico Micro 16V and Micro 16P

These small systems are used as front-end processors for the 1903T and 1905E machines.

The Micro 16V handles communications to and from remote job entry stations for the 1903T batch system under GEORGE 3. It comprises:

- CPU with 16K words of store
- Processor to processor coupler (PPC)
- Pullman paper tape reader
- 2 GCIC synchronous communications cards

The Micro 16P handles the teletypes and visual display units that are connected to the 1905E MAXIMOP system. It comprises:

- CPU with 12K words of store
- Processor to processor coupler (PPC)
- 300 cps paper tape reader
- Synchronous communications controller
- 2 Communication multiplexors with 20 channel boards
- MIC clock

#### 3.4 Ancillary Equipment/

### 3.0 EQUIPMENT (continued)

#### 3.4 Ancillary Equipment

##### Communications:

A selection of ancillary equipment is available for use as part of the multi-access facilities offered by the Centre. The Centre has:

- 18 Teletypes of various manufacture,
- 7 Visual Display Units of various types,

together with modems, level convertors, etc. necessary for the communication involved.

##### Data Preparation:

To cater for the main systems, 11 interpreting card punches are available together with a verifier, reproducer and interpreter. There are 2 Flexowriters to complement the paper tape facilities provided by the Teletypes, as well as a D-MAC pencil follower producing paper tape. Most data preparation is done by the users themselves but the Centre employs punch operators to provide a limited amount of general punching for users.

### 4.0 WORK OF THE COMPUTING CENTRE

#### 4.1 Computer Usage:

Two-shift working was in operation on both systems throughout the year with overtime being worked during busy periods in term. It is expected that this arrangement will continue during the next academic year.

1903T: This has continued to operate a general user batch service under GEORGE 3 during the day and GEORGE 4 during the evening. The introduction of a scheduler has enabled the users themselves to balance turnround against cost. In general, most jobs are returned within three hours and very few users achieve a regular turnround worse than over-night.

1905E: 60% of the 1905E is dedicated to the provision of a MAXIMOP service with its wide range of interactive facilities. The rest is available for in-core compilers. The turnround usually achieves the target of one hour.

#### 4.2 Serviceability:

##### 4.2.1 ICL

The serviceability of the 1903T has been consistently high throughout the year and is proving to be a reliable processor. However, the 1905E processor has suffered a fall in reliability from its previous high figure, but is still good when compared with other systems. The response of ICL engineers to faults continues to be excellent.

Table 1:/



#### 4.0 WORK OF THE COMPUTING CENTRE (continued)

##### 4.2.1 ICL

Table 1:

#### ICL Computers - Serviceability, 1975-76

(Average weekly figures - 48 weeks)

|                   | <u>1903T</u> | <u>1905E</u> |
|-------------------|--------------|--------------|
| Scheduled time    | 69.54 hr.    | 58.09 hr.    |
| Total lost time   | 2.33 hr.     | 3.58 hr.     |
| Hardware downtime | 2.11 hr.     | 3.58 hr.     |
| Utilisation       | 96.93%       | 94.03%       |
| Serviceability    | 97.44%       | 94.76%       |

Table 2:

#### ICL Computers - Faults Reported 1975-76

| <u>Area</u>             | <u>1903T</u> | <u>1905E</u> |
|-------------------------|--------------|--------------|
| Processor/Store         | 49           | 126          |
| Card equipment          | 18           | 15           |
| Line printers           | 18           | 9            |
| Magnetic tape equipment | 30           | 14           |
| Magnetic disc equipment | 85           | 14           |
| Other                   | 18           | 4            |
| Total                   | <u>218</u>   | <u>182</u>   |
| Average faults per week | 4.5          | 3.8          |

##### 4.2.2 Digico

Throughout the year two Digico Micro 16 systems have acted as front-end processors to the two ICL mainframes. They have been operational whenever the mainframes have been available. Both systems have been extremely reliable with serviceability almost 100%. Engineering response has been usually within 24 hours.

Table 3:

#### Digico Computers - Faults Reported 1975-76

|                          | <u>Micro 16V</u> | <u>Micro 16P</u> |
|--------------------------|------------------|------------------|
| Host Processor           | 1903T            | 1905E            |
| Area                     |                  |                  |
| Processor/Store          | 0                | 3                |
| Control teletype         | 0                | 0                |
| Paper tape equipment     | 0                | 1                |
| Communications equipment | <u>1</u>         | <u>1</u>         |
| Total                    | <u>1</u>         | <u>5</u>         |

##### 4.2.3 CTL/

#### 4.0 WORK OF THE COMPUTING CENTRE (continued)

##### 4.2.3 CTL

Two CTL systems act as remote job entry terminals. One, a Satellite One with multiplexor, is situated in the Computing Centre and is used as a link to Cambridge and to Manchester. This has performed well throughout the year. The other, a MINIMOD, was installed during Autumn 1975 in the University Village and is linked to our central system. Unfortunately, due to inadequacies in CTL hardware and software, a reliable service was not achieved for over 6 months and even now cannot be said to be trouble-free, although users do receive a reliable service. Engineering support has been good.

Table 4:

#### CTL Computers - Faults Reported 1975-76

|                          |                  | <u>Satellite One (EA1)</u> | <u>Minimod (EA2)</u> |
|--------------------------|------------------|----------------------------|----------------------|
|                          | 7020<br>emulator | Manchester, Chilton, UEA   | UEA                  |
| Mainframes accessed      | HASP<br>emulator | Cambridge                  |                      |
| Area                     |                  |                            |                      |
| Processor/Store          |                  | 1                          | 2                    |
| Control teletype         |                  | 1                          | 0                    |
| Paper tape equipment     |                  | 0                          | Not fitted           |
| Card reader              |                  | 1                          | 1                    |
| Line printer             |                  | 3                          | 7                    |
| Communications equipment |                  | 0                          | 3*                   |
|                          |                  | <u>Total 6</u>             | <u>13</u>            |

\* Special visits not included

##### 4.3 Jobs Run

Table 5 records the total number of jobs processed during the year on the various systems available to users. Undergraduate teaching figures are distinguished from other work. There was a major increase in the number of jobs handled by the 1903T resulting in a 30% increase overall in jobs processed by the Centre.

Table 5:

#### Total Jobs Processed 1975-76

|            | <u>Research and<br/>Administrative</u> | <u>Undergraduate<br/>Teaching</u> | <u>TOTAL</u>   |
|------------|--|-----------------------------------|----------------|
| 1903T      | 48,667                                 | 14,046                            | 62,713         |
| 1905E      | 13,509*                                | 24,249                            | 37,758*        |
| Cambridge  | 5,627                                  | -                                 | 5,627          |
| Manchester | 819                                    | -                                 | 819            |
| Total      | <u>68,622</u>                          | <u>38,295</u>                     | <u>106,917</u> |

\* A user Maximop session is accounted as one job, in general it contains many units, each of which would be accounted for as a job on a batch system.

4.0 WORK OF THE COMPUTING CENTRE (continued)4.4 Job Characteristics

The figures given in this section are very dependent upon the system being used on each processor. The 1903T figures represent a general workload on a batch system, the 1905E figures reflect the low mill time and high core requirements of the in-core compilers and the large elapsed times of MAXIMOP sessions.

Table 6:

| <u>Elapsed Times of Runs</u> |            |             |              |            |
|------------------------------|------------|-------------|--------------|------------|
| <u>Time (mins.)</u>          | <u>0-3</u> | <u>3-10</u> | <u>11-30</u> | <u>30+</u> |
| Percentage of 1903T jobs     | 31.9       | 40.1        | 20.3         | 7.7        |
| Percentage of 1905E jobs     | 48.0       | 5.7         | 46.3         | 0.0        |

Table 7:

| <u>Storage Required by Jobs</u>     |             |              |              |            |
|-------------------------------------|-------------|--------------|--------------|------------|
| <u>Core size required (K words)</u> | <u>0-10</u> | <u>10-20</u> | <u>20-40</u> | <u>40+</u> |
| Percentage of 1903T jobs            | 25.2        | 54.2         | 20.6         | 0.0        |
| Percentage of 1905E jobs            | 6.2         | 65.5         | 28.3         | 0.0        |

Table 8:

| <u>Mill Required by Jobs</u> |             |              |              |               |                |             |
|------------------------------|-------------|--------------|--------------|---------------|----------------|-------------|
| <u>Mill time (secs.)</u>     | <u>0-10</u> | <u>10-30</u> | <u>30-60</u> | <u>60-120</u> | <u>120-300</u> | <u>300+</u> |
| Percentage of 1903T jobs     | 23.4        | 33.4         | 18.0         | 11.1          | 7.7            | 6.4         |
| Percentage of 1905E jobs     | 50.9        | 27.7         | 9.1          | 6.2           | 4.7            | 1.4         |

## 4.5 Departmental Use

4.5.1 1903T Computer Usage:

Table 9 shows the actual percentage usage of the 1903T made by departments during the year, and also records the amount of budget allocated and used. The discrepancy between the budgets allocated and used is due to several factors such as the processor not being fully loaded throughout the year, filestore not being fully used, budgets being held by non-active users, and use during 'cheap' and 'free' periods.

Table 9:/

4.0 WORK OF THE COMPUTING CENTRE (continued)4.5 Departmental Use4.5.1 1903T Computer Usage:

Table 9:

Usage by Departments on 1903T  
August 1975-July 1976

| Department            | No. of<br>Jobs | Average jobs<br>per week | % of<br>total<br>resources<br>used | % Budget<br>used | % Budget<br>allocation<br>@ July '76 |
|-----------------------|----------------|--------------------------|------------------------------------|------------------|--------------------------------------|
| BIOLOGICAL SCIENCES   | 3,262          | 68                       | 4.0                                | 2.9              | 4.5                                  |
| CHEMICAL SCIENCES     | 8,322          | 173                      | 12.8                               | 9.3              | 17.0                                 |
| COMPUTING SERVICES    | 10,556         | 220                      | 15.1                               | 10.9             | 10.0                                 |
| COMPUTING STUDIES     | 2,975          | 62                       | 7.4                                | 5.4              | 7.5                                  |
| DEVELOPMENT STUDIES   | 440            | 9                        | 1.2                                | 0.8              | 3.0                                  |
| ENVIRONMENTAL STUDIES | 7,933          | 165                      | 10.7                               | 7.8              | 11.0                                 |
| EXTERNAL              | 1,303          | 27                       | 2.1                                | 1.5              | 3.5                                  |
| LIBRARY               | 656            | 14                       | 3.3                                | 2.4              | 3.0                                  |
| MATHEMATICS & PHYSICS | 6,505          | 136                      | 13.5                               | 9.8              | 17.0                                 |
| REGISTRY              | 1,294          | 27                       | 4.2                                | 3.0              | 3.0                                  |
| SMALL GROUPS          | 683            | 14                       | 1.0                                | 0.7              | 1.5                                  |
| SOCIAL STUDIES        | 2,560          | 53                       | 10.1                               | 7.3              | 10.0                                 |
| TEACHING X            | 1,179          | 25                       | 0.7                                | 0.5              | 3.0*                                 |
| TEACHING Y            | 12,867         | 269                      | 12.0                               | 8.7              | 14.0*                                |
| BUDGET MANAGERS       | 2,178          | 45                       | 1.9                                | 1.4              | 0                                    |
| Total                 | 62,713         | 1,307                    | 100.0                              | 72.4             | 108.0                                |

\* For 1975-76, the official budget allocation for all teaching courses was 14% overall, 20% being allocated in term and 2% out of term. During the year, practical problems necessitated some adjustments to be made to actual allocation.

4.5.2 1905E Computer Usage:/

4.0 WORK OF THE COMPUTING CENTRE (continued)4.5 Departmental Use (continued)4.5.2 1905E Computer Usage:

Control of usage of the 1905E was less strict than for the 1903T, as there was surplus capacity. Limits were applied to the use of Maximop by undergraduates and the in-core compilers applied other restrictions to undergraduates, but to the rest of the user community, access to Maximop facilities and to the in-core compilers was in practice unrestricted. The George 2 service was used less and less during the year and was withdrawn in July, 1976.

Table 10:

Departmental Use of the 1905E  
August 1, 1975-July 31, 1976

| Department            | No. of jobs | Average number jobs per week | % of total resource units |
|-----------------------|-------------|------------------------------|---------------------------|
| BIOLOGICAL SCIENCES   | 2,045       | 43                           | 5.4                       |
| CHEMICAL SCIENCES     | 1,789       | 37                           | 5.7                       |
| COMPUTING SERVICES    | 3,587       | 75                           | 5.7                       |
| COMPUTING STUDIES     | 1,127       | 23                           | 3.4                       |
| DEVELOPMENT STUDIES   | 27          | 1                            | 0.1                       |
| ENVIRONMENTAL STUDIES | 1,027       | 21                           | 1.9                       |
| EXTERNAL              | 387         | 8                            | 1.6                       |
| LIBRARY               | 6           | 0                            | 0.0                       |
| MATHEMATICS & PHYSICS | 3,139       | 65                           | 10.7                      |
| REGISTRY              | 116         | 2                            | 0.3                       |
| SOCIAL STUDIES        | 101         | 2                            | 0.3                       |
| TEACHING X            | 2,398       | 50                           | 7.6*                      |
| TEACHING Y            | 21,851      | 455                          | 57.3*                     |
| Total                 | 37,600      | 782                          | 100.0                     |

\* Teaching shows as a high percentage since it was not necessary to restrict usage and the second shift was not filled. This is unlikely to continue when the 1903T is installed because the load on the interactive service is increasing rapidly and because GEORGE 3/4 work will overflow onto this machine.

