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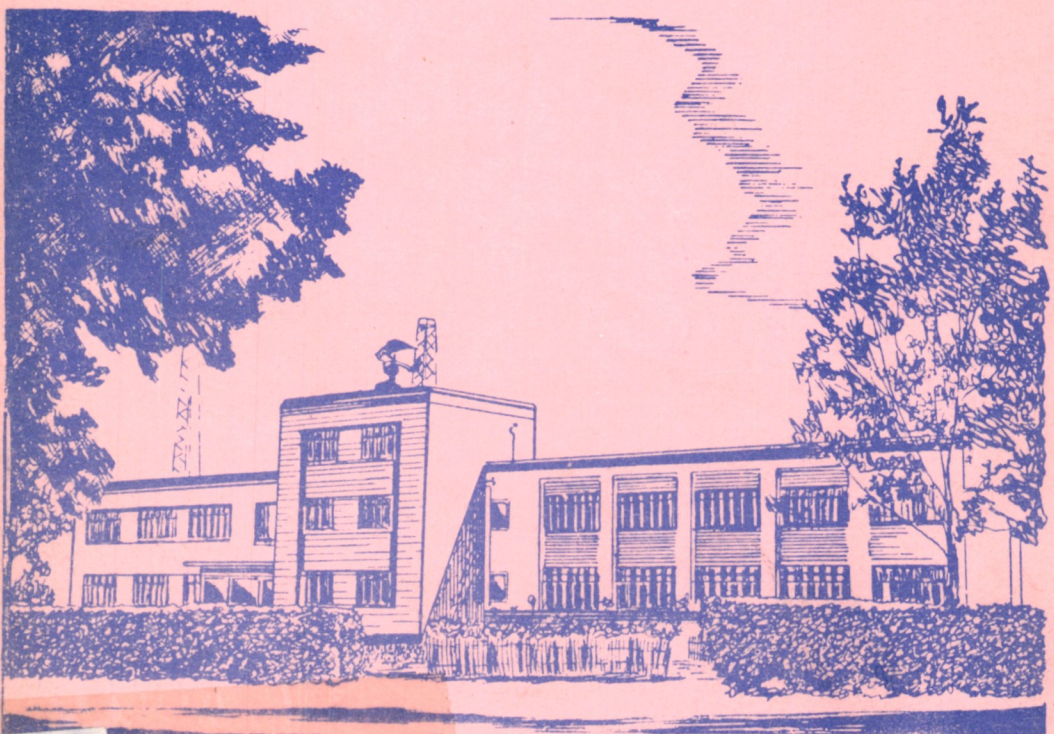


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METEOROLOGICAL DEPARTMENT

ANNUAL REPORT 1978 / 1979



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ANNUAL REPORT
ON
KENYA METEOROLOGICAL DEPARTMENT
FOR THE PERIOD
1ST JULY 1978 TO 30TH JUNE 1979

Presented by the Director
to the
Minister for Transport and Communications

KENYA NATIONAL ASSEMBLY
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Kenya meteorological Department
Dagoretti Corner, Ngong Road
P.O. Box 30259, Nairobi, Kenya

CORRIGENDA SLIP
KENYA METEOROLOGICAL DEPARTMENT
ANNUAL REPORT 1978/79.

- P. (i), para. 5, line 4, interst to read interest.
- P. 2, (ix), maintainance to read maintenance.
- P. 5, 2.2.1, Messers to read Messrs. trainnig to read training.
- P. 18, 4.3.1.4, and to read an.
- P. 20, 4.4.1.1, line 4, commettee to read committee.
- P. 26, 4.10.1, line 3, pamphlets to read pamphlets.
- P. 39, 6.6.4, Trainsport to read Transport.

Foreward by the Director:

The period of this report saw the full integration of the Meteorological Department into Kenya Government Civil Service, the previous period being transitional. The Department made substantial progress in all areas. It also made full impact in the national and international affairs.

Officers of the Department represented the country in many international meetings. The most important meeting was the eighth World Meteorological Congress held in Geneva in April/May 1979. At the Congress the Director who was leading the Kenya Delegation was re-elected to the Executive Committee of the World Meteorological Organization for a second term of four years.

The Department participated in the Global Weather Experiment which commenced in December 1978. In this experiment, meteorological services of the world co-operated to conduct the largest experiment ever conducted by man. The Kenya Meteorological Department participated mainly in the collection and dissemination of weather and climate data from its area of responsibility. The Department also seconded two scientists to the Summer Monsoon Research Centres in Bombay and Calcutta in India. Our scientific and technical staff received fourteen fellowships from the World Meteorological Organization. These fellowships went a long way in increasing the scientific and technical capability of the department and are gratefully acknowledged.

The demand for weather forecasts and advice for all sectors of national economy continued to increase. The Department therefore made efforts during the period under review to expand and improve its services to meet the demand. Negotiations were started during the year for the modernization of the Meteorological Telecommunications System using French credit.

The Institute for Meteorological Training and Research, which is a division of the Department, continued to play its role of training meteorological personnel from Kenya and the rest of Africa, as well as carrying out research on meteorological problems of interest to Kenya. The Institute conducted 12 courses during the period. 115 students from Kenya and 109 students from 11 countries in Africa and Asia were

trained at the Institute during the period under review. Six research reports on various meteorological topics were published during the same period.

Nevertheless, it was not all a bed of roses. During the period, the Department was allocated a sum of Shs. 34.295 million for development. Due to problems associated with procedures involving other ministries, only Shs. 2.052 million was utilized during the period. Further, the Department experienced an acute shortage of scientific and technical personnel. This was mainly due to resignation by scientific and technical personnel to take up better paid jobs in the private sector and the parastatals. A total of 104 officers resigned or deserted the office during the period. It is hoped that measures will be taken to stem the loss of highly qualified personnel from the civil service to other sectors of the national economy.

Finally, it is my pleasure to acknowledge the willing and loyal co-operation of members of staff and the considerable assistance and co-operation received from the Departments of Agriculture, Civil Aviation, Defence, Environment and Water Development.

J.K. Murithi
DIRECTOR

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1.3 Functions of the Meteorological Department.

The Meteorological Department is the State Meteorological Service. It forms part of the Ministry of Transport and Communications. The Director is responsible to the Minister for Transport and Communications through the Permanent Secretary, Ministry of Transport and Communications.

The general functions of the Meteorological Department are:

- (i) The provision of meteorological and climatological service to agriculture, plantation farming, forestry development and for the better exploitation and utilization of natural resources for national development.
- (ii) The provision of meteorological and climatological service to water resources development and other government departments, public corporations, local authorities, the mass media and the general public.
- (iii) The provision of meteorological service to civil aviation for the safety and economy of civil aircraft operations.
- (iv) The provision of meteorological service to shipping in the western Indian Ocean including the issue of cyclone warning for the safety of merchant and other ships in the western Indian Ocean.
- (v) The provision of meteorological service to military aviation for the safety of Kenya Air Force aircraft for national defence.
- (vi) The provision of meteorological and climatological advice to the private sector including industry, commerce and public utilities.
- (vii) The provision of meteorological and climatological advice for the improvement and preservation of national environment for a better human life.
- (viii) The organization and administration of surface and upper air meteorological observations within its area of responsibility and the publication of climatological data.
- (ix) The maintenance of an efficient telecommunication system for rapid collection and dissemination of

meteorological information required for national and international use in accordance with World Meteorological Organization and ICAO procedures.

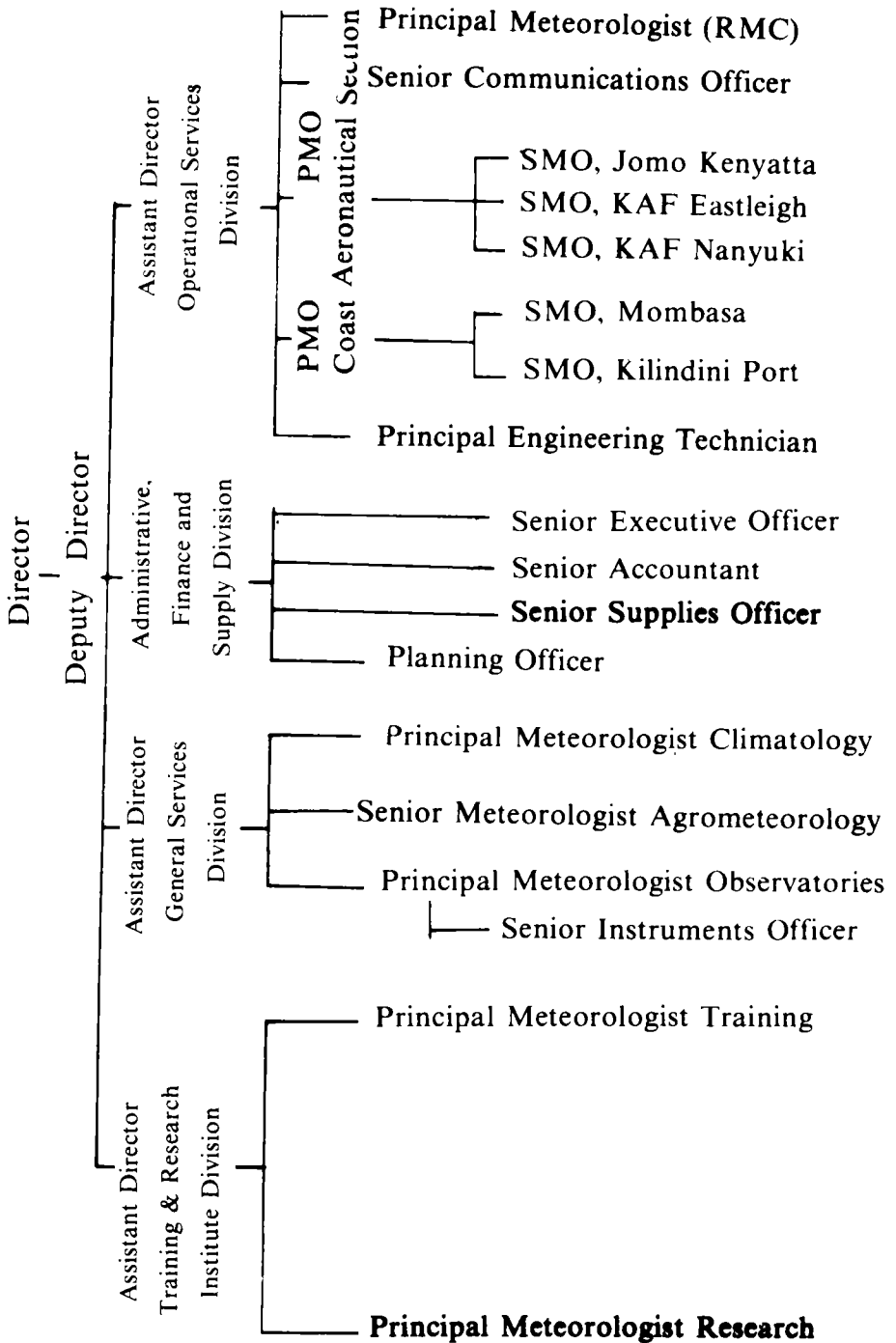
- (x) Research in meteorology and climatology including co-operation with other authorities in all aspects of applied meteorological research.
- (xi) The maintainance of National Meteorological Library
- (xii) Evolving suitable training programmes in all fields of meteorology relevant to national development.

The meteorological Department also takes a leading part in International co-operation in meteorology. The Director is the permanent representative of Kenya to the World Meteorological Organization and acts in concert with the other Directors of the Meteorological Services in the general development of meteorology in Africa. He is also an elected member of the Executive Committee of the World Meteorological Organization.

1.4 Principal Officers of the Meteorological Department:

| | |
|---|--|
| <i>Director:</i> | J.K. Murithi B.Sc. (London) Dip. Met. (Nairobi) |
| <i>Deputy Director:</i> | A.L. Alusa B.Sc. (Oregon State) M.Sc. (Sunya) |
| <i>Operational Services Division</i> | |
| Assistant Director (Acting) | P.C. Okot B.Sc. (London) Dip. Met. (Nairobi) |
| <i>Regional Meteorological Centre:</i> | |
| Principal Meteorologist: | E.A.A. Mukolwe B.Sc. Dip. Met. (Nairobi) |
| <i>Aeronautical Section:</i> | |
| Principal Met. Officer | E.G. Njoroge |
| Principal Met. Officer (Coast) | L.K. Kariungi |
| <i>Senior Meteorological Officers (Incharge of Forecast Office):</i> | |
| Jomo Kenyatta International Airport | A.C. Warratho |
| Mombasa International Airport | S. Magalasia (Acting) |
| KAF Eastleigh Airport | L.K. Njoroge |
| KAF Nanyuki Airport | S. Wanderi |
| Port Met. Office, Kilindini | S. Ochieng (Acting) |
| <i>Engineering Section:</i> | |
| Principal Engineering Technician | P.S. Mwasi |
| <i>Communication Section:</i> | |
| Senior Communications Officer | J.M. Oluoch |

1.5 ORGANIZATION OF THE METEOROLOGICAL DEPARTMENT



General Services Division:

Assistant Director (Acting)

E. Nyoni B.Sc. Dip. Met. (Nairobi)

Climatological Section:

Principal Meteorologist

S.J.M. Njoroge B.Sc. Dip. Met. Nairobi

Observatories Section:

Principal Meteorologist (Acting)

J.H. Kinuthia B.Sc. (Nairobi)

Agrometeorology Section:

Senior Meteorologist

G.W. Mugenyi B.Sc. (Makerere)

Instruments Section:

Senior Instruments Officer

G.M. Muchemi

Printing Section:

Assistant Press Superintendent

W. Ogada

Institute for Meteorological Training and Research Division

Assistant Director (Acting)

J.K. Njihia B.Sc. Dip. Met. (Nairobi)

Training Section:

Principal Meteorologist

G.W. Mwebesa (Mrs) B.Sc. (Nairobi)

Research Section:

Principal Meteorologist

P. Mwingira B.Sc. Dip. Met. (Nairobi)

Administrative, Finance and Supply Division

Administrative Section:

Senior Executive Officer

Vacant

Accounts Section:

Senior Accountant

J.E. Kamau

Supplies Section:

Senior Supplies Officer (Acting)

R.N. Wanyama

Planning and Development Section:

Planning Officer

J. Agin

Transport Section:

Transport Officer

J.C. Ndungu

2. Technical Co-operation and General International Affairs

2.1 General

2.1.1 The year 1978-79 saw the Department make its full impact in the international circles as a separate Department from the East African Meteorological Department, the previous year having been transitional. Various bilateral arrangements negotiated during the

previous year were completed and implemented during the year under review.

2.2 Overseas Training

2.2.1 In February 1979 the Department obtained financial support from WMO Voluntary Cooperation Programme (VCP) for Messers P. Mwasi, M. Gitau, C. Matheka, J. Omware, P. Omolo and S. K. Kamau to attend weather radar, transmitters and receivers equipment training courses in the United Kingdom. In September 1978, Messers I. Osinya and F. Kiarie received VCP support to attend a training course on Single Side Band radio receivers and transmitters in Cairo, Egypt.

2.2.2 During the period under review negotiations were under way for a possible VCP support for Mr. S.H. Mwandoto to go to United Kingdom to study for a M.Sc. degree in Agrometeorology. The VCP support did not ultimately materialize, but WMO funded his stay for one year from their regular budget and the Kenya Government met his airfare costs. It is hoped that during his second year, he will be able to get support through VCP from United Kingdom Government.

2.2.3 Two communications officers, Messrs B.R. Gaya and S.E.M. Mariga were offered WMO short term awards to study advanced telecommunications technical knowledge course in Cairo, Egypt for three months from February to May 1979. Mr. W.M. Chebukaka was sponsored by Special Commonwealth Assistant Programme (SCAP) to attend a course on seismology in India. He was expected back in November 1979.

2.3 Equipment

2.3.1 Requests were sent under Voluntary Cooperation Programme (VCP) for an APT/WEFAX Satellite readout station for Nairobi. By the end of the financial year no country had responded, but we were hopeful of some response since the equipment is an important forecasting tool.

2.3.2 Negotiations regarding possible provision of a modern telecommunications equipment for our Regional Telecommunications Hub through a French loan continued with the draft agreement being vetted by the Attorney General's Chambers.

2.4 International Conferences

2.4.1 In November, 1978 Mr. E.A.A. Mukolwe and Mr. J.H. Kinuthia attended the Commission for Basic System seventh session

held in Washington D.C. In December 1978, WMO organized a Conference in Cairo for National Meteorological Instructors of Regional Association 1 (Africa). Mr. A.L. Alusa was among the invited lecturers. He lectured on **Cloud Physics and Weather Modification** topics as they relate to training in Regional Association 1 (Africa). Mr. J.K. Njihia was a participant in the seminar.

2.4.2 Mr. E.G. Njoroge and Mr. E.A.A. Mukolwe represented the World Meteorological Organization (WMO) and the Kenya Meteorological Department respectively in a meeting of cooperative investigations in the North and Central Western Indian Ocean Region which was held in Nairobi from 5 to 9 March 1979. The meeting was organized by UNESCO and dealt with Marine Sciences of North and Central Western Indian Ocean especially in connection with fisheries.

2.4.3 During April/May 1979 the Director, Mr. J.K. Murithi led a Kenya Delegation consisting of himself, Mr. E.A.A. Mukolwe, Mr. S.J.M. Njoroge of Kenya Meteorological Department and Mr. O.K. Bobotti of the Ministry of Water Development to the eighth World Meteorological Congress. Kenya made a major impression in Congress which culminated in the re-election of the Director, Mr. Murithi to the Executive Committee of WMO. Soon after the Congress Mr. Murithi stayed on for a further one week attending the Executive Committee with Messrs Njoroge, Mukolwe and Bobotti as his advisers. Thereafter, the Director, Mr. Murithi proceeded to the United Kingdom where he attended the Commonwealth Meteorological Directors Conference (CMDC).

2.4.4 In June 1979, Mr. A.L. Alusa attended, at the invitation of UNEP, a meeting of Air Pollution Control Association of North America, in Cincinnati, Ohio, U.S.A. In September, 1978, he also attended a meeting of the Working Group on Cloud Physics and Weather Modification in Geneva. In March 1979, Mr. Alusa attended an International Symposium on Meteorological Aspects of Energy Problems in Madrid, Spain. Thereafter he proceeded to Valladolid, Spain, to participate in WMO Training Workshop on Weather Modification.

2.4.5 Mr. S.K. Kahinga attended an International Workshop on Agroclimatology at ICRISAT, India, held from 22 to 24 November 1979. The workshop was organized under the auspices of ICRISAT.

2.4.6 Mrs. G.W. Mwebesa attended a course on Remote Sensing in Agrometeorology (Landsat) in October 1978 organized by FAO, ESA and WMO. She was sponsored by European Space Agency (ESA).

2.5 Meteorological Institute

2.5.1 The funding of the post of professor at the University of Nairobi was the subject of discussions between the University officials, Treasury, Ministry of Power and Communications, Meteorological Department and the World Meteorological Organization in April 1979. The WMO agreed to fund the post with effect from 1 January 1980 under OPAS arrangement where the University would pay the equivalent of local costs to be topped up by WMO out of its regular budget. It was hoped that with effect from 1 July 1980 a proper agreement for further UNDP funding would have been reached. In this connection a project proposal was sent to the UNDP resident representative through the Treasury and is being vigorously pursued.

2.6 Important Visitors to the Department

2.6.1 Hon. Kamwithi Munyi, E.B.S., M.P. Assistant Minister for Power and Communications, visited the Department and was shown round by the Director.

2.6.2 Mr. Robert W. Kitchen, Resident Representative, United Nations Development Programme, Nairobi, discussed with the Director proposals for continued funding, by the UNDP, of the Institute for Meteorological Training and Research, Nairobi.

2.6.3 Mr. John B.S. Diphaha, Director of Botswana Meteorological Service, visited the Department.

2.6.4 Dr. T. Florkowski from the International Atomic Energy Agency, Vienna, visited the Department in connection with the Regional Training Seminar on the use of Isotope Technology in Water Resources Inventory Planning and Development which the Department hosted in September, 1978.

2.6.5 Dr. R.R. LaCount and his delegation from the National Science Foundation, Washington D.C. held discussions with the Director in connection with the arrangements for the total solar eclipse of the sun which was to occur in Kenya on February 16, 1980.

2.6.6 Hon. John Cronin, M.P. House of Commons, London, visited the Department.

2.6.7 M. Dusserre and his delegation from France visited the Department in connection with the purchase of meteorological equipment through French loan to Kenya.

2.6.8 Mr. Rugirangoga, Director of Rwanda Meteorological Department accompanied by Rwanda Director of Civil Aviation discussed with the Director exchange of meteorological data between Rwanda and Kenya.

2.6.9 Dr. Watts Russell of the British Council visited the Department in connection with supply of library books.

2.6.10 Professor G.O.P. Obasi, Director for Education and Training, WMO Geneva and his delegation discussed with the Director continued funding of the Institute for Meteorological Training and Research, Nairobi.

2.6.11 Mr. P. Lequeux and his delegation from Commission of European Community (EDF) discussed with the Director availability of meteorological data for wind and solar energy development.

2.6.12 Dr. H. Taba, Director for Technical Cooperation, WMO Geneva visited the Department and discussed with the Director, WMO technical assistance to Kenya Meteorological Department.

2.6.13 Mr. A.W. Wilkins from the Crown Agents, London, visited the Department in connection with supply of meteorological equipment through the Crown Agents.

2.6.14 Mr. J.L. Toulouse, a Counsellor from the French Embassy, visited the Department in connection with the French loan.

2.6.15 Mr. E. Kayengeyenge, Director, Burundi Hydrometeorological Department, visited the Department in connection with exchange of meteorological data between Burundi and Kenya.

2.6.16 Mr. M. Verstraete of UNEP visited the Department in connection with the supply of meteorological data for combat against desertification.

3. Operational Services Division.

3.1 General

The Division is responsible for the preparation and supply of meteorological information on a real-time basis to the public, the air transport industry, the Kenya Air Force and shipping in the western

Indian Ocean.

In this regard the Division maintains the Regional Meteorological Centre/Area Forecast Centre, National Meteorological Centre, Aerodrome Watch offices and Port Meteorological office. These office units carry out weather analysis and prepare forecasts as required by the users and the general public. There is also the Regional Telecommunications Hub which serves as a focal point for national and international telecommunications for meteorological data (both raw and processed) collection and dissemination. This centre is linked by point-to-point telecommunications circuit to selected centres e.g. Offenbach, Kano, Cairo, Reunion to mention just a few; there is also available a facsimile broadcast of processed information in analogue form. In the discharge of its functions the Division adheres to those procedures normally agreed upon by member countries of the World Meteorological Organization and the International Civil Aviation Organization.

The constraints experienced during the previous year have been reduced to some degree. The work of the Division is described in the following paragraphs.

3.2 Weather Reports and Forecasts

3.2.1 East African Collectives

The reception of synoptic reports (SYNOPS) and Aerodrome forecasts (TAFs) from Kenya stations was very good throughout the year. Pilot balloon data showed much improvement this year. SYNOPS and TAFs reports from Uganda and Tanzania were very irregular and during part of 1979 no reports were received from the two countries. Despite many reminders to our counterparts in both countries, there was no improvement of flow of meteorological data from Entebbe and Dar-es-Salaam by the end of the year.

During the first four months of the reporting period only Nairobi Radiosonde station operated satisfactorily while all others in East Africa were out of order. During the second four months Dar-es-Salaam and Garissa also became operational but no winds were obtained from Garissa. During the last four months Garissa Radiosonde was on and off quite frequently. The lack of this important data was mainly due to equipment failure. Dar-es-Salaam was fairly satisfactory with Tabora and Kericho being irregular. No Radiosonde reports were received from Entebbe.

3.2.2 *External Data Reception*

The flow of surface and upper air data from outside regions was generally good except on a few occasions when some technical problems arose. One of these being the breakdown of electricity but this was partly rectified by connecting the Regional Meteorological Centre teleprinters to the emergency generator. However, poor data reception from Cairo, Somalia and Angola continued for some unknown reasons. Efforts were being made to reactivate the Kano Link.

There was much improvement in the collection of weather reports made by pilots in flight (AIREPs). This was mainly due to the efforts made by ICAO and IATA in requesting pilots to submit AIREPs to the meteorological services as required by their regulations. Satellite images were received from Offenbach for sometime but eventually the equipment broke down. The Automatic Picture Transmission (APT) equipment at Dagoretti Corner did not operate for the whole year due to lack of spare parts. Efforts are being made to replace this equipment. (see paragraph 2.3.1)

3.3 **Regional Meteorological Centre (RMC)/Area Forecast Centre (AFC)**

3.3.1 *General*

In spite of some problems in adjoining countries which are within the area of our responsibility, the Department continued to meet its obligations to the International Community and the public in general. Besides the routine operations, the Department issued press releases on the onset of "short rains" and the "long rains". Press releases explaining the unusual rains of January 1979, the weather during the Safari Rally and the Easter Weekend were issued. The Department was complimented on the accuracy of these forecasts.

The provision of meteorological information to the Desert Locust Control Organization was intensified. Low level Convergence Charts were issued to Food and Agriculture Organization (FAO) and to Muguga Research Station. The Department was co-opted into the **National Committee on the fight against the Desert Locust menace** and took an active part by providing weather forecasts to the locust fighters. The responsibility of issuing advisory forecasts to the National Meteorological Centres of Kenya, Uganda and Tanzania was maintained in spite of little data received from Tanzania and no data

received from Uganda.

Besides the usual data collection, the Regional Telecommunications Hub/Regional Meteorological Centre (RTH/RMC), Nairobi was approached by the International Monex Management Centre to assist in collecting surface and upper Air data from RTH/RMC area of responsibility during the GARP Summer Experiments from 1 May 1979, to 31 August 1979. Information from Southern Hemisphere Drifting Buoy System (FGGE Buoy System) was added on the surface charts. The section also participated in the Ambex Test Runs which concerns the reception and transmission of TAF messages.

3.3.2 *Forecast products*

The following is the summary of the forecast products issued by the Regional Meteorological Centre/Area Forecast Centre during the year under review.

| | |
|---|------|
| (a) Surface analysis charts | 1460 |
| (b) Upper Air analysis charts | 4745 |
| (c) Streamline Charts | 1460 |
| (d) Convergence zone Charts | 365 |
| (e) Indian Ocean Analysis Charts | 730 |
| (f) Surface Prognosis Charts | 730 |
| (g) Upper Air Prognosis Charts | 2920 |
| (h) Significant Weather Prognostic Charts | 2920 |
| (i) Forecast inferences | 730 |
| (j) Shipping Forecasts | 365 |

3.3.3 *Stationary and Equipment.*

New meteograms were introduced during the year. A new tephigram prepared by the Department was tested and it was recommended that it should be redrawn more accurately before being put into operation.

3.3.4 *Visits, Tours and Training*

Five of the RMC class I meteorologists were posted to work at Jomo Kenyatta Airport for familiarization. The Principal Meteorologist (RMC) visited Jomo Kenyatta Airport, Moi International Airport and Mombasa Port Meteorological Office on familiarization tour. He attended the Commission for Basic Systems

(CBS) seventh session as a principal delegate from Kenya. He also accompanied the Director to Geneva for the eighth WMO Congress and the thirty first session of the Executive Committee of the WMO. Mr. Nyenzi, a Meteorologist, participated in the GARP Summer Monex Experiment in India. Dr. Khalil, a WMO expert visited the section.

3.4 Meteorological Service to Civil Aviation

3.4.1 Jomo Kenyatta Airport continued to operate as the National Meteorological Centre (NMC) and Airport Forecast Office. Apart from the routine duties the NMC participated in the collection of AIREP for the first Garp Global Experiment(FGGE) from 1 December 1978 and the monsoon Experiment (MONEX). The data was continuously passed to RMC for world wide dissemination.

3.4.2 The AMBEX SCHEME test runs were carried out during the period 1 - 7 May 1979 and 1 - 7 June 1979 and the data forwarded to Meteorological Office in Cairo. Mr. A.C. Warratho, member of AFI/COM/MET Regional Planning group co-ordinated the test runs.

3.4.3 A questionnaire on warm cloud electrification was carried out and distributed to Dr. Patnaik of the University of Nairobi, Kenya Airways, Airline operators at Wilson Aerodrome, Kenya Airforce Eastleigh and Nanyuki.

3.4.4 The Meteorological Officers stationed in Jomo Kenyatta Airport undertook a familiarization flight to Mombasa via Malindi through the courtesy of Kenya Airways.

3.4.5 Services to International and general Civil Aviation were provided by Regional Meteorological Centre for the East African Flight Information Region through the Area Control Centre in Nairobi and also by the NMC and the Moi Airport to aircrafts operating through those airports by means of flight documentations and trend type forecasts. The airport centres also collected post flight reports from various aircrafts operating through their respective centres.

3.4.6 The following is the summary of weather forecasts and reports returns from Jomo Kenyatta International Airport and Moi International Airport:

| | |
|---------------------------------------|--------|
| (a) Flight Forecast Folders EX-JKA | 12,736 |
| (b) Flight Forecast Folders EX-Wilson | 2,502 |
| (c) Foutine Forecast (ROFOR, QFA etc) | 5,888 |

| | |
|--|--------|
| (d) Miscellaneous Forecasts | 1,460 |
| (e) TREND type landing forecasts | 18,553 |
| (f) Aerodrome Forecasts JKA | 4,380 |
| (g) Aerodrome Forecasts Moi International Airport | 1,460 |
| (h) Aerodrome Forecasts Malindi | 730 |
| (i) Aerodrome Forecasts Kisumu | 730 |
| (j) Miscellaneous Forecasts/Enquiries, (Aviation) | 66 |
| (k) AIREPS collection during the period 1 March to 30 June 1979 | 410 |
| (l) Folders issued EX - MOMBASA | 704 |

3.4.7 The Moi Airport also supplied the following climatological data to various users in the Coast Province:

| | |
|--|-----|
| (a) Monthly rainfall | 132 |
| (b) Monthly Relative Humidity | 132 |
| (c) Monthly Maximum Temperature | 132 |
| (d) Monthly Minimum Temperature | 132 |
| (e) Total radiation figures for three months | |
| (f) Three monthly wind velocities - 6 months for 0600 and 1200 GMT. | |

3.5 Meteorological Service to Military Aviation

3.5.1 Full Meteorological Services for Military Aviation were maintained in Eastleigh and Nanyuki. As the staff situation improved, an extra Meteorological Officer was posted to Nanyuki and also more Meteorological Assistants were posted to Eastleigh and Nanyuki.

3.5.2 Radio Teletype equipment were installed at Nanyuki as a standby to landline circuits. This greatly improved the communications to Nanyuki.

3.5.3 The Senior Meteorological Officer, Eastleigh gave lectures in meteorology to cadets in the Flying Training School.

3.6 Meteorological Service to Shipping in Western Indian Ocean

3.6.1 The Regional Meteorological Centre kept constant watch on the weather in the Western Indian Ocean area of responsibility.

3.6.2 A Port Meteorological Office in Mombasa whose activities relate to liaison with ships captains and checking meteorological equipment on board the ships and advice on ships weather observations and collection did not function satisfactorily during this period. This was due to lack of transport, lack of interest in the meteorological work

by shipping personnel and the frequent changing of ownership of selected ships which are sold.

3.7 Meteorological Service to the General Public

3.7.1 The Regional Meteorological Centre, and Jomo Kenyatta International Airport Meteorological Office which operated as the National Meteorological Centre (NMC) provided services to the general public by way of public forecasts through the local press, radio, television and Automobile Association as can be seen from the following summary:

| | |
|---|-------|
| (a) Press forecasts | 365 |
| (b) Radio and TV forecasts | 1,095 |
| (c) Inquiries for local weather on forecast Mombasa | 26 |

3.7.2 Besides, special forecasts were issued by RMC, Press releases were issued on the onset of the "short rains" and the "long rains". Also on the unusual rains of January 1979, the weather during the Safari Rally and the Easter weekend. The section was complimented on the accuracy of these forecasts.

3.8 Regional Telecommunications Hub (RTH)

3.8.1 Regional Telecommunications Hub (RTH) Nairobi participated in WMO exercise during this period; namely FGGE which started in December 1978 and is expected to end in December 1979, AMBEX (AFI MET BULLETIN EXCHANGE) SCHEME from 30 March to 7 June 1979 and MONEX from 1 May to 31 August 1979. The section also participated in monitoring the operations of the World Weather Watch (WWW) exercise which was conducted between 1 to 15 June 1979.

3.8.2 The reception of the routine data from Kano and Cairo was very poor. The RTH Nairobi frequently intercepted the Jeddah Station to compensate for lack of the data from Cairo.

3.8.3 During the period the following surface and Upper Air Bulletins were received and transmitted from the Regional Telecommunications Hub, Nairobi.

| | |
|-----------|--------|
| (a) SYNOP | 24,623 |
| (b) TEMP | 6,888 |
| (c) PILOT | 10,608 |
| (d) SHIP | 3,648 |
| (e) AIREP | 96 |

3.9 Engineering

3.9.1 The Principal Engineering Technician (PET) actively participated in the meetings which were preparing for the WARC'79 conference. All the Engineering equipment the Department wanted to purchase were not approved by the end of the financial year.

3.9.2 The requisition of spare parts did not improve during this reporting period. This made the maintenance difficult to carry on.

3.9.3 *Transmitting Station*

The equipment for Nairobi - Kano circuit remained faulty throughout the period. Nairobi - Cairo circuit had some problems on the transmitter Drive Unit which had an intermittent fault thereby causing it to go on and off at times. A new drive unit was ordered and was not delivered by the end of the period under review. Other equipment worked well. The Nairobi - Addis-Ababa and Nairobi - Brazzaville circuits were installed. Aerial feeders for the above aerials had not been delivered by the end of the period under review.

3.9.4 Receiving Station and Engineering Base Workshop

Equipment serviceability was good. The maintenance work in the workshop progressed well. The Automatic Picture Transmission (APT) equipment did not function for the whole period because of lack of spares.

3.9.5 *Switching Centre*

The switching equipment worked satisfactorily. There was a shortage of teleprinter ribbons at the times but the problem was overcome. Few teleprinter machines were operational during the period as the centre missed spare parts. Air condition plant did not work satisfactorily. The centre experienced the problem of power supply whenever the East African Power and Lighting supply failed.

3.9.6 During the period under review, the section was visited by the following.

- (a) Mr. A. Foster of Racal who supplied the Racal Transmitter to the Department.
- (b) Mr. J. Howel of Novcom came to discuss with the Engineering Technician on Transmitting/Receiving Aerials.

- (c) The Rigging Contractors who installed the Nairobi-Addis-Ababa aeriels had discussions with the Principal Engineering Technicians and Engineer in-charge, Transmitting Centre.
- (d) Mr. S. Kay of Plessey visited the office to discuss training of our technicians.
- (e) Mr. John Sihra from Wublin and G.J. Mwathi of High Fidelity visited the office to see our Radio Link (UHF) equipment which they supplied to the Department.
- (f) Mr. Rick Payne of Racal Antennae visited the office to discuss the aerial which was supplied together with Racal Transmitter.
- (g) W.E. Satterthwaite of Muirehead equipment visited the office to discuss on the Muirehead equipment owned by the Department.
- (h) Mr. Brain Keebaugh of NOAA came to Meteorological Department to commission the equipment for Nairobi-Pretoria circuit.

4. General Services Division

4.1 General

The Division is responsible for natural resources activities of the Department which include climatology, Data Processing, Agrometeorology and Hydrometeorology and other geophysical sciences, e.g. Astronomy. In addition, Observatories, Instruments and Printing fall under this Division.

Seismological activities which used to be under the Division were moved to the Ministry of Natural Resources. The Division started co-ordinating the activities connected with the Solar Eclipse due on 16 February 1980. Further the Division worked with the Department of Energy and the Department of Engineering, University of Nairobi, in the field of energy, i.e. Hydro, Solar and Wind Energy.

4.2 Weather in Kenya During the Year

4.2.1 Central and Nairobi Provinces

The areas received normal to above normal rainfall for most of the year except during July, November and April. Temperatures were below normal during July, November and May while sunshine was

mainly below normal except in November and March. The air was mainly dry except during December to February and April when the afternoon relative humidity was above normal.

4.2.2 Coast Province

During the first four months of the year, this area received below normal rainfall but the remaining months varied from normal to above normal rainfall. Temperatures were above normal except during December and March when they were slightly below normal. The first four months (July to October) had normal sunshine while the remaining months had below normal sunshine hours. The air was drier than normal during the first four months of the year but normal to above normal relative humidity was recorded later during the year.

4.2.3 Eastern Province

Rainfall was above normal for most of the year except during August. Machakos and Kitui got less than normal rainfall during September while Marsabit got less than normal falls during May. Temperatures were slightly below normal to normal. Sunshine was below normal during the year. Relative humidities were generally normal.

4.2.4 North Eastern Province

The first half of the year was rather dry whereas the second half had above normal rainfall except during May when rainfall was poorly distributed over the area. Temperatures and sunshine were mainly normal although Garissa had below normal temperatures during January. Afternoon relative humidity was normal to above normal except during August, September and March when the air was drier than normal.

4.2.5 Nyanza and Western Provinces

This area had normal to above normal rainfall except during the months of July, November and May when it got below average rainfall. Air temperatures were generally normal except during October and March when the temperatures were slightly below normal. Kisumu recorded below normal temperatures during November and December. The relative humidity was mainly normal except during March and April when the year was drier than normal.

4.2.6 *Rift Valley Province*

During the first half of the year, **Central Rift Valley** received normal to above normal rainfall. while the **remaining areas** had below normal rainfall. In the remaining months rainfall was above normal except for April which received less than normal rainfall. Temperature were generally normal. Kitale recorded 1.1°C above normal during July. Sunshine and Relative humidity were mainly normal to slightly above normal throughout the year.

4.2.7 See the attached map showing 1978/1979 rainfall total expressed as percentage of long term annual average rainfall.

4.3 **Agrometeorology and Agromet Observations**

4.3.1 *General*

4.3.1.1 During the latter part of the period under review, a few planned targets were realised. On the whole however, little was achieved by way of implementing development projects approved for the financial year.

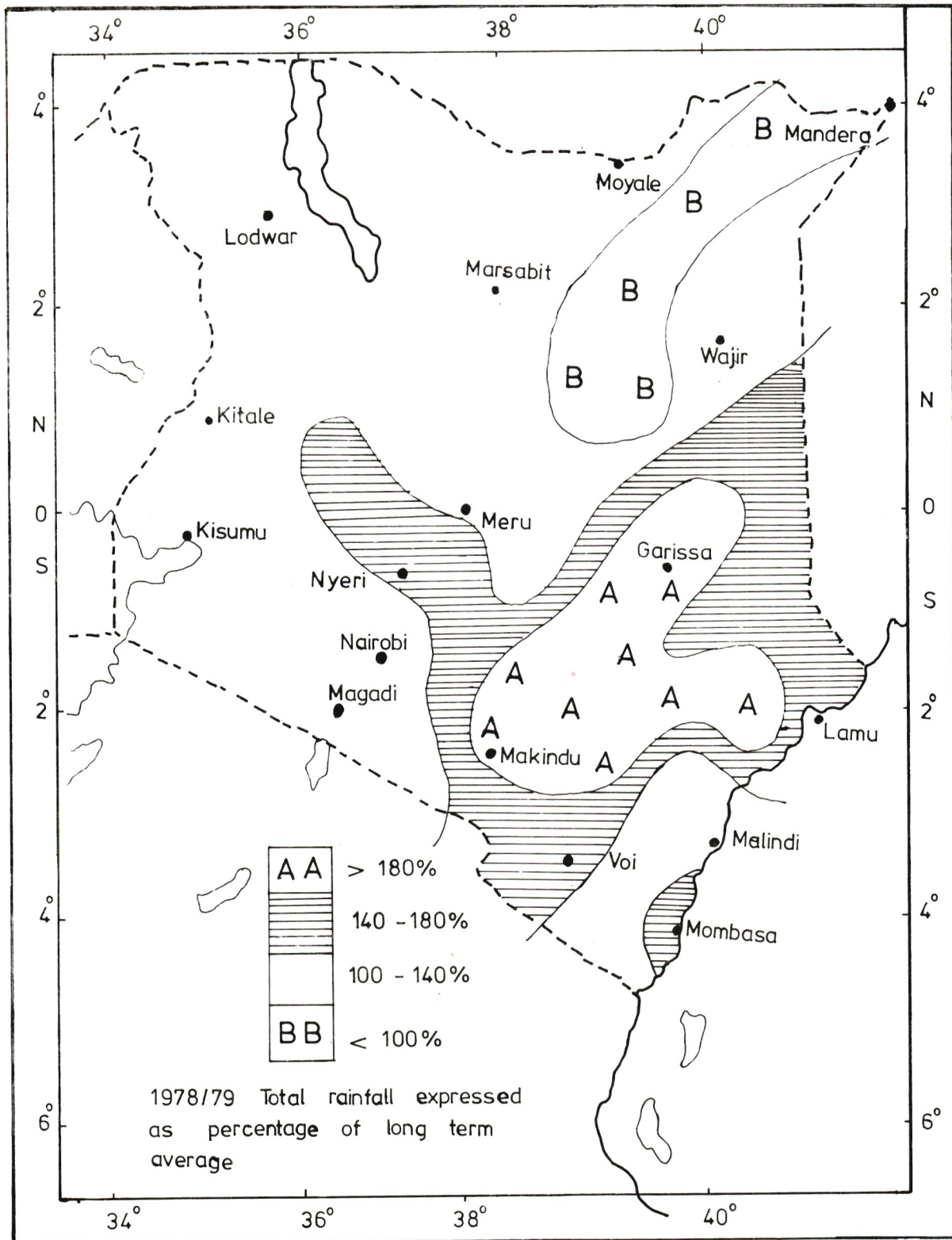
4.3.1.2 Two agrometeorologists continued assisting in the instruction of students of Course 5A and the Basic Course at the Institute until towards the end of the reporting period. Mr.Kahinga continued in the organization and preparations for the Departments' participation in the ASK shows at Mombasa and Nairobi.

4.3.1.3 Information and data was issued by the Department on ad hoc basis, to **researchers** from University of Nairobi, Muguga, Food and Agriculture Organization (FAO), United Nations Development Programme (UNDP) and others. Most of it was phenological, Soil moisture and crop yields.

4.3.1.4 Mr. Kahinga from the section attended and international workshop on agroclimatology at ICRISAT, India, held from 22-24 November 1979. The workshop was organized under the auspices of ICRISAT. He was sponsored by ICRISAT.

4.3.2 *Maintenance of Station Network*

In general most stations carried out their routine observations satisfactorily and were in good state. Early in the period Messrs Matheka and Gago made visits to Thika, Embu, Nyeri, Nanyuki, Meru, Nyahururu and Kakamega. These stations were later inspected by the Principal Meteorologist Observatories (PMB) and the Networks officer. A number of administrative, residential and office



accommodation problems were ironed out during these visits. The period also saw the cessation of observations at practically all the part-time grade "B" agromet stations. This was caused by officers failing to take the observations after the Department withdrew the allowances, which it was paying to such observers.

4.3.3 Development of Station Network

Two grade "A" agromet stations, namely, Kakamega and Msabaha were implemented during the period under review. During this period two members of staff from the section mounted countrywide surveys of possible suitable sites for future development as agrometeorological stations. The surveys were partly in response to an appeal by the Director of Research (Agriculture) to the Department and partly an attempt on the part of the Department to fulfil our aspirations expressed in the current Kenya Development Plan 1979/83.

4.3.4 Routine Publications

No new publications were launched during the period. However, publication of the monthly "Farming Weather" and the weekly Weather Review continued to improve particularly with the inclusion of tables and maps of estimates of soil moisture conditions at various stations. The circulation of the bulletins expanded considerably. As at the end of the period, circulation for the Farming Weather stood at 235 copies compared to 192 copies for the last period. Circulation of the Weekly Weather Review expanded from the last period's figure of 100 copies to the current 235 copies. Some of the new customers included members of international agencies as UNDP, USAID and FAO.

4.3.5 Research/Investigations

Three areas of agrometeorology were being researched on — namely crop/weather relationships, soil moisture status and budgets; the occurrence of peak armyworm months in Kenya in relation to low level wind-field. Apart from work on armyworm little progress was made in the other two fields. This was attributed to shortage of Meteorological Assistants in the Department which led to a situation where the investigating officers were often called upon to extract their own raw data e.t.c. Appreciably progress was made in conjunction with research scientists from the centre for Overseas Pests Research in London. While tentative results have surfaced pointing to the possible association of peak moth catches with various weather trends, the project will continue before any conclusive statements can be made.

4.4 Hydrometeorology

4.4.1 General

4.4.1.1 This section continued to work closely with the Water Department and the Hydromet Survey Project of Lake Victoria. The Director of Kenya Meteorological Department continued to play his role as a co-opted non voting member of the Technical Committee of the Hydromet Survey Project. The Department continued its membership in the Kenya Standing (Technical) Research Committee for International Hydrological Programme (IHP). Messers A.L. Alusa, S.J.M. Njoroge and J.H. Kinuthia represented the Department in the Technical meetings during the period.

4.4.1.2 The instructors from the East African Institute for Meteorological Training and Research (EAIMTR) assisted in the critical evaluation of a Technical Report bearing the title "Some aspects of Measurement and Distribution of Precipitation over Lake Victoria" prepared by one of the Meteorologists attached to Hydromet Survey Project.

4.4.1.3 Mr. P.D. Muna, a Meteorologist, attended an International Post Graduate Course in hydrology held in Budapest-Hungary. This course was organized by VITUKI and was sponsored by UNESCO.

4.4.2 Hydrometeorological Network

4.4.2.1 In order that a hydrometeorological network could run efficiently the Department has continued to station Mr. Obewa, **A Meteorological Superintendent**, at Kisumu to supervise the Hydrometeorological network.

4.4.2.2 The following hydrometeorological network was maintained. Climatological stations in Kitale, Eldoret, Kisii, Kericho and Kisumu. About five hundred rainfall stations in Kenya side of the project were maintained. Mr. Obewa also inspected the following stations which are under Water Department: Mosoch, Muhuru Bay, Keekorok, Rusinga, Bungoma and Kadenge.

4.4.3 Climatological forms

4.4.3.1 The climatological returns of daily observations on Form HMS-1 from project area were received and processed.

4.4.3.2 A total of about 800 forms (HMS No. 1) were printed by the Departmental printing section for the Hydrometeorological Survey. The Department also supplied the Hydromet Survey Project with ten packets of muslin cloth and wick, charts 3311/1-3 packets, forms 601 and 602-30 packets and piche filter paper one packet.

4.5 Climatology and Data Processing

4.5.1 General

The climatological section collected Meteorological data from rainfall stations most of which are voluntary observing stations, agromet stations, temperature stations and synoptic stations which are manned by the Departmental staff. The data received was checked and any careless errors corrected. Rainfall and agromet data was copied on forms for punching and storage on computer magnetic tapes. Charts were stored permanently on microfilms. Gunn Bellani instruments were calibrated during the year.

4.5.2 Data Processing

4.5.2.1 Mr. E. Nyoni, Ag. Assistant Director, General Services resigned from the Department and took up a WMO post in Malawi. He was the most experienced officer in Data Processing and his resignation was a blow to the Division. However, shortly after his departure Mr. Wanderi had returned from Lagos where he underwent a post-graduate course in computer science, and Mr. Masika had been trained by Mr. Nyoni before his departure. The situation is gradually improving.

4.5.2.2 All 1978 radio-sonde, synoptic and pilot balloon data were key edited and correction of agromet Key edited data was done.

4.5.2.3 Numerous requests from users of data stored in magnetic tapes were received. Among them were Hydromet Survey Project, Tana River Development Authority, Ministry of Agriculture and Water Development.

4.5.2.4 During this period some delays were experienced mainly due to the installation of the new ICL 2950 at the University of Nairobi and also due to one key edit station being out of order for six months. After the computer at the University was changed, we had to convert our units to handle nine tracks instead of the present Seven tracks. The University held orientation seminars and courses for all users of the new ICL 2950.

4.5.2.5 The computer of the Customs Department at Mombasa stopped operating during this period and we withdrew all cards that were supposed to be processed in Mombasa.

4.6 Training Activities

4.6.1 Within the Department, we have local and overseas training. The Institute handles all the training carried out in the Institute itself

while the General Services Division co-ordinates all training outside the Institute both local and overseas.

- (a) One meteorologist, Mr. Wanderi, returned from a nine months post-graduate course at the University of Lagos, Nigeria, under the OAU scholarship.
- (b) One meteorologist, Mr. P.D. Munah attended a six months post-graduate course in Hydrometeorology in Budapest, Hungary, under the WMO Voluntary Co-operation Programme (VCP) scholarship.
- (c) One Engineer, Mr. P.M. Kimotho returned from Canada where he successfully completed an under-graduate course in Telecommunications Engineering.
- (d) Fifteen B.Sc. graduates were sponsored for post-graduate diploma course in meteorology at the University of Nairobi. Only five completed the course, the others having resigned to go to other organizations.
- (e) Nine Instruments Assistants completed their first year in a diploma course at the Kenya Polytechnic.
- (f) Two Meteorologists were sponsored for Masters degree in meteorology in the University of Nairobi.
- (g) Nine Communications Assistants and two Assistant Communications officers were sponsored for a training at the school of Aviation.
- (h) Six Engineering Technicians trained overseas on some meteorological equipment.
- (i) Nine Assistant Engineering Technicians started one year Telecommunications course at Kenya Polytechnic.
- (j) Nine Instruments officers trainees continued their course in Kenya Polytechnic.
- (k) One Meteorological officer attended a French course at Kenya Institute of Administration from February to June.

4.7 Observatories

4.7.1 General

During the early part of this reporting period the Principal Meteorologist Observatory (PMB) accompanied by the Instruments Assistants inspected the National Station Network. These visits were

followed after by the visits by the Network officers who delivered the consumables to the stations. These combined visits and follow ups have helped to improve the observations tremendously. The meteorological instruments have continuously been repaired at the stations. This has enabled us to have continuous data.

4.7.2 *Synoptