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A SURVEY OF AFRICAN STATISTICAL DATA PROCESSING FACILITIES

Table of Contents

|  | <u>Page</u> |
|--|-------------|
| SECTION I - Summary of Country Facilities        | 1 - 9       |
| SECTION II - Individual Country Reports          | 10 - 24     |
| Algeria  | 11          |
| Basutoland                                       | 11          |
| Cameroon   | 11          |
| Central African Republic                         | 12          |
| Chad   | 12          |
| Democratic Republic of Congo                     | 12          |
| East African Common Services Organization        | 13          |
| Ethiopia   | 13          |
| Gabon  | 13          |
| Gambia   | 14          |
| Ghana  | 14          |
| Guinea   | 14          |
| Ivory Coast                                      | 15          |
| Kenya  | 15          |
| Liberia  | 16          |
| Libya  | 16          |
| Madagascar                                       | 17          |
| Mauritania                                       | 17          |
| Mauritius  | 17          |
| Morocco  | 18          |
| Niger  | 18          |
| Nigeria  | 18 - 19     |
| Republic of Congo                                | 19          |
| Rhodesia   | 20          |
| Senegal  | 20          |
| Sierra Leone                                     | 21          |
| Sudan  | 21          |
| Togo   | 21          |
| Tanzania   | 22          |
| Tunisia  | 22          |
| Uganda   | 23          |
| United Arab Republic                             | 23          |
| Upper Volta                                      | 23          |
| Zambia   | 24          |
| SECTION III - Prospects for Electronic Computers | 25 - 28     |

## SECTION I

Summaries of Country Facilities

## INTRODUCTION

The survey of data processing equipment used by African statistical Offices was begun in the spring of 1965. One purpose was to provide a summary for statistical offices and other interested parties of the current situation. Such a summary would also have served as a reference document for a working group on data processing which had been proposed but was deleted from the programme in favour of other higher priority activities.

By September 1965, of the 38 countries which had been requested to report on their current equipment, expected acquisitions, and the specific projects processed automatically, 29 had replied. A reminder was sent at that time, resulting in further replies, and in the final summary only Angola, Dahomey, Mali and Somalia are not included. A brief country-by-country description of facilities will follow in Section II.

Facilities and Uses

With respect to equipment in use or available, table I shows in some detail what is further summarized in table II below. The last five columns of table I groups the uses of data processing equipment reported by countries, and more detail on this can be found in the individual country reports, Section II.

Classifying uses is somewhat unrewarding because if the uses are aggregated so that the result could properly be called a summary, the categories are so general that most countries must be listed in most uses. The column heading "Processing Census and Survey Data" refers to information collected by the CSO through enumeration or sampling. Registration and licensing includes such information as vehicle registration, school enrollment, various forms of civil registration, and transport records: in short, data which is collected as part of the normal work of another governmental or semi-governmental function. Trade and Balance of Payments is at least partly (shipping, customs)

similar to Registration and Licensing, but its importance is thought to warrant listing separately. Government Accounts and Payroll refers generally to administrative functions including social security, which are not necessarily for statistical publications. Economic Analysis refers to calculations, such as demand elasticity, using the basic data. Although only five countries report economic analysis in the CSO it is probable this work is more widely done, but outside the CSO.

Table I

- Facilities and Uses

| Country                      | Conventional <sup>a/</sup> equipment | Computer <sup>b/</sup>       | Processing census and survey data          | Registration and licensing | Trade and balance of payments | Gov't a/c payroll analysis | Economic analysis     |
|------------------------------|--------------------------------------|------------------------------|--|----------------------------|-------------------------------|----------------------------|-----------------------|
| CENTRAL AFRICA               |                                      |                              |  |                            |                               |                            |                       |
| CAR                          |                                      | UDE computer (Bangui)        | Uses not reported.                         |                            |                               |                            |                       |
| Gabon                        |                                      | UDE computer (Librev.)       | Has not been used up to present time       |                            |                               |                            |                       |
| Congo (Rep.of)               |                                      | UDE computer                 | Uses not reported                          |                            |                               |                            |                       |
| CHad                         | UDE facilities                       | UDE computer                 | x  |                            | x                             |                            |                       |
| Congo (Dem.Rep.of)           | x                                    |                              | Uses not reported                          |                            |                               |                            |                       |
| Cameroon                     | x                                    | Expected Dec.1965            | x  | x                          | x                             | x                          |                       |
| WEST AFRICA                  |                                      |                              |  |                            |                               |                            |                       |
| Togo                         | x                                    |                              | Data processing activities not reported.   |                            |                               |                            |                       |
| Upper Volta                  | x                                    |                              | New installation. Programme not finalized. |                            |                               |                            |                       |
| Gambia                       | None                                 |                              |  |                            |                               |                            |                       |
| Senegal                      |                                      | Ministry of Finance computer | Uses not reported.                         |                            |                               |                            |                       |
| Niger                        | x                                    |                              | x  |                            |                               |                            |                       |
| Nigeria (Statistical office) | x                                    | Under consideration          | x  | x                          | x                             | x                          | In experimental stage |
| (Bureau of census)           | x                                    |                              | x  |                            |                               |                            |                       |

<sup>a/</sup>Automatic calculating equipment, not digital computer, see p/.

<sup>b/</sup>In CSO, expected shortly, or available for use although outside CSO.

Table I  
Facilities and Uses (cont'd)

| Country              | Conventional <sup>a/</sup><br>equipment | Computer <sup>b/</sup>           | Processing<br>census and<br>survey data | Registration<br>and<br>licensing | Trade and<br>balance of<br>payments | Gov't a/c Economic<br>payroll analysis |
|----------------------|---|----------------------------------|---|----------------------------------|-------------------------------------|--|
| WEST AFRICA (Cont'd) |   |                                  |   |                                  |                                     |  |
| Chana                | x                                       | Expected shortly                 | x                                       | x                                | x                                   |  |
| Ivory Coast          |   | Independent tabulating<br>unit x | x                                       | x                                | x                                   | x                                      |
| Guinea               |   |                                  | x                                       | x                                |                                     | x                                      |
| Sierra Leone         | x                                       | Requested                        | x                                       | x                                | x                                   | x                                      |
| Liberia              | x                                       |                                  |   | x                                | x                                   | x                                      |
| Mauritania           | None                                    |                                  |   |                                  |                                     |  |
| EAST AFRICA          |   |                                  |   |                                  |                                     |  |
| Uganda               | x                                       | Acquisition under study          | x                                       | x                                |                                     |  |
| Ethiopia             | x                                       |                                  | x                                       |                                  | x                                   |  |
| Madagascar           |   | x(2)                             | x                                       | x                                | x                                   | x                                      |
| Madagascar           | x                                       | Treasury computer                | x                                       | x                                | x                                   |  |
| Mauritius            | x                                       |                                  | x                                       |                                  |                                     |  |
| Malawi               | x                                       | ICT Bureau computer              |   |                                  |                                     | x                                      |
| Malawi               |   | Due Jan. 1966                    |   |                                  |                                     |  |
| Malawi               |   | Ministry of Finance computer     |   | Expected                         |                                     | Expected                               |
| Malawi               | x                                       | Gov't computer                   | Expected                                | x                                |                                     |  |
| Malawi               | In Treasury                             | In Treasury                      | Expected                                | x                                |                                     |  |

<sup>a/</sup> Automatic calculating equipment, not digital computer, See b/.

<sup>b/</sup> In CSO, expected shortly, or available for use although outside CSO.

**Table I**  
**Facilities and Uses (Cont'd)**

| Country      | Conventional <sup>a/</sup><br>equipment | Computer <sup>b/</sup> | Processing<br>census and<br>survey data    | Registration<br>and<br>licensing | Trade and Gov't a/c<br>balance of payroll<br>payments | Economic<br>analysis |
|--------------|---|------------------------|--|----------------------------------|---|----------------------|
| NORTH AFRICA |   |                        |  |                                  |   |                      |
| Libya        | x                                       | x                      | x  |                                  | x   | x                    |
| Sudan        | x                                       |                        | x  |                                  | x   | x                    |
| Tunisia      |   | x                      | In future                                  | x                                | x   | x                    |
| U.A.R.       |   |                        | Ministry for National<br>Planning computer |                                  |   | x                    |
| Morocco      | x                                       |                        | Ministry of Finance<br>computer            | x                                | Processed by<br>Ministry of<br>Commerce               |                      |
| Algeria      | x                                       |                        | x  | x                                |   | x                    |

<sup>a/</sup> Automatic calculating equipment, not digital computer, See <sup>b/</sup>.

<sup>b/</sup> In CSO, expected shortly, or available for use although outside CSO.

Table II, Number of Countries Possessing Facilities, may be read bearing in mind the more detailed information in the country-by-country paragraphs of Section II. Some countries report both conventional equipment and a computer (or computer under consideration) as separate installations, giving a total of 45 entries in the various categories with only 34 countries including EACSO, reporting. It is recognized that peripheral card-handling equipment is part of any computer installation. Table II, however, lists only installations operating separately, as far as could be determined from the survey replies.

Of all the countries reporting, only the Gambia and Mauritania neither have nor are considering any sort of automatic data processing equipment. It is believed that Somalia also does not use such equipment at present, but no reply was received.

The only equipment described as being "under consideration" are digital (electronic) computers, and all these countries are already using conventional equipment.

Perhaps the most significant observation that can be made about table II is that over half the countries reporting have the use of a computer for the CSO. In the case of the countries of former French Equatorial Africa, computer facilities of the UDE in Brazzaville serve all four countries. Also, smaller centres are geographically dispersed. It should be noted that only 2 out of 23 conventional facilities are located outside the CSO whereas only 6 of the 19 CSO's having access to a computer operate or shortly will operate their own computer. The aspect of sharing expensive equipment or having a service bureau computer for several governmental divisions will be discussed further in Section III.

#### Influence of Size of Statistical Office

Table III shows the total manpower of central statistical offices which replied to the manpower survey for 1965 reported in E/CN.14/CAS.4/9. The table also shows in column 2, digital computers possessed or shortly to be acquired by the statistical offices, and in column 3, government computers providing service to various users including the CSO.



It might be expected that CSO size is a function of the desired volume of statistical work and hence of the need for computing facilities.

In fact, all the offices possessing or shortly to possess computers have a staff of over 90 and no office with a staff of 90 or less, possesses such facilities. On the other hand, several of the larger offices, notably Morocco, the Sudan and Nigeria, do not have or use a digital computer.

With regard to the use of computers outside the CSO, small offices enter the picture. All the members of the Union Douanière Equatoriale (Former French Equatorial Africa) have access to the UDE facilities. These four countries have statistical offices which are among the smallest in Africa. The other statistical offices shown in the table which use computers of other governmental organizations are all former British territories in East Africa and all have ICT computers.

TABLE II

Number of Countries Possessing Facilities<sup>a/</sup>

|   | Number of facilities <sup>b/</sup> |                     |       |
|---|------------------------------------|---------------------|-------|
|   | "Conventional"<br>equipment        | Digital<br>computer | Total |
| Facilities under consideration                                | 0                                  | 3                   | 3     |
| Facilities presently used or available<br>in immediate future | 23                                 | 19                  | 42    |
| (1) Operated by CSO   | 21                                 | 6                   | 27    |
| (2) Service provided by outside<br>organization               | 2                                  | 13                  | 15    |

<sup>a/</sup> Of the reporting countries, only two had no data processing equipment.

<sup>b/</sup> Several countries have both types of facilities, resulting in a total number of facilities greater than the number of countries reporting.

TABLE III  
Influence of Size of Statistical Office

| Country <sup>a/</sup> | Total Staff of CSO | CSO Computer or due in immediate future | use of computer outside CSO |
|-----------------------|--------------------|---|-----------------------------|
| NORTH AFRICA          |                    |   |                             |
| Algeria               | 57                 |   |                             |
| Libya                 | 213                | 1                                       |                             |
| Morocco               | 177                |   |                             |
| Sudan                 | 161                |   |                             |
| Tunisia               | 147                | 1                                       |                             |
| EAST AFRICA           |                    |   |                             |
| Basutoland            | 11                 |   |                             |
| Ethiopia              | 90                 |   |                             |
| Kenya                 | 127                |   | 1                           |
| Madagascar            | 238                | 2                                       |                             |
| Rhodesia              | 124                |   | 1                           |
| Somalia               | 44                 |   |                             |
| Tanzania              | 44                 |   | 1                           |
| Uganda                | 50                 |   |                             |
| Zambia                | 64                 |   | 1                           |
| WEST AFRICA           |                    |   |                             |
| Gambia                | 2                  |   |                             |
| Ghana                 | 449                | 1                                       |                             |
| Niger                 | 10                 |   |                             |
| Nigeria               | 789                |   |                             |
| Togo                  | 29                 |   |                             |
| Upper Volta           | 27                 |   |                             |
| CENTRAL AFRICA        |                    |   |                             |
| Cameroon              | 93                 | 1                                       |                             |
| CAR                   | 8                  |   | 1 (UDE)                     |
| Chad                  | 8                  |   | 1 (UDE)                     |
| Congo (The Rep.of)    | 9                  |   | 1 (UDE)                     |
| Congo (DR)            | 42                 |   |                             |
| Gabon                 | 11                 |   | 1 (UDE)                     |

<sup>a/</sup> Only countries which replied to the statistical manpower survey are listed.

## SECTION II

### Individual Country Reports

The individual country reports which follow are arranged by the following headings:

1. Administration of facility
2. Present equipment
3. Data processed or reports produced
4. Future developments
5. Remarks

When reference is made to a "conventional computing facility" it is intended to mean that an automatically programmed computing machine is available but of the pre-electronic computer class. Only major equipment will be mentioned since it is assumed that supporting equipment, such as key punches and sorters, is included in normal quantity.

ALGERIA

1. The Division of Statistics possesses its own data processing unit.
2. This is of conventional type with one tabulator.
3. Vital statistics  
Financial statistics  
Employment and salary survey  
1960 population census  
Establishment register  
Industrial survey  
Price survey.

PASUTOLAND

1. There is no installation, but one is anticipated in the near future.
2. The new installation will be conventional, having one tabulator.
3. The 1960 agricultural census was processed by the ICT bureau of South Africa.
4. The new installation is anticipated for January 1966.

CAMEROON

1. The General Statistics Service operates its own computing facility.
2. This facility is an IBM conventional type with 3 accounting machines.
3. -Civil service salaries  
Demographic survey and census  
Agricultural sample survey  
Nutrition survey  
Customs data  
Budget survey  
Clinic survey  
Automobile registration
4. An IBM 1401 is expected to replace 2 of the accounting machines in December 1965. The new facility will then deal with the public accounts and reclassification for statistical purposes. The census of Douala to be undertaken in the near future will be tabulated.
5. The demographic survey of Western Cameroon will be analysed in France by the INSEE.

CENTRAL AFRICAN REPUBLIC

1. A facility is operated by the UDE in Bangui.
2. An electronic computer is used.
3. Data concerning external trade of the Union Douanière Equatoriale are treated at the UDE mechanographic centre in Brazzaville.

CHAD

1. The Mechanographic Centre of the Union Douanière Equatoriale serves Chad for statistical data processing requirements.
2. In this regard, a computer is available in Brazzaville and a conventional equipment centre in Fort Lamy.
3. The Brazzaville computer processes customs data as well as the results of a demographic sample survey in Chad. The centre in Fort Lamy processes government salaries, purchase orders, and public utility bills.
4. It is probable that the Fort Lamy household budget survey will be processed at the Fort Lamy centre

It is expected to locate an IBM 1401 in Fort Lamy during 1966.

DEMOCRATIC REPUBLIC OF THE CONGO (DR)

1. The statistical service operates its own mechanographic centre.
2. The equipment is of IBM manufacture and includes one calculator and one accounting machine.
3. A classification of data being processed was not supplied.
4. Replacement by more modern equipment is being considered.

## EAST AFRICAN COMMON SERVICES ORGANIZATION

1. The organization has its own installation.
2. The equipment is conventional and from ICT.
3. Projects were not reported.
4. An ICT 1500 is being considered.
5. Some experience in the use of computers is gained through contact with the ICT bureau in Nairobi.

ETHIOPIA

1. The CSO operates its own data processing centre.
2. The equipment is conventional, from IBM, and includes one accounting machine.
3. Foreign trade                                  national sample survey  
Addis Ababa budget survey                      Industrial census
4. It is hoped to process trade data extending back to 1960 or 1961,  
and to assist other Ministries of the Government.
5. The centre is quite new, dating from early 1965.

GABON

1. The mechanographic unit is under the control of the Union Douanière Equatoriale and located in Libreville. Presumably, the UDE computer in Brazzaville is also available.
2. The Libreville unit is conventional, of IBM manufacture.
3. The Gabon statistical service has made very little use of the mechanographic unit up to now.
4. It is planned to install an IBM 1401 in January 1966, primarily for automatic handling of the public accounts.

#### GAMBIA

1. There is no data processing equipment used for statistical purposes in the government.

#### GHANA

1. The Central Bureau of Statistics operates a data processing installation.
2. The central machine at present is an IBM tabulator.
3. 

|                         |                     |
|-------------------------|---------------------|
| Education survey        | Foreign trade       |
| Household budget survey | Labour              |
| Transport survey        | Migration           |
| Population census       | Civil aviation      |
| Agriculture census      | Government accounts |
| Industrial census       | Import licenses     |
| Vehicle registration    | Shipping            |
|                         | Meteorological data |
4. An IBM 1401 computer is to be installed shortly. It is expected to process the area sample survey, judicial statistics, and vital statistics in addition to the list under item 3.

#### GUINEA

1. The mechanographic unit is combined with the statistical service.
2. This unit is based on an IBM 1401 electronic computer.
3. The following work is recently begun as the computer is a new arrival.

|  |                               |
|--|-------------------------------|
| Demographic census                       | Rental service to enterprises |
| Agricultural census                      | Social security               |
| Register of establishments and employees | Vital statistics              |
| Utility bills                            | Public accounts               |
|  | National budget monitor       |



#### IVORY COAST

1. The data processing centre has recently been detached from the statistical service and is now autonomous. Some computation is done outside the centre (see below).
2. The equipment is from "Machines Bull", including an electronic computer and two tabulators.
3. 

|                            |                          |
|----------------------------|--------------------------|
| Foreign trade              | -Enterprise registration |
| Public accounts (economic) | Automobile registration  |
| Tuberculosis               | Civil service salaries   |
| Customs                    | Other taxes              |
| Government expenses        |                          |
4. Sample surveys covering agriculture, housing, demography, consumption and budget, and working hours, have been treated outside the centre whose capacity was sufficient only for work under item 3. Certain calculations, such as correlations, were also done outside the centre. This work will be shifted to the centre itself due to increased capacity provided by the computer.

#### KENYA

1. A central governmental centre serves the statistics office.
2. The principal machine is an ICT 1500.
3. 

|                    |                       |
|--------------------|-----------------------|
| Labour enumeration | -Agricultural census  |
| Social security    | -Governmental payroll |
| Vital events       | -Vehicle registration |
| Judicial records   | -Migration            |
|                    | Student records       |
4. It is hoped to process the agricultural and resettlement surveys as well as perform some subsidiary analysis of the Central Province Survey on the computer.

#### LIBERIA

1. The Bureau of Statistics operates its own computing facility.
2. This facility is of the conventional type IBM including one calculator and one accounting machine.
3. 

|                            |                                      |
|----------------------------|--------------------------------------|
| Foreign trade              | Consumer price index                 |
| Shipping                   | 1962 population census               |
| Employment survey          | Industrial production survey         |
| Motor vehicle registration | Teachers' and students' record cards |

#### LIBYA

1. The Statistical Department operates a data processing section.
2. The equipment is from ICT and includes 2 tabulators and a rolling total machine.
3. 

|                   |                          |
|-------------------|--------------------------|
| Population census | Family budget survey     |
| External trade    | Census of establishments |
| Social insurance  |                          |
4. The installation of an ICT 1300 computer is expected around the end of 1965.
5. One of the tabulators was rented for the population census.

#### MADAGASCAR

1. The statistical organization operates its own computing facility.
2. This facility is built around two IBM 1401 computers with magnetic tapes and discs. A conventional accounting machine is also available.
3. Government accounts  
Taxation  
Agricultural survey  
External migration  
Economic accounts  
Analysis of seasonal variations  
Census  
Miscellaneous economic surveys  
Nutrition survey  
Vital statistics  
Automobile registration  
Enterprise registration
4. Replacement of the computers with a more modern type is expected.

#### MAURITANIA

2. Neither conventional equipment nor a computer is used.

#### MAURITIUS

1. The CSO data processing equipment does the CSO work as well as for other departments.
2. The equipment is of ICT manufacture, the principal machine being one conventional tabulator.
3. Only the 1962 population census was specifically reported as a data processing project, but it is clear that other work is also done.

MOROCCO

1. The statistical service has its own mechanographic unit.
2. The equipment is conventional, including two tabulators.
3. Population census  
Household and lodging  
Multi-purpose survey  
Agricultural holdings survey  
Insurance records  
Community advisers survey  
Student survey  
Agricultural production  
Vehicle registration  
Health statistics
5. Final analysis of the 1960 census was carried out on the IBM 1401 in the Ministry of Finance. Customs statistics are the responsibility of the Ministry of Commerce.

NIGER

1. The statistical office contains the mechanographic service.
2. This equipment is from Machines Bull and includes one calculator and two accounting machines of conventional type.
3. Family budget survey  
Consumption survey

NIGERIA

1. Three groups of equipment relate to the work of the Federal Office of Statistics:
  - (i) machines rented by the statistics office
  - (ii) machines rented by the Ministry of Education but installed in the statistics office.
  - (iii) machines at the census office.
2. Of the three groups in 1., only the first group with 2 accounting machines and the third with 3 accounting machines and an automatic conventional calculator have capacity for statistical tabulation. All are IBM.

NIGERIA (cont'd)

3. The following projects refer to (i), machines rented by the statistics office :

|                            |                           |
|----------------------------|---------------------------|
| Trade statistics           | Shipping returns          |
| Industrial survey          | Capital formation         |
| Government accounts        | Urban consumer surveys    |
| Housing statistics         | Migration                 |
| Motor vehicle registration | Civil aviation statistics |
| Staff records              | Employment and earnings   |
| Hospital statistics        | TB study                  |

In addition, some experimental work is being done in the analysis of rural food consumption data and calculation of elasticities of demand from urban consumer surveys.

4. Plans are being developed for processing the demographic and labour force surveys. A UN expert is studying the feasibility of installing an electronic computer.
5. An inter-departmental committee has been formed for co-ordination of automatic data processing.

THE REPUBLIC OF CONGO

1. The statistical service has no mechanographic unit.  
The Union Douanière Equatoriale computer is available should the need arise.
3. Foreign commerce data are tabulated by UDE computer.

#### RHODESIA

1. A data processing installation is operated by the CSO, manufacture ICT. A computer in the Treasury is available for large jobs; presumably also ICT manufacture.
2. The CSO installation contains one accounting machine with, of course, supporting equipment. The Treasury computer has already been mentioned.
3. 

|                          |                             |
|--------------------------|-----------------------------|
| Agricultural production  | National income and balance |
| Industrial production    | of payments                 |
| Construction (quarterly) | Income tax                  |
| Employment (quarterly)   | Migration (monthly)         |
|                          | Sales tax (monthly)         |

Monthly and annual trade statistics are processed in the Treasury computer.

#### SENEGAL

1. The statistical office is serviced by a mechanographic centre in the finance Ministry.
2. The principal machine in this centre is an IBM 1401 computer.
3. The statistical office is served by the computer but exact projects were not specified.

#### SIERRA LEONE

1. The CSO possesses a mechanical unit.
2. The unit includes one tabulator, one calculator, and two electronic statistical machines (conventional equipment).
3. 

|                                   |                    |
|-----------------------------------|--------------------|
| Population census                 | Agriculture survey |
| Migration                         | Labour statistics  |
| Road traffic survey               | Manpower           |
| Railway goods traffic             | External trade     |
| Accounts for public corporations. |                    |
4. It is expected to replace the equipment in the near future with an IBM 1401 computer.

#### SUDAN

1. The Department of Statistics contains its own data processing equipment.
2. Two accounting machines and one conventional calculator, IBM, form the core of the facility.
3. 

|                     |                                |
|---------------------|--------------------------------|
| Agricultural census | Demographic and housing survey |
| Budget survey       | Foreign trade                  |
| Government payroll  | Exchange control               |

#### TOGO

1. The statistical service possesses a conventional installation of manufacture Machines Bull.
2. The principal units are one tabulator and one calculator.
3. 

|                      |                      |
|----------------------|----------------------|
| Population           | External trade       |
| Establishment survey | Salary survey        |
| Vehicle registration | Agricultural survey. |
| Demographic survey   |                      |
4. An additional tabulator will be added in 1966.

#### TANZANIA

1. At present, the data processing facility is located in the Treasury.
2. It is a conventional punch-cord installation.
3. Migration  
Labour enumeration
4. The Treasury has recently installed an I.C.T. 1500 computer which will process the information listed above and later, agricultural and population censuses.

#### TUNISIA

1. An independent mechanographic centre performs all data processing for the government and is under the direction of the Secretary of State for Planning and National Economy.
2. The centre possesses an IBM 1401 computer.
3. 

|                                 |                       |
|---------------------------------|-----------------------|
| Customs                         | Vehicle registration  |
| Vital statistics                | Patent registration   |
| Income (business and personnel) | National accounts     |
| Employment survey               | Education survey      |
| Industrial census               | Rural consumption     |
| Military records                | Civil service records |
| Local taxes                     | Telephone bills       |
4. The centre will process results of the general population census planned for 1966.



## UGANDA

1. The installation is under the administrative control of the Organization and Methods Unit of the Treasury.
2. At present, the equipment is conventional and is based around 3 ICT tabulators (accounting machines).
3. Vehicle registration Migration  
Survey of employment and wages Education statistics  
Agricultural statistics
4. The Uganda Government is considering an electronic computer for the joint use of the Government and Makerere University College.

UNITED ARAB REPUBLIC

1. and 2. The installation, including one tabulator and one IBM 1620 computer is operated by the Ministry for National Planning.
3. Only economic analysis can be reported, but this may not be complete. Sec 5.
5. In response to the inquiry, the UAR reply referred only to the UN report, "Mechanized Data Processing in Government Operations", which is mentioned in Section III and which discusses government, rather than specifically statistical, data processing.

## UPPER VOLTA

1. There is no mechanographic unit at present.
4. It is planned to install in 1966, 29 IBM machines including 1 conventional calculator and 2 tabulators.

ZAMBIA

1. A computer, serving all government departments, is located in the Finance Ministry.
2. The computer is an ICT 1500.
3. External trade                      Income tax  
Immigration                      -Employment
4. An ICT 1900 will replace the present computer in 1966.
5. Actual programming and operation of the computer is handled by ICT under contract to the Finance Ministry.

### SECTION III - Prospects for Electronic Computers

The purpose of Section III is to recommend to statistical offices consideration of a computer for data processing requirements. As noted in Section I, nearly half the statistical offices already have access to a computer and it is likely that most of the remainder have indeed considered the question. The second and thus more relevant purpose of Section III is to review briefly how one should approach such an acquisition.

Considerations relevant to the acquisition of an electronic computer.

The final section of the ECA document mentioned above is a discussion of the prospects for electronic computers in African statistical offices. This final section follows below essentially in its original form:

"Obviously the first question to be answered is whether the present or future workload of the office can fill the capacity of a computer. Clearly, one can assume that if the size and resources of a statistical office are such that basic data are produced in sufficient quantity to fill available machine time, then the rental price of a computer will definitely be comparable with or less than the cost of alternative processing methods.

An example of how one goes about measuring the work load, but not on a comparative cost basis, is presented as a case study for Ghana in the ECA document E/CN.14/CAS.3/12, "Prospects for Electronic Data Processing Methods in Africa", September, 1963.

Such a workload analysis is relatively straightforward but the aspect of growth in the workload must be included, as is done in the Ghana example. The survey results show that many African countries already process data in most fields of statistics<sup>1/</sup>. Thus future

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<sup>1/</sup> For example note, in Section II, above, the subjects covered in country reports. On page 4, Annex 1, of ECA document E/CN.14/CAS.4/DEV.1/Rev.1, "Statistical Development in Africa", is a list of essential subject fields.

expansion in the workload would involve primarily an increase in work already undertaken rather than completely new tasks, at least from the statistical point of view, and responsible persons should be able to estimate this.

One exception to this might be new work in economic analysis if undertaken in the CSO's. But this would involve primarily computation rather than mass card handling which is the usual feature of statistical data reduction. In modern computers, the computational is always much greater than the card handling (input) capacity, and additional analysis would not impose an excessive burden.

One specific indication of future expansion of the workload in the CSO's can be taken from the recent ICA, statistical manpower survey. The results of this survey are contained in E/CN.14/CAS.4/9, "Report on Statistical Training Centres and a Statistical Manpower Survey of Africa". On page 19 of that document it is shown that African statistical office manpower would increase, if present goals are realized, from 6,250 in 1965 to 9,960 in 1970, an increase of over 50 per cent. It should also be remarked that the volume of data within established programmes tends to increase once the initial hurdles of establishing procedures and data flow channels are overcome. Thus both logic as well as actual plans for increasing staffs suggest that the workloads will increase significantly.

It can thus be concluded that the CSO's will be forced to consider some form of increase in their data processing and that they should be able to predict reasonably well what type of processing would be required. Since it is not unreasonable to assume, furthermore, that between the decision to acquire a computer and the earliest time when it is in full operation, two years may elapse, immediate consideration of possible acquisition is indicated.

As suggested above, considerable time is involved in studying requirements and equipment alternatives, and once new equipment is agreed, a much longer period is needed to ensure that a suitable staff

is prepared to use the new equipment with a minimum of delay after arrival. These points have been clearly brought out in other publications<sup>1/</sup> and will not be treated in detail here.

One other point which should be mentioned, however, is the possibility of setting up a central governmental data processing service bureau. Examples have been noted earlier in this report of African governments which have already done this. The entire government workload may well justify the largest and most modern (and hence expensive) computer thus providing training and experience in applications to individual departments unable to afford or properly utilize their own equipment. It is suggested, however, that the long range objective of the CSO should be to operate its own centre, since its work differs significantly from the administrative and accounting functions of many other governmental organizations.

Because the United Nations has recommended certain priorities in country programmes, it is reasonable to enquire whether a generally applicable recommendation can be made regarding the data processing capacity needed to support a standard programme. This really amounts to ascertaining a need specifically for electronic equipment since almost all countries have conventional equipment and presumably could judge the need for changes in their conventional capacity. Fortunately, there is no longer any sharp distinction in cost between computers and conventional equipment owing to the wide price range now available in computers, with the cheaper models comparable in price to a conventional installation. This suggests that it is possible to make a generalized recommendation even in light of the great differences in size between the largest and smallest African countries.

With one additional proviso, one may assert that even the smaller countries could effectively utilize the services of a small computer.

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<sup>1/</sup> For example, see "Mechanized Data Processing in Government Operations; A Preliminary Appraisal for Developing Countries", 3 July 1964, by Edward F.R. Hearle, United Nations, New York.

The additional proviso is that it may be desirable to process government operating accounts and payroll as well. This work results in peak loads at monthly intervals leaving slack time in between the peaks which should be adequate for processing the work of the statistical office.

Of course the larger countries may have enough work to occupy separate installations for government finance and for statistics. But in the smaller countries, the combined work of the two functions will almost certainly justify a small computer while providing operating experience which would greatly smooth the eventual acquisition of a larger machine or even the setting up of two or more separate installations.

The General recommendation is to acquire a computer, even if very small, and have it serve as many offices as necessary to result in a full work load.

It may be useful to conclude with a few comments on the variety of benefits obtainable: Although a fully utilized computer performs a given workload more economically than "conventional equipment", this consideration is far less important than the increased speed with which data may be published. Of equal importance is the vastly improved accuracy which is made possible by the automatic error-checking features which are now standard in electronic computers. Also, there is the advantage that ad hoc analysis and reports may be provided at any time without jeopardizing the regular work commitments due to the enormous computing speed. This last advantage makes possible experimentation and investigations which never would have been possible had the data processing capacity been constantly fully taxed.

Finally, it should be remarked that having a central government computation service bureau located in the CSO has beneficial side effects for the CSO. Much data which is being processed for other departments can be used for economic analysis in the CSO. For example, the processing of public finance can simultaneously provide information which can be utilized in the national accounts. This type of side benefit has resulted, for example, in Madagascar.