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Tenth session of the Conference
of African Statisticians

Addis Ababa, 17-22 October 1977

ELECTRONIC DATA PROCESSING INVENTORY

CONTENTS

GENERAL NOTES

The following symbols have been used in the tables:

"x" denotes "Yes"
"..." denotes "not available"
"-" denotes "Nil"

M77-1485

I. Introduction

1. At its ninth session the Conference of African Statisticians agreed that regional information on data processing capabilities and requirements should be collected periodically and that statistical offices and data processing units throughout the region should be asked to provide relevant information biennially.

2. This study is based on country replies to a questionnaire entitled "Regional Survey of Data Processing Capabilities and Requirements, 1976/77". The new enquiry was intended to be a systematic one developed to bring up-to-date and maintain a running record of all relevant facts. The scope was therefore more comprehensive than any made previously.

3. The questionnaire was sent to 50 countries but at the time of writing replies have been received from only 22 (see table 1 annexed hereto) out of which 5 countries stated that they did not process any computers but two envisaged installations of one form or another EDP facilities in the near future. Due to the rather low response rate information available and relating to non-participating countries in the enquiry is included in the document.

4. One is aware that in developing countries even where computers have been introduced there is often underutilization of the equipment because, for example, there are no enough people with training and experience to apply the new methods. Also concerted action for the transfer of computer technology to developing countries has been of top priority 1/, it would be useful if the Conference of African Statisticians were to consider seriously ways and means of improving and responding to future enquiries in spite of certain conclusions drawn from the available data and information of the present survey.

5. The following points will be discussed:

- Location of the computer in relation to the statistics - producing organ;
- Computer installations for processing statistical data;
- EDP workload;
- Personnel;
- Training

II. LOCATION OF THE COMPUTER IN RELATION TO THE STATISTICS - PRODUCING ORGAN

6. Table 1 below summarizes the situation as regards the location of the computer in relation to statistics - producing organs.

7. The 36 countries for which the ECA secretariat has information concerning the location of computers may be classified into two groups.

1/ United Nations: The Application of computer technology for development E/4800, ST/ECA/136.

8. The first group contains those countries where the statistical services do not have computers to process their work but can by and large use equipment in other departments. 18 countries are in this situation. For the most part,

Table 1: Location of computer in relation to statistics - producing organ

Country	Computer available in the statistical service	Computer available in another service	Remarks
North Africa			
Egypt	x		
Libyan A.J.	x		
Morocco	x		
Sudan	x		
Tunisia	x		
West Africa			
Benin		x	Direction du central mécanographique (Ministère des finances)
Ghana	x		
Guinea		x	Ministère des finances
Ivory Coast		x	Office Central de la mécanographie (OCM)
Liberia	x		
Mali		x	Ministère des finances
Mauritania		x	
Niger	x		
Senegal		x	Direction du traitement automatique de l'information (DTAI)
Nigeria	x		
Sierra Leone	x		
Togo	x		
Upper Volta 2/		x	Centre nationale du traitement de l'information
Central Africa			
Cameroon	x	x	Direction centrale de l'information et de la tele-informatique
Central African Empire		x	Office National de l'informatique (ONI)

2/ Reply sent by Institut National de la Statistique et de la Démographie.

Table 1: Location of computer in relation to statistics - producing organ (cont'd)

Country	Computer available in the statistical service	Computer available in another service	Remarks
Central Africa (Cont'd)			
Chad		x	
Congo		x	Office Congolais de l'informatique (OCI)
Gabon		x	Direction de l'informatiq (Ministère des finances)
Zaire	x		
East Africa			
Botswana		x	
Ethiopia	x		
Kenya	x		Treasury, Ministry of
Lesotho		x	Finance
Madagascar	x		
Malawi		x	Account General's Department, Ministry of Finance
Mauritius		x	
Somalia	x		
Swaziland		x	Treasury Department
Uganda		x	Ministry of Finance
United Republic of Tanzania		x	Ministry of Finance and Planning
Zambia	x		

Sources: Replies to ECA questionnaire and information available to ECA secretariat.

they have adopted a policy of centralising processing facilities particularly as regards the public sector and have therefore established either national computer science offices, which are managed more or less independently, or national computer science departments, which are more integrated into the administrative machinery. In general, computer science offices and departments are attached to the Ministry of Finance which, by virtue of its management tasks, is initially the first client. But as computer sciences develop, the applications are also directed towards the management of services other than financial ones. Thus, to meet the needs of all users, the Central Computer Science Service of Cameroon is still attached to the Office of the President of the Republic although the Central Statistical Office acquired a mini-computer IBM/32 in 1976 for internal use while major statistical tasks are still undertaken by Direction Centrale de l'Informatique et de la tele-informatique. In Malawi the National Statistical Office has no longer its computer since the old ICL 1004 installed for 1966 census got too old to maintain. The Data Processing Unit was transferred in 1975 to the Accountant General's Department and uses the Portland Cement Co. or Malawi Railways ICL 1901.

9. The second group includes countries where the statistical services have their own equipment which, for the most part, is used to process mainly statistical work. In Sudan, the equipment is also used to process savings bonds and offer processing service to Shell Company, Bank of Sudan and non-governmental surveys on a customer basis which altogether take up 43 per cent of total processing time in the year. In Zaire, although the Institut de Recherche Scientifique (IRS) possesses an IBM 1401 computer there are two other services involved with processing statistical work. They are SIZ (Service de l'information du Zaire) and Finances. Both possess IBM 370/60. The former operating within the offices of the President of the Republic serves to co-ordinate the computer policy of the country and has also established a data bank containing files on foreign trade, enterprises and workers.

10. In some cases, the computers operated by the statistical services are used by all the services within the administration. For example, they are used to process such data as taxation, personnel records, medical stores in Zambia, fichier des etablissements and parc automobile in Madagascar.

11. The first group, whose statistical work has to be processed in the ministry directly responsible for the computer service is placed in a vulnerable position. At a time when severe shortage of skilled manpower in computer science and technology is common in many developing countries lack of supervision of computer development and communication between the statistical office and the computer service might hinder smooth and speedy processing of statistical work of this group.

12. In view of the above, it has become necessary for statisticians to have some basic training in computing so as to establish a better dialogue between the statisticians and the computer specialists. This suggestion remains valid for the second group in which the computer is located in relation to statistics-producing organ.

13. In the second group, i.e. those countries where the computers used to process statistics are located within the statistical services, there exists the problem of overloading when an occasional heavy load occurs. It is observed that the computers used by this group are usually of low capacity.

14. For countries which have adequate resources the easiest solution is of course to replace with a machine with larger memory and sufficient supporting peripherals Madagascar envisages acquisition of an IBM/370/13 with 512k memory in 1978 to replace its present IBM 360/40 with only 64k memory, Egypt has been using an ICL 1906s with 192k memory since 1974 apart from an ICL 1904 of 32k owned by the statistical office. The Department of Census and Statistics in Libya is known to have acquired an IBM 370/135 of 145k.

15. Another solution might be to pool all the resources of all available computers in the country so as to establish a comprehensive plan for processing. This could avoid wasteful idle time in one department while the other one is heavily loaded.

16. Certainly various kinds of problems will arise in connection with the location of computer. To solve them depends on the concrete conditions, resources personnel, etc. of the country involved.

17. Lastly, mention should be made of Gambia and Guinea-Bissau where there are no computer installations at all. The Statistical Office of Gambia is exploring the possibility of having one installed later this year and similarly the Gambia Meteorological Department is contemplating the purchase of a mini-computer in the near future. In the case of Guinea-Bissau, an inter-regional adviser from the UN Statistical Office recently visited the country to examine the feasibility of installing and operating a mini-computer for the planned Population Census being assisted by UNFPA.

III. COMPUTER INSTALLATIONS FOR PROCESSING STATISTICAL DATA

18. Tables 2 to 6 annexed hereto give a general view of the facilities available to process statistical data. The information contained in the 5 tables is limited to those countries which sent in their replies to the questionnaire and therefore no substantive conclusions could be drawn for developing Africa as a whole. However, some brief comments can be made of installations as far as data input, the processor, output devices and software are concerned.

19. Data input devices (See Table 3 annexed hereto). The most striking example is Egypt which has very good facilities for data input. There is, among the countries, wide variation in the installation of various devices. Malawi would acquire two mini computers in future. In fact mini computers are increasingly popular in America and Europe for their efficiency and low installation costs. Tanzania and Uganda have one each in use in their statistical offices. In the years to come the mini computer could also find its place in Africa. The rest of the countries reported do not seem to have any immediate plans to replace their present devices.

20. The majority of the countries under review use 80 column cards. Zambia reportedly to be using 128 column cards is now using also 80 column type.

21. As far as automatic data input is concerned, only three - Egypt, Uganda and Zambia use optical-mark reader or optical character reader. It would be useful to know the experiences of these countries because although the method is attractive and is supposed to be time-saving there are many practical problems to be looked into.

22. Data support (See Table 4 annexed hereto)

All countries under review as expected use magnetic drivers for data support. Apart from Zaire and Tanzania which have computers of small memory size at the statistical offices all have exchangeable discs for backing store. Only Cameroon has installed magnetic drums capable of transmitting 806000 characters per second. A magnetic drum as a storage device can record serially binary coded data upon any track as the drum rotates and data can be recorded serially upon any track as the drum rotates and data can be read or written to any one of the tracks by switching from one read/write head to another. This device, not overlooking its cost, probably could be considered for statistical work in future.

23. Processing (See Table 2 annexed hereto)

All the computers installed belong to the third generation and most of them were installed in 1970s. Tunisia, Togo, Upper Volta, Congo and Kenya acquired their present computers in 1975, which belong to the IBM 370 series. Although Egypt installed its ICL 1904 in 1966 with 32k it boosted its processing capacity in 1974 with the access to an ICL 1906 s with 192k and of course other essential peripherals. Lesotho plans to install an ICL machine with 8k in 1977 while Madagascar also plans to acquire an IBM 370/138 with 512k in 1978.

24. It is observed that IBM models still dominate the market in Africa followed by ICL, Honeywell Bull and CII (IRIS).

25. On the whole the storage capacity falls in the lower middle range. There are extreme cases of 4k (Niger) and 512k (Cameroon).

26. Output Devices (See Table 5 annexed hereto)

8 out of the 17 countries have card punches, 3 have paper tape punches. Sudan and Uganda use character printers. Only Zambia has a graph plotter and only Egypt has use of 5 ICL 7151 video display terminals.

27. Most of the countries use more than one line printer with speed ranging from 150 lines per minute to 1850 lines per minute.

28. Software (See Table 6 annexed hereto)

Zaire uses only Autocode. Cobol and Fortran, being procedure-oriented and problem oriented are used by nearly all countries. RPG II is still quite popular with eight countries using it. Five countries are using PL/1, a language developed with the intention of combining features of commercial languages and scientific languages.

29. CENTS and COCENTS are used by Sudan, Upper Volta, Congo, Kenya, Madagascar and Zambia for processing population and housing censuses. Uganda uses XDS2 and XDSB for statistical and economic analysis.

IV. EDP WORK LOAD

30. Current EDP tasks (See Table 7, annexed hereto)

Eight out of the 17 countries reported include population census among their major statistical tasks. Naturally processing of these data accounts a relatively big portion of processing time in the year. External trade, being periodically processed is the second major statistical task handled. Social and economic surveys of various kinds are other major tasks of nine countries.

31. Future EDP tasks (See Table 8 annexed hereto)

Four countries have no immediate plans of future EDP tasks. Sudan, Cameroon, Madagascar and Tanzania plan to process household survey data. Apart from external trade, agricultural and industrial surveys will be major taks for Sudan, Congo, Swaziland and Zambia. The overall picture is that thirteen of the reported countries will have challenging plans for the next three years.

V. PERSONNEL

32. Table 9 annexed hereto shows that there are 9 experienced systems/programming managers with 3 undergoing training. 10 out of the 17 countries have systems analysts supported by senior or junior programmers. Ethiopia, which reported to have neither systems analysts nor senior programmers in fact will have these posts filled out in the very future as soon as the proposed organization of the Central Statistical Office is put into force. Consequently these posts are currently shouldered by the existing staff members.

33. Table 10 annexed hereto presents supporting personnel involved in off-line operations and administration, data preparation and output preparation. Egypt is undoubtedly the only country which has such all round support. As far as computer operations are concerned there are 8 DP managers, 21 operation specialists, 36 senior operation staff and 154 junior operation staff for all the countries under review.

34. As far as off-line operations and administration are concerned there are 15 subject specialists DP liaison, 545 DP input/output clerical staff and 6 junior staff. All the staff mentioned are experienced.

35. At the level of data preparation there are 59 supervisors of whom 2 are under-training and 515 punchers and verifiers of whom 34 are under training.

36. Lastly, as far as output operations are concerned Egypt has one manager and recruitment estimate is 1, Central African Empire has 2 expatriates and Madagascar also has 1 manager.

37. Table 2 below summarises the current and future situation as regards the computer staff employed to process statistics.

38. It can be seen that demand for specialists is high. The higher demand for junior programmers than senior programmers could imply an expansion in the transfer of programming knowledge. As far as off-line operations-administration is concerned demand for DP output clerical staff is the lowest.

Table 2: Number of trained staff by category and recruitment estimates

Category of staff	Trained and experienced staff or staff under training (A)	Recruitment estimates (B)	Ratio in $\frac{B}{A}$ %
1. Systems/Programming			
- Systems/programming managers	12	7	58.3
- Systems analysts	63	11	17.5
- Senior programmers	57	2	3.5
- Junior programmers	41	4	9.8
2. Computer operations			
- DP Managers	9	3	33.3
- Operation specialists	24	-	-
- Senior operational staff	45	4	8.9
- Junior operational staff	169	21	12.4
3. Off-line operations - admin.			
- Subject specialists DP liaison	16	3	18.8
- DP output clerical staff	553	6	1.1
- Other junior staff	35	2	5.7
4. Data preparation			
- Supervisors	59	2	3.4
- Puncher and verifier	515	41	8.0
5. Output preparation			
- Managers/specialists	4	1	25.0
- Other staff	21	4	19.0

VI. TRAINING

39. As far as systems analysis is concerned training areas may be divided into three headings:

- Introductory
- Basic
- Advanced

40. It can be seen from Table 3 below that 64 have been trained and 14 are under training in introductory and basic theory and practice of systems analysis. Relatively smaller number, only 10, have been trained or being trained in advanced systems.

41. There are 154 trained programmers and 69 trainees. As far as languages are concerned, there are 54 trained in Cobol, 20 in Fortran, 11 in RPGII, 29 in other languages such as PL/1 and Algol, 13 trained how to use packages like CENTS and COCENTS and 8 on operating systems. Those who are being trained are also in the same order of magnitude but with none being trained on operating systems.

42. From Table 3 it can be observed that a large proportion of the training is offered by statistical offices or within government and by manufacturers within the country as far as basic systems analysis and programming is concerned.

Table 3: Number of staff trained by area of study and training sources

Training organs	A	B	C	D1	D2	D3	E1	E2	E3
1. Systems									
- Introductory	2	14	4	-	-	2	4	-	-
- Basic	12	50	5	2	-	3	15	-	1
- Advanced	4	6	5	2	-	5	4	-	1
2. Programming									
- Assembly languages	-	19	2	10	-	1	-	-	3
- Cobol	40	54	14	18	8	6	12	-	6
- Fortran	26	20	7	3	9	6	2	-	3
- RPG II	2	11	5	1	-	1	-	-	1
- Other highland languages	1	29	10	-	-	4	12	-	1
- Statistical package	1	13	7	-	2	2	-	-	1
- Operating systems	-	8	5	-	-	3	-	-	3
Total	88	224	64	36	19	33	49	-	20

A: Numbers in training
B: Numbers trained
C: Training within statistical offices or within government
D: Training in United Nations or other non-commercial centres
D1: Within the country
D2: Outside the country but within Africa
D3: Outside Africa
E: Training at manufacturers or other commercial centres
E1: Within the country
E2: Outside the country but within Africa
E3: Outside Africa

43. For advanced knowledge of computer science training sources have generally to be sought outside the country either within Africa or outside Africa.

44. Table 12 annexed hereto presents future training needs by field of study. Undoubtedly the demand for systems analysts at introductory, intermediate and advanced level is higher. As far as programming is concerned training needs in assembly languages, Cobol and Fortran are equally big. It can also be observed that there is a strong demand for people to be trained in operating systems.

VII. CONCLUSION

45. In the past ten years or so there has been considerable development in the application of computers in Africa, especially for data processing and statistical analysis. There is no doubt that developing African countries have urgent needs. However, it must be pointed out that it is not at all obvious what priority should be given to computers or what contributions can or should be made by computers in developing African countries when considered relative to the monumental problems of food production, population, development of natural resources, and employment. It merits attention that in their initial years of installation computers have been shown to be particularly capital-intensive and could require a developing country to use a large amount of its foreign exchange.

46. One must not overlook other related problems for example, location of the computers, adequate understanding, built on experience, of what needs to be done in the collection and analysis of data, personnel available with a firm practical background in administrative procedures for data collection and analysis before one merely associates the contribution of computing to data processing and statistical analysis with speed, reliability and cost-effictiveness.

47. In view of the growing interest in computers in the world in general and in Africa in particular there is need for a periodical inventory of equipment and personnel to the field of computer sciences as they relate to the processing of statistics. It remains a joint effort on the part of the countries concerned and the secretariat to lay emphasis, in future enquiries, on obtaining data and more precise information on personnel as well as on training facilities offered in Africa.

Annexes

Table 1: List of Countries which sent replies

North Africa	East Africa
Egypt	Ethiopia
Sudan	Kenya
	Lesotho
West Africa	Madagascar
	Malawi
Cape Verde Islands	Seychelles
Gambia	Somalia
Guinea Bissau	Swaziland
Upper Volta	Tanzania
	Uganda
Central Africa	Zambia
Cameroon	
Central African Empire	
Congo	
Rwanda	
Zaire	

Table 2: Computers used to process statistics in Africa

Country	Type of Computer	Storage Capacity	Acquisition Date	Other Computers in the Administration
NORTH AFRICA				
Egypt	ICL 1904	32 K	1966	
	ICL 1906 S	192 K	1974	-
Libya A.J.	IBM 370/135	145 K	...	...
Sudan	IBM 360/130	64 K	1970	...
Tunisia	IBM 370/125	128 K	1975	...
WEST AFRICA				
Bénin	HB GAMMA 30	20 K	1971	-
Ghana	IBM 360/30	64 K	...	...
Guinea	IBM 1401	16 K	...	IBM 370/145, HB-2-H
Ivory Coast	IBM 370/145	...	...	CII-2-IRIS 45
Liberia	IBM 360/20	8 K	...	...
Mali	HB GAMMA 10	...	...	HB GAMMA 10
Mauritania	IBM 3	32 K	1974	-
Niger	HB GAMMA 10	4 K	1967	-
Nigeria	IBM 370/145	208 K	...	...
Senegal	IBM 360/40	256 K	...	IBM 360/40
	IBM 370/145	...	...	IBM 370/45
Togo	IBM 370/115	96 K	1975	-
Upper Volta	IBM 370/125	...	1975	...
CENTRAL AFRICA				
Burundi	IBM 3	...	...	-
Cameroon	IBM 370/155	512 K	1974	IBM/32
Central Afr. Empire	CII IRIS 45	80 K	1973	
Chad	IBM 360/22	32 K	...	-
Congo	IBM 370/125	128 K	1975	...
Gabon	CII IRIS 50	...	...	-
Zaïre	IBM 1401	16 K	1970	-
EAST AFRICA				
Botswana	...	128 K	1974	...
Ethiopia	IBM 5410	48 K	1972	-
Kenya	IBM 370/135	256 K	1975	
Lesotho	ICL	20 K		
	ICL	8 K 3/		
Madagascar	IBM 360/40	64 K	1970	-
	IBM 370/138 4/	512 K		
Malawi	ICL 1901	16 K	1972	-
Uganda	IBM 360/E30	32 K	1967	ICL/1901 A
United Rep. of Tanzania	ICL 1902	16 K	1968	
	ICL 1902 A	16 K	1969	-
Zambia	IBM 370/145	208 K	1973	-

3/ Installation planned for 1977
4/ Installation planned for 1978.

Table 3: INPUT DEVICES

Sub-region Country	Key-tape Machine No.	Key-tape Machine Model	Key-Disc System: Terminal No.	Terminal Model	Mini Computer No.	Mini Computer Model	Video Display No.	Video Display Model	Diskette (Floppy Disc) No.	Diskette (Floppy Disc) Model	Card Punches No.	Card Punches Model	Card Punch Verifier No.	Card Punch Verifier Model	Card Type Number of Columns	Card Read Punch Single Unit No.	Card Read Punch Single Unit Model	Paper Tape Puncher No.	Paper Tape Puncher Model	Paper Tape Reader No.	Paper Tape Reader Model	Optical Mark Reader No.	Optical Mark Reader Model	Optical Character Reader No.	Optical Character Reader Model	Other Devices System	Other Devices No.	Other Devices Model
NORTH AFRICA																												
Egypt	43 1/	NCR2101 NCR2102	72 1/ 8 2/	ICL4690 NCR2491	6 1/ 1 2/	ICL8955/02 NCR2404	72 1/ 6 2/	ICL8970 NCR2491	6 1/ 1 2/	ICL8978/05 NCR2471	12 1/ 4	ICL072 ICL69	8 1/ 4	ICL171 ICL169	...	1 1/ 2 2/	ICL2101 ICL2101	1 1/	ICL882c	1 1/ 1 2/	ICL1915 ICL1915	1 1/	ICL8301/1	-	-	-		
Sudan	-		-		-		-		-		15 1/	IBM29AAB	7 1/	IBM59-002	...	1 1/	IBM2520	-		1 1/	IBM1017	-		-		-		
WEST AFRICA																												
Upper Volta	...		...		...		...		14 1/	IBM3742	4 2/	IBM029	...		80	1 2/	IBM	...		4 2/	IBM	...		...		Diskette Reader	...	IBM3747
CENTRAL AFRICA																												
Cameroon	-		-		1 1/	IBM/32	-		2 1/ 19 2/ 1 2/	IBM3742 IBM3742 IBM3747	1 1/	IBM029	-		80	1 2/	IBM3505	-		1 2/		-		-		-		
Central African Empire	-		-		-		-		-		6 2/	Honeywell Bull K212 (5) and IBM129(1)	6 2/	Honeywell Bull K212 (5) and IBM59 (1)	80	1 2/	C11 300 l/min.	-		-		-		-		-		
Congo	-		-		-		-		5 2/	IBM3742	-		-		...	2 2/	IBM029	-		-		-		-		-		
Zaire	10	MDS1101	-		-		-		-		1 1/	IBM026	-		...	-		2 1/	MDS1102	-		-		-		-		
EAST AFRICA																												
Ethiopia	-		-		-		-		-		-		5 1/	IBM5496	96	-		-		-		-		-		Multi Function Card Unit	2 1/	IBM5424
Kenya	-		-		-		-		-		7 1/		4 1/	IBM059	...	-		-		1 2/	IBM	-		-		-		
Lesotho	-		-		-		-		-		6 1/	ICL71	3 1/	ICL171	80	1 2/	ICL	-		-		-		-		D.E.	1 2/	ICL2903
Madagascar	-		-		-		1 1/	IBM3277-84	20 1/	IBM3742	-		-		80	-		-		-		-		-		Mini disc converter paper tape	1 1/	IBM3749
																										Mini disc reader	1 1/	IBM2)540
Malawi	32 1/ 26 2/	ICL2904 ICL1302	-		2 1/	15000	-		-		16 1/	...	16 1/	...	...	-		3	...	1	...	-		-		-		
Somalia	10 1/	MDS6481	-		-		-		-		1 1/	NCR376	-		...	-		-		-		-		-		-		
Swaziland	10 1/	NCR1101	-		-		-		-		1 2/	ICL071-1	1 2/	ICL171-1	...	-		-		-		-		-		-		
Tanzania	-		-		1 1/	Olivetti	-		-		9 1/	ICL	6 1/	ICL	80	-		-		-		-		-		Card Read Single Unit	2 1/	ICL
Uganda	-		-		20 1/	L2000	-		-		7 1/ 2 2/	IBM50 IBM29 ICL72			59			10 1/	L2000	1 1/	2671	1 1/	2671	1 1/	1442	Hand Punches	6 2/	...
Zambia	-		34 1/	IBM/3740	-		-		500 1/	IBM	6 1/	129	-		80	-		-		-		1	IBM3881	-		-		

Sources: Replies to ECA Questionnaire

1/ Equipment owned or rented by statistical office
2/ Other equipment used by statistical office
3/ Prospective acquisitions by statistical office

Table 4: DATA SUPPORT

Sub-region Country	MT Drivers No.	MT Transfer Rate	MT Packing Density	MT Type No. of Channels	MT Type Cost/Reel	Exchangeable Disc Size Disc No.	Exchangeable Disc Size (No. of Char.)	Magnetic Drums Storage cap.	Magnetic Drums Trans-mission	Operating System Storage Requirements (K - Char.)	Other random access devices
NORTH AFRICA											
Egypt	6 1/	40 KC/S 1/	556 1/	7 1/	...	3 1/	8M 1/				
	12 2/	60 & 80 KC/S 2/	200, 556 & 800 2/	7 & 9 2/	...	10 2/	30M 2/	-		16 2/	-
Sudan	4 1/	15 000 Char./ sec. 1/	800 1/	9 1/	...	3 1/	7M 1/	-		10 1/	
WEST AFRICA											
Upper Volta	4 2/	15K/S 2/	800 2/	...	...	3 2/	7250K 2/	-		8 2/	
CENTRAL AFRICA											
Cameroon	8 2/	200 000 Char./ sec. 2/	800 & 1 600 2/	9 2/	...	1 1/	9M			2 1/	
						10 2/	100M 2/	806 000 Char/sec.			
Central African Empire	2 2/	60KC/S 2/	1 600	9	10 000FCFA	4 2/	25M 2/	-		28 2/	-
Congo	3 2/	80KC/S 2/	1 600	9	...	4 2/	70M 2/			48 2/	-
Zaire	6 1/	...	850	7 1/	...	-	-	-		-	-
EAST AFRICA											
Ethiopia	3 1/	80 000 Char./ sec. 1/	1 600	9 1/	87 125 Birr	2 1/	4.9M 1/	-		...	-
Kenya	5 2/	120 000 Char./ sec. 2/	1 600	7 2/	...	6 2/	70M 2/	-		...	-
Lesotho	4 1/	20KC/S	...	...	...	1 1/	4.9M 1/	-		1 408 1/	-
						2 3/	60M 3/				
Madagascar	4 1/	60K/S	800 1/	9 1/	...	3 1/	89M 1/	-		12 1/	-
	4 3/	40K/S	1 600 3/	9 3/	...	4 3/	300M 3/	-		VM System	
Malawi	8 1/	41 700 Char./ sec. 1/	556 1/	7 1/	...	6 1/	4 096 000 1/	-		...	-
Somalia	3 1/	40K/S 1/	1 600 1/	9 1/	...	1 1/	4.2M 1/	-		-	-
Swaziland	4 1/	20 850 Char./ sec. 1/	37.5 1/	...	...	2 1/	4.9M 1/	-		...	-
Tanzania	4 4/	20K/S 2/	1 600 2/	7 2/	100/per 1 200 feet	-	-	-		6	-
Uganda	4 1/	92 160 Char./ sec. 1/	1 600 1/	9 1/	...	6 1/	29 176 000 1/				
	4 2/			7 2/		2 2/	3 200 000 2/	-		...	-
Zambia	6 1/	...	1 600 1/	9 1/	...	4 1/	106 x 100	-		4	-

Sources: Replies to ECA questionnaire and information available to ECA Secretariat.

1/ Equipment owned or rented by statistical office
2/ Other equipment used by statistical office
3/ Prospective acquisitions by statistical office
4/ Figure relates to the second computer installed
MT Magnetic Tape

Table 5: OUTPUT DEVICES

Sub-region Country	Computer Output card Punch No.	Model	Computer Output P.T. Punch No.	Model	Line Printer No.	Model	Line Printer Speed (line/min.)	Character Printer No.	Model	Character Printer Speed (Char./Sec.)	Special Character Features	Graph Plotters No.	Model	Video Display Terminals No.	Model	Computer Output microfilm	Other computer Output Devices	Ancillary Output Devices
NORTH AFRICA																		
Egypt	1 2/	ICL2151	1 1/ 1 2/	ICL1925 ICL1925	2 1/ 3 2/	ICL1933/3 ICL1933/3	1 350	–		–	–	1 1/	ICL1934	1 1/ 4 2/	ICL7151 ICL7151	–	–	–
Sudan	1 1/	IBM2520	1 1/	IBM1017	1	IBM1403	500	1	IBM1052	40	–	–		–		–	–	–
WEST AFRICA																		
Upper Volta	1 2/	...	–		1 2/	...	...	...		...	...	...		...		...	–	–
CENTRAL AFRICA																		
Cameroon	1 2/	IBM3525	1 2/	IBM3505	1 1/ 2 2/	... IBM3211	155 1/ 1 850 2/	–		–	–	–		–		–	–	–
Central African Empire	–		–		1 2/	C112	1 000	–		–	–	–		–		–	–	–
Congo	1 2/	IBM1442	–		1 2/	IBM1403	1 100	–		–	–	–		–		–	–	–
Zaire	–		–		2 1/	MDS1320 IBM1403	150 150	–		–	–	–		–		–	–	–
EAST AFRICA																		
Ethiopia	–		–		1 1/	IBM5203	300	–		–	–	–		–		–	–	–
Kenya	1 2/	IBM1442	–		2 2/	IBM1403	1 100	–		–	–	–		–		–	–	–
Lesotho	–		–		1 1/	ICL	300	–		–	–	–		–		–	–	–
Madagascar	–		–		2 1/ 2 3/	IBM1403 IBM3204	1 100 1/ 1 200 3/	–		–	–	–		–		–	–	–
Malawi	–		–		2 1/	ICL2405	600	–		–	–	–		–		–	–	–
Somalia	–		–		1 1/	NCR645	650	–		–	–	–		–		–	–	NCR6101 1/
Swaziland					2 2/	ICL2411 ICL2409	300 & 600	–		–	–	–		–		–	–	–
Tanzania	–		–		1 2/ 1 3/	ICL	600	–		–	–	–		–		–	–	–
Uganda	1 1/	...	–		1 1/ 1 2/	1403N2 ...	600 1/ 300 2/	1 1/ 1 2/	1052 ...	1 ...	–	–		–		–	–	–
Zambia	1 1/	IBM3525	–		2 1/	IBM1403	1 100	–		–	–	1 1/	Callomp 1627 II	–		–	–	–

Sources: Replies to ECA questionnaire and information available to ECA Secretariat.

1/ Equipment owned or rented by statistical office
2/ Other equipment used by statistical office
3/ Figure relates to the second computer installed

Table 6: Software

Sub-region Country	ALGOL	BASIC	COBOL	FORTRAN	RPG II	Other high level language computers	Operating system	Assembly language	Packages
NORTH AFRICA									
Egypt	x	x	x	x	-	PLAN	GEORGE 2&3	PLAN	Data entry, including editing, table generation, output procedures standard ICL software library
Sudan	-	-	x	x	x	-	DOS	-	CENTS COCENTS
WEST AFRICA									
Upper Volta	...	...	x	x	...	...	DOS	...	COCENTS
CENTRAL AFRICA									
Cameroon	-	-	x	x	x	PL/1	Release 21.7	x	Data entry, including editing Table generation Computer-assisted programming
Central African Empire	-	-	x	x	x	-	SIRIS 2	-	-
Congo	-	-	x	x	x	-	DOS/VS R33	IBM 320	CENTS
Zaire	-	-	-	-	-	AUTOLOADER	-	-	-
EAST AFRICA									
Ethiopia	-	-	x	x	x	-	...	-	-
Kenya	-	-	x	x	-	-	DOS	ASSEMBLER	CENTS-AID 11 for SPSS
Lesotho	-	-	x	x	x	XDDC - Direct Entry format programme compiler	EXEC	-	Table generation
Madagascar	-	-	x	x	-	-	DOS		COCENTS
Malawi	-	-	x	x	-	PLAN	...	-	-
Somalia	..	..	x	x	-	-		x	..

Table 6: Software (Cont'd)

Sub-region / Country	ALGOL	BASIC	COBOL	FORTRAN	RPG II	Other high level language computers	Operating system	Assembly language	Packages
EAST AFRICA (Cont'd)									
Swaziland	-	-	x	x	x	PLAN	...	-	-
Tanzania	-	-	x	-	-	-	...	-	-
Uganda	x		x	x	x	PL/1 (BASIC 48 SET CHARACTER)	...	-	XDS2 XDSB for Statistical and economic analysis
Zambia	-	-	x	x	-	BAL	DOS/VS	-	COCENTS

Sources: Replies to ECA questionnaire and information available to ECA secretariat

Table 7: Current EDP tasks

Sub-region / Country	Major Statistical Tasks	Processing Time Required	
		Average No. of of minutes per day	Per cent of total processing time in the year
NORTH AFRICA			
Egypt	Foreign Trade	60	9
	Vital Statistics	120	18.5
	Industrial Production Statistics	30	4.5
	Family Budget Researches	60	9
	Labour Force Statistics	30	4.5
	Establishments Census	30	4.5
Sudan	1973 Population Census	61	13
	Foreign Trade	33	7
	Animal Census	30	6
WEST AFRICA			
Upper Volta	Population Census	120	10
	Demographic Survey	120	2
CENTRAL AFRICA			
Cameroon	Population Census	120	15
	External Trade	100	12
Central African Empire	External Trade	12	2.5
	Population Census	30	6.3
Congo	Processing of figures from 1974 Census	...	...
Zaire	Social Demographic Survey	178	66.61
	Kinshasa Price Index	18	6.75
	Kinshasa Traffic Accidents	24	9.02
	Immigration Statistics	12	4.53
	Kinshasa Desirable Births	5	1.35
	Dietary Survey in Bukavu	18	6.73
	Prison Statistics	5	1.63
	Small and Moyennes Enterprise Survey in Kinshasa	9	3.06
EAST AFRICA			
Ethiopia	Household Economic Survey	54.60	13
	Manpower Survey	51.75	12.74
	Juvenile Delinquency	37.93	9.03
	Public House Administration	40.44	9.63
	Lower Income Survey	90.43	21.53
	Prostitution Survey	40.69	9.09

Table 7: Current EDP tasks (Cont'd)

Sub-region / Country	Major Statistical Tasks	Processing Time Required: Average No. of minutes per day	Processing Time Required: Per cent of total processing time in the year
EAST AFRICA (Cont'd)			
Kenya	Birth and Death Registrations		
	Migration/Tourism Statistics		
	Annual Enumeration of Enterprise		
	Motor Vehicle Statistics		
	Education Census		1/
	Income Tax Statistics		
	Large Farms Census		
	Integrated Rural Surveys		
	National Sample		
Lesotho	1976 Population Census	...	...
Madagascar	External Trade	60	10
	Card-Index of Establishments	20	3
	Car Parks	20	3
	Population Census	120	20
	Rice Survey	60	10
Malawi	Trade Statistics	30	...
Somalia	Census of Population and Livestock	480	100
Swaziland	Population Census	120	19
Tanzania	Household Budget Survey	30	60
	Agricultural Census	14	28
	Migration Statistics	2	4
	Labour Statistics	3	6
	Income Tax Statistics	1	2
Uganda	Migration	22	6.6
	Hydrometrological Survey	30	9.0
	Income Tax Statistics	24	7.2
Zambia	External Trade	50	6
	Population Census	30	4

Sources: Replies to ECA questionnaire

1/ The Kenya Government Computer Centre operates 18 hours per day, 6 days per week under DOS in a multiprogramming environment. Because of this the processing time per task is not shown as a proportion of the total processing time available.

Table 8: Future EDP Tasks

Sub-region Country	Tasks planned or contemplated	Date of incidence	Estimated No. and type of records involved
NORTH AFRICA			
Egypt	1976 Population, Housing Buildings & Establishments Census	1977-1979	50 million records (110 char.)
	Vital Statistics	1977	2 million records (80 char.)
	Foreign Trade	1977	½ million records
Sudan	Population Census	1980	15 million records
	Household Budget Survey	1978	1.5 million records
	Industrial Census	1978	...
WEST AFRICA			
Upper Volta	Industrial and Commercial Statistics from declaration of enterprises	...	...
CENTRAL AFRICA			
Cameroon	Fertility Survey	...	1 million records (80 char.)
	Household Survey	...	6 000 records (600 char.)
	Processing of Statistics and Fiscal Documents of Plan Comptable	...	3 000 records (120 char. & numerics)
Central African Empire	Consumption Budget Survey	1977	200 000 records (80 char.)
Congo	Analysis of Industrial Statistics	...	...
	Analysis of Agriculture Statistics	...	...
	Analysis of Civil Status Statistics	...	...
Zaire	-		
EAST AFRICA			
Ethiopia	National Census	1977	10 000 000 numerics

Table 8: Future EDP Tasks (Cont'd)

Sub-region Country	Tasks planned or contemplated	Date of incidence	Estimated No. & type of records involved
EAST AFRICA (Cont'd)			
Kenya	Labour Force Survey	May 1977 - April 1978	2 500 households
	World Fertility Survey	August 1977	15 000 women
	Manpower Survey	...	...
	Rural Development Evaluation	...	...
	Marketing Surveys	All 1977	
	National Demographic Survey	Jan. - March 1977	32 000 households
Lesotho	-		
Madagascar	Household Survey	1978	...
	Employment Survey	1977/78	5 000 records
Malawi	Population Census	Sept. 1977	5.5 million
	Blantyre Market Survey	1977	...
Somalia	Under consideration		
Swaziland	Education Statistics	1978/1979	19 000 numerics
	Employment Statistics	1978/1979	3 000 numerics
	Agriculture Statistics	1978/1979	180 000 numerics
	Extrnal Trade	1977/1978	20 000 numerics
	Census of Industries	1978/1979	15 000 numerics
Tanzania	Household Budget Survey 1976/1977	1977-1978	6 000 households
	Tabulations		300 000 tape records
	Population Census	1977-1979	3 million households
			8 million tape records
Uganda	-		
Zambia	Medical Stores	May/June 1977	15 000 records/month
	Personnel Records	Nov./Dec.1977	3 000 records/month
	Tazation	January 1978	5 000 records/month
	Census of Population	Sept. 1979	6 million records
	Census of Agriculture	1980-1981	6 million records
	Other Statistical Surveys	1977	20 000 records/month

Sources: Replies to ECA questionnaire

Table 9. Personnel - Systems/Programming Staff

Sub-region / Country	Systems/ Programming Managers			Systems Analysts			Other Systems Specialists			Senior Programmers			Junior Programmers		
	E	U	R	E	U	R	E	U	R	E	U	R	E	U	R
NORTH AFRICA															
Egypt	–	–	–	4	8	1 1/	–	–	–	1	–	–	–	–	–
Sudan	1	–	–	1	–	–	–	–	–	3	–	–	–	5	–
WEST AFRICA															
Upper Volta	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–
CENTRAL AFRICA															
Cameroon	–	–	–	3	–	–	–	–	–	1	1	–	1	–	–
Central African Empire	1	–	–	3	–	–	1	–	–	8	5	–	2	7	–
Congo	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Zaire	1	2	–	–	–	–	4	–	–	3	–	–	–	–	–
EAST AFRICA															
Ethiopia	–	–	–	–	–	–	–	–	–	–	–	–	3	–	2
Kenya	1	–	–	4	4	–	–	–	–	4	2	2	–	–	–
Lesotho	–	–	–	1	–	–	–	–	–	–	–	–	–	2	–
Madagascar	1	–	3	7	–	–	–	–	–	10	–	–	2	–	–
Malawi	3	–	–	5	–	–	3	–	–	4	–	–	5	7	–
Somalia	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–
Swaziland	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–
Tanzania	1	–	–	1	–	1 1/	–	–	–	–	1	–	–	–	–
Uganda	–	–	–	4	8	1 1/	–	–	–	1	–	–	–	–	2
Zambia	–	–	4	9	–	8 2/	–	–	–	10	2	–	–	6	–
TOTAL	9	3	7	43	20	11	8	--	–	46	11	2	14	27	4

Sources : Replies to ECA questionnaire

1/ Systems Analysts/Programmers
2/ Senior Systems Analyst/Systems Analyst

E: Experienced
U: Under training
R: Recruitment planned in the short and long-term.

Table 10. Personnel Off-line operations and administration data preparation, output preparation

Sub-region / Country	DP Managers			Opération specialists			Senior Op. Staff			Junior Op. staff			Liaison Specialists			DP input/ output clerical			Other junior data support			Data prep. supervisors			Data prep. operators			Managers/ Specialists			Others		
	E	U	R	E	U	R	E	U	R	E	U	R	E	U	R	E	U	R	E	U	R	E	U	R	E	U	R	E	U	R	E	U	R
NORTH AFRICA																																	
Egypt	2	–	2	5	3	–	2	3	4	12	2	20	1	1	3	170	–	5	6	–	2	22	–	2	161	–	40	1	–	1	2	2	4
Sudan	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4	–	–	32	–	–	–	–	–	–	–	–
WEST AFRICA																																	
Upper Volta	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	24	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–
CENTRAL AFRICA																																	
Cameroon	–	–	–	–	–	–	–	–	–	86	–	–	–	–	–	230	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Central African Empire	1	–	–	–	–	–	4	–	–	24	–	–	4[1/]	–	–	29	–	–	–	–	–	4	–	–	29	–	–	2[1/]	–	–	7	–	–
Congo	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	2	–	–	8	–	–	–	–	–	–	–	–
Zaire	–	–	–	4	–	–	2	–	–	2	–	–	3	–	–	–	–	–	3	–	–	6	–	–	42	–	–	–	–	–	–	–	–
EAST AFRICA																																	
Ethiopia	–	–	–	1	–	–	–	–	–	1	1	–	–	–	–	5	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Kenya	1	–	–	1	–	–	3	–	–	6	–	–	1	–	–	16	–	–	–	–	–	2	–	–	22	–	–	–	–	–	–	–	–
Lesotho	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	9	–	–	–	–	–	–	–	–
Madagascar	1	–	–	3	–	–	7	–	–	4	4	–	2	–	–	26	–	–	8	–	–	3	–	–	39	–	–	1	–	–	8	–	–
Malawi	2	1	–	5	–	–	9	–	–	12	2	–	4	–	–	28	–	–	10	–	–	6	–	–	60	10	–	–	–	–	–	–	–
Somalia	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	2	–	–	20	–	–	–	–	–	2	–
Swaziland	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	20	–	–	8	–	–	1	–	–	10	–	–	–	–	–	–	–	–
Tanzania	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Uganda	1	–	–	–	–	–	5	6	–	1	3	1	–	–	–	9	2	–	–	–	–	2	–	–	29	3	1	–	–	–	–	–	–
Zambia	–	–	1	1	–	–	4	–	–	6	–	–	–	–	–	–	–	–	–	–	–	3	–	–	40	–	–	–	–	–	–	–	–
TOTAL	8	1	3	21	3	–	36	9	4	154	15	21	15	1	3	545	8	6	35	–	2	57	2	2	481	34	41	4	–	1	17	4	4

Source: Replies to ECA questionnaire.

1/ Expatriates

E: Experienced
U: Under training
R: Recruitment planned in the short and long-term

DP: Data Processing
Op: Operation.

Table 11: Number of staff trained by field of study

Sub-region / Country	Systems Training				Programming					
	Introductory	Basis Systems	Advanced Systems	Assembly Language	COBOL	FORTRAN	RPGII	Other high-level language	Statistical package	Operating Systems
NORTH AFRICA										
Egypt	2A	2A,8B/2D1	1A,2B/2D1	13B/10D1	6A,20B/10D1	3A,6B/2D1	-	-	2E3 (COMMUNICATIONS)	3E3 (GEORGE 3)
Sudan	-	1B/D3	-	1B/D3 (PAL 11)	2B/D1	2B/D2,D3	3B/D1	1B/D3(ALGOL60), 1B/D3(ALGOL68IR) and 1B/D3(ML/1)	1B/D2 (CENTS) 1B/D2 (COCENTS)	-
WEST AFRICA										
Upper Volta	...	...	...	...	...	...	...	...	...	...
CENTRAL AFRICA										
Cameroon	-	-	-	-	2B/1C ,1D3	4B/2C, 2D3	5 B/5C	2B/1C,1D3(PL/1)	5B,4C/1D3(CENTS, CENTS-AND COCENTS XTALLY)	4B/1C,3D3/JCL(OS-MFT)/
Central Afr. Empire	-	-	-	-	12A/2C, 8D2,2D3	12A/2C, 8D2,2D3	-	-	-	-
Congo	-	-	-	-	-	-	-	-	-	-
Zaire	11B/11E1	11B/11E1	-	-	2B/2E1	1B/E1	-	10B/10E1(RPG) 11B/9C,2E1 (AUTOCODER)	-	4B/4C (SPSS)
EAST AFRICA										
Ethiopia	-	-	-	-	2A/D3	2A/D3	2A/D3	-	2B/D3(CENTS AND COCENTS)	-
Kenya	3B/4C,2D3,4E1	3B/4C,2D3,4E1	3B/4C,2D3,4E1	-	12B/9C, 3D3,9E1 3E3	2B/2C,2E1	-	-	1A/C (CENTS-AID II), 1B/C SPSS	-
Lesotho	-	2B/E3	1B/C,E3	1B/E3(PLAN)	3B/E3	2B/E3	1B/E3	-	1B/C (COCENTS) 2B/E3 (CENTS)	-
Madagascar	-	-	3A/3D3	-	-	-	-	-	-	-
Malawi	-	-	-	-	3/C	-	-	-	-	-
Somalia	-	20B/C	-	-	6B/C	3B/C	-	-	-	-
Swaziland	-	-	-	-	-	-	-	-	-	-
Tanzania	-	-	-	-	1/D2	-	-	-	-	-
Uganda		10A,4B	-	-	6A,4B	6A,3B	2B	2B(PL/1), 1B(ALGOL)	-	-
Zambia	-	1B	-	4B/2C,2E3(IBM BAL)	14A/3B/D1	3A/1D1,2E3		1A/E3 (AL 60L)		-

Sources: Replies to ECA questionnaire

A: Numbers in training
B: Numbers trained
C: Training within statistical offices or within government
D: Training in United Nations or other non-commercial centres
  D1: within the country
  D2: outside the country but within Africa
  D3: outside Africa
E: Training at manufacturers or other commercial centres
  E1: within the country
  E2: outside the country but within Africa
  E3: outside Africa.

Table 12. Future training needs by field of study

Sub-region / Country	Year	Systems analysis: Introductory level				Systems analysis: Intermediate level				Systems analysis: Advanced level			
		77	78	79	80	77	78	79	80	77	78	79	80
NORTH AFRICA													
Egypt		14	10	6	5	7	9	10	6	10	4	9	10
Sudan		1	-	-	-	-	1	-	-	1	-	1	-
WEST AFRICA													
Upper Volta		-	-	-	-	-	-	-	-	-	-	-	-
CENTRAL AFRICA													
Cameroon		-	-	-	-	-	1	-	-	-	1	-	-
Central African Empire		-	-	-	-	-	-	-	-	-	-	-	-
Congo		-	-	-	-	-	-	-	-	-	-	-	-
Zaire		-	-	-	-	-	-	-	-	-	-	-	-
EAST AFRICA													
Ethiopia		-	-	-	-	x2/	-	-	-	-	x2/	-	-
Kenya		6	3	3	3	6	3	3	3	6	3	3	3
Lesotho		-	-	-	-	-	-	-	-	-	-	-	-
Madagascar		-	-	-	-	-	-	-	-	-	-	2	3
Malawi		-	-	-	-	-	2	-	2	-	4	2	2
Somalia		-	-	-	-	-	-	-	-	-	-	-	-
Swaziland		1	-	-	-	-	-	-	-	-	-	-	-
Tanzania		1	-	1	-	-	1	-	1	-	-	1	-
Uganda		-	-	-	-	-	-	-	-	-	-	-	-
Zambia		-	-	-	-	1	-	-	-	-	-	2	2
TOTAL		23	13	10	8	14*	17	13	12	17	12*	20	20

Sub-region / Country	Year	Programming: Assembly language				Programming: Cobol				Programming: Fortran			
		77	78	79	80	77	78	79	80	77	78	79	80
NORTH AFRICA													
Egypt		13	15	10	6[1/]	15	11	8	5	6	4	2	1
Sudan		1[1/]	1[1/]	1[1/]	-	-	-	2	-	1	1	-	-
WEST AFRICA													
Upper Volta		-	-	-	-	-	-	-	-	-	-	-	-
CENTRAL AFRICA													
Cameroon		-	-	-	-	-	-	-	-	-	-	-	-
Central African Empire		-	-	-	-	-	-	-	-	-	-	-	-
Congo		-	-	-	-	-	-	-	-	-	-	-	-
Zaire		-	-	-	-	-	-	-	-	-	-	-	-
EAST AFRICA													
Ethiopia		x2/	-	-	-	x2/	-	-	-	x2/	-	-	-
Kenya		3	2	2	2	6	3	3	3	2	2	2	2
Lesotho		-	-	-	-	-	-	-	-	-	-	-	-
Madagascar		-	-	-	-	-	-	-	-	-	-	-	-
Malawi		-	-	-	-	-	2	-	-	-	-	-	-
Somalia		-	-	-	-	-	-	-	-	-	-	-	-
Swaziland		-	-	-	-	-	-	-	-	-	-	-	-
Tanzania		-	-	-	-	2	2	2	2	-	-	-	-
Uganda		-	3[1/]	-	-	-	-	-	-	-	-	-	-
Zambia		1	3[1/]	2	3[1/]	2	2	2	2	1	-	2	2
TOTAL		18*	24	15	10	25	20	17	12	10*	7	6	5

Sub-region / Country	Year	Programming: RPGII				Programming: Other high-level languages				Programming: Statistical packages				Programming: Operating systems				Others			
		77	78	79	80	77	80	79	80	77	78	79	80	77	78	79	80	77	78	79	80
NORTH AFRICA																					
Egypt		-	-	-	-	-[4/]	-	-	-	-	-	-[5/]	-	10	7	4	2	-	-	-	-
Sudan		-	-	-	-	2[4/]	-	-	-	-	-	2[5/]	-	1	-	1[7/]	1[6/]	-	-	-	-
WEST AFRICA																					
Upper Volta		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CENTRAL AFRICA																					
Cameroon		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1[8/]	-	-
Central African Empire		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Congo		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zaire		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EAST AFRICA																					
Ethiopia		x2/	-	-	-	-	-	-	-	x2/2/	-	-	-	-	-	-	-	-	-	-	-
Kenya		2	2	2	2	-	-	-	-	1	2	2	2	1	2	2	1[11/]				
Lesotho		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
Madagascar		-	-	-	-	-	-	-	-	-	-	-	-	1	2	5	13/	-	-	-	-
														1	2	10	13/				
														1	2	10	14/				
Malawi		-	-	-	-	-[1/]	-[1/]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Somalia		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Swaziland		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tanzania		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uganda		-	4	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	15/	-	-
Zambia		-	-	-	-	-	-	-	-	2/16/	-	-	-	-	-	-	-	-	-	-	-
TOTAL		X	4	-	-	2	1	1	-	1*	5	4	2	15	15	32	5	-	5	-	-

Sources: Replies to ECA questionnaire.

1/ Plan
2/ George 2 & 3
3/ Assembler
4/ PL/1
5/ CENTS & COCENTS
6/ DOS, OS/VS
7/ George/I
8/ For training in some type of programming
9/ Number not specified
10/ CENTS-AID and SPSS
11/ DOS - VS
12/ APL/VS
13/ DLI/DOS/VS
14/ CICS/DOS/VS
15/ System installation
16/ Cocents.