4.5.3 Cambridge:

4.0 WORK OF THE COMPUTING CENTRE (continued)4.5 Departmental Use (continued)4.5.3 Cambridge:

The usage of the Cambridge 370/165 system remained steady throughout the year with users having no major restrictions placed upon them other than by the Cambridge scheduling system. In terms of resource units, the University used about 1.4% of the Cambridge system which is well below the 2.5% available. In addition to the remote job entry station, the leased line also supports a Phoenix terminal at specified times in the day. Co-operation with Cambridge continues to be excellent.

Table 11:

Usage by Departments of Cambridge 370/165  
August 1, 1975-July 31, 1976

| Department            | No. of jobs  | Resource units | % of total UEA usage |
|-----------------------|--------------|----------------|----------------------|
| BIOLOGICAL SCIENCES   | 437          | 2,503          | 0.94                 |
| CHEMICAL SCIENCES     | 2,327        | 213,638        | 79.99                |
| COMPUTING STUDIES     | 124          | 1,296          | 0.49                 |
| COMPUTING SERVICES    | 466          | 2,582          | 0.97                 |
| DEVELOPMENT STUDIES   | 603          | 13,872         | 5.19                 |
| ENVIRONMENTAL STUDIES | 902          | 15,160         | 5.68                 |
| MATHEMATICS & PHYSICS | 172          | 6,970          | 2.61                 |
| SMALL GROUPS          | 49           | 374            | 0.14                 |
| SOCIAL STUDIES        | <u>547</u>   | <u>10,679</u>  | 4.00                 |
| Total                 | <u>5,627</u> | <u>267,074</u> |                      |

4.5.4 Manchester:

Those users requiring the facilities of a powerful number-cruncher should be able to look back on a year of successful use of the powerful UMRCC system. Although there were costly communication problems due to faults in the 7020 emulator on the Satellite One, users obtained a fairly reliable twice daily contact with Manchester throughout the year. Our usage increased significantly and we presently use about 0.33% of the system. This may not be large, but it enables users to obtain facilities that would be very difficult to provide locally.

Table 12:/

#### 4.0 WORK OF THE COMPUTING CENTRE (continued)

14

#### 4.5 Departmental Use

##### 4.5.4 Manchester: (continued)

Table 12:

#### Usage by Departments

| Department             | No. of jobs | Resource units | % of total UEA usage |
|------------------------|-------------|----------------|----------------------|
| BIOLOGICAL SCIENCES    | 18          | 156            | 0.6                  |
| CHEMICAL SCIENCES      | 223         | 3,277          | 13.5                 |
| COMPUTING SERVICES     | 50          | 294            | 1.2                  |
| ENVIRONMENTAL SCIENCES | 152         | 3,118          | 12.8                 |
| MATHEMATICS & PHYSICS  | 298         | 16,019         | 65.9                 |
| SOCIAL STUDIES         | <u>78</u>   | <u>1,440</u>   | 5.9                  |
| Total                  | <u>819</u>  | <u>24,304</u>  |                      |

##### 4.5.5 Overall Departmental use of Computer Resources

The Computer Board has developed the notion of Atlas Shift Units in an attempt to gather figures for the overall departmental use of computer resources at each University. The formula used is as follows:-

number of shifts x overall percentage use by  
University x Atlas power x percentage use by departments.

The results are expressed in hundredths of an 'Atlas Shift Unit' and given in Table 13 (page 15).

#### 4.6 Use of Consumables

The major types of consumable used during the year were as follows:-

|  |    |    |                  |
|--|----|----|------------------|
| Line printer paper (all types)             | .. | .. | 1,691,000 sheets |
| Punch cards (all types)                    | .. | .. | 2,677,000 cards  |
| Graph plotter paper                        | .. | .. | 114 rolls        |
| Paper tape                                 | .. | .. | 560 coils        |
| Teletype rolls                             | .. | .. | 573 rolls        |
| Line printer ribbons                       | .. | .. | 76 ribbons       |
| Other printing ribbons, eg. teletype, etc. | .. | .. | 191 ribbons      |
| Magnetic tapes                             | .. | .. | 60 tapes         |
| Magnetic discs                             | .. | .. | 2 discs          |

#### 5.0 Software/

Table 13:  
Overall Departmental Usage - Atlas Shift Units 1975-1976

| Active users           | Use of Internal Computers |        |                | Use of External Computers |           |            | Overall usage |                |        |        |       |
|------------------------|---------------------------|--------|----------------|---------------------------|-----------|------------|---------------|----------------|--------|--------|-------|
|                        | 1903T                     | 1905E  | Internal total | %                         | Cambridge | Manchester |               | External total | %      | Total  | %     |
| Atlas Power            | 0.6                       | 0.4    |                |                           | 6.5       | 22.0       |               |                |        |        |       |
| UEA % usage            | 100.0                     | 100.0  |                |                           | 1.4       | 0.33       |               |                |        |        |       |
| No. of shifts          | 2                         | 2      |                |                           | 3         | 3          |               |                |        |        |       |
| Mult. Factor           | 1.20                      | 0.80   |                |                           | 0.27      | 0.22       |               |                |        |        |       |
| Departments:           |                           |        |                |                           |           |            |               |                |        |        |       |
| BIOLOGICAL SCIENCES    | 37                        | 4.80   | 4.32           | 9.12                      | 4.56      | 0.26       | 0.13          | 0.39           | 0.80   | 9.51   | 3.9   |
| CHEMICAL SCIENCES      | 72                        | 15.36  | 4.56           | 19.92                     | 9.96      | 21.84      | 2.94          | 24.78          | 50.51  | 44.70  | 18.0  |
| COMPUTING SERVICES     | 27                        | 18.12  | 4.56           | 22.68                     | 11.34     | 0.26       | 0.26          | 0.52           | 1.06   | 23.20  | 9.3   |
| COMPUTING STUDIES      | 20                        | 8.88   | 2.72           | 11.60                     | 5.80      | 0.13       | 0.00          | 0.13           | 0.26   | 11.73  | 4.7   |
| DEVELOPMENT STUDIES    | 11                        | 1.44   | 0.08           | 1.52                      | 0.76      | 1.42       | 0.00          | 1.42           | 2.89   | 2.94   | 1.2   |
| ENVIRONMENTAL SCIENCES | 70                        | 12.84  | 1.52           | 14.36                     | 7.18      | 1.55       | 2.79          | 4.34           | 8.55   | 18.70  | 7.5   |
| EXTERNAL               | 19                        | 2.52   | 1.28           | 3.80                      | 1.90      | 0.00       | 0.00          | 0.00           | 0.00   | 3.80   | 1.5   |
| LIBRARY                | 3                         | 3.96   | 0.00           | 3.96                      | 1.98      | 0.00       | 0.00          | 0.00           | 0.00   | 3.96   | 1.6   |
| MATHEMATICS & PHYSICS  | 53                        | 16.20  | 8.56           | 24.76                     | 12.38     | 0.71       | 14.35         | 15.06          | 30.70  | 39.82  | 16.0  |
| REGISTRY               | 4                         | 5.04   | 0.24           | 5.28                      | 2.64      | 0.00       | 0.00          | 0.00           | 0.00   | 5.28   | 2.1   |
| SMALL GROUPS           | 15                        | 1.20   | 0.00           | 1.20                      | 0.60      | 0.04       | 0.00          | 0.04           | 0.08   | 1.24   | 0.5   |
| SOCIAL STUDIES         | 17                        | 12.12  | 0.24           | 12.36                     | 6.18      | 1.09       | 1.29          | 2.38           | 4.85   | 14.74  | 5.9   |
| TEACHING - X           | 89                        | 0.84   | 6.08           | 6.92                      | 3.46      | 0.00       | 0.00          | 0.00           | 0.00   | 6.92   | 2.8   |
| TEACHING - Y           | 539                       | 14.40  | 45.84          | 60.24                     | 30.12     | 0.00       | 0.00          | 0.00           | 0.00   | 60.24  | 24.2  |
| BUDGET MANAGERS        | -                         | 2.28   | 0.00           | 2.28                      | 1.14      | 0.00       | 0.00          | 0.00           | 0.00   | 2.28   | 0.9   |
| Total                  | 976                       | 120.00 | 80.00          | 200.00                    | 100.00    | 27.30      | 21.76         | 49.06          | 100.00 | 249.06 | 100.0 |



## 5.0 SOFTWARE

### 5.1 Language Use

FORTRAN is by far the most popular language for general research and teaching use on both systems. Probably 85% of all compilations are FORTRAN compilations. Other languages used are ALGOL 60, ALGOL 68, COBOL, BASIC and PLAN, but their use is small compared with FORTRAN.

### 5.2 Application Package Use

A relatively small number of packages is requested by users. For convenience, package use is split into three groups: HIGH, MEDIUM, LOW, giving some indication of the amount of use made by users.

#### HIGH usage - more than 10 users of the package:

| <u>Package Name</u> | <u>Description</u>                                      | <u>Site Used</u> |
|---------------------|---|------------------|
| XDS3                | ICL Statistics Package                                  | UEA              |
| #STAT               | Chemical Sciences Statistics Package                    | UEA              |
| STAT                | Computing Centre Simple Statistics Package              | UEA              |
| -                   | UEA Graph Plotting Package (development of ICL package) | UEA              |
| SPSS Mk 6           | Statistics Package                                      | CAMBRIDGE        |

#### MEDIUM usage - between 3 and 9 users of the package:

|         |                                      |     |
|---------|--------------------------------------|-----|
| XDSE    | ICL Survey Package                   | UEA |
| FILETAB | NCC Simple Sorting & Survey Analysis | UEA |

#### LOW usage - only 1 or 2 users:

|            |                                |            |
|------------|--------------------------------|------------|
| XDSD       | ICL Survey Package             | UEA        |
| FAMULUS    | Text Editing System            | UEA        |
| XDL2       | ICL Linear Programming         | UEA        |
| GENSTAT    | Rothamstead General Statistics | CAMBRIDGE  |
| CSMP       | Continuous Systems Modelling   | CAMBRIDGE  |
| CLUSTAN 1B | Cluster Analysis               | MANCHESTER |
| GHOST      | Graphics Package               | MANCHESTER |

### 5.3 Software Development in the Computing Centre

After a year when all the efforts of the Systems Programmers and Programming Advisers were directed to the successful implementation of the GEORGE 3 system, software development during the past year covered many areas of the Centre's responsibility. Investigations into the viability of GEORGE 4, which had been started during the previous year, continued. It was shown that/

## 5.0 SOFTWARE (continued)

### 5.3 Software Development in the Computing Centre (continued)

it was sensible to use an EDS 60 drive instead of the more usual and expensive drum. ICL loaned the University an extra 32K core making a total of 128K, so that further benchmark tests could be made. As a result, modifications were made to GEORGE 4 which resulted in greater throughput, and a regular GEORGE 4 service was offered to users during the evening instead of GEORGE 3. These modifications are also in use at several other universities and a report has been transmitted to the Computer Board and ICL.

The development of a High Level Scheduler for the GEORGE 3/4 batch service came to fruition during the second half of the year, when it went into general service. The aim of the scheduler is to enable users to define the level of service they require for each job, subject to the budgetary restraints put on them by their budget manager. The scheduler controls the entry of jobs with a jobwell according to a preset set of conditions and the transfer of jobs from the jobwell to the processor.

Two major developments to the MAXIMOP system were released during the year. An automatic archiving system for dumping inactive user files onto magnetic tape allowed many more users to have their own MAXIMOP files. This system also simplified the problems of keeping user files secure in fault situations. A scheme allowing users to transfer MAXIMOP subfiles to the GEORGE 3 filestore and allowing users to submit GEORGE 3 jobs from a MAXIMOP terminal was also introduced successfully. This latter project will also act as a practical tool in the development of the dual processor with shared disc system, which will be created over the next few years.

The development of an efficient remote job entry system with GEORGE 3 on the 1903T and the in-core compilers on the 1905E has also required dedicated effort. The addition of extra channels with the Sheffield 7903 emulator on the Micro 16V front-end processor was successful, but revealed disturbing inadequacies in the CTL 7020 emulator on both Satellite Ones. Even now, despite extensive liaison with the Post Office which has pinpointed the CTL emulator as being at fault, we still are not satisfied with CTL's response. The operational efficiency of the in-core compilers has been increased by a Cafeteria system developed from the CAFE system written at Queen Mary College, London.

During the year, the Programming Advisers increased their responsibilities by officially supporting the ALGOL 68 compiler and the FILETAB package, as well as investigating the merits of GINO-F. In response to many users' requests, a package (SIAT) for teaching simple statistics under MAXIMOP was designed and implemented towards the end of the year. It is expected to be used as part of several teaching courses during the next academic year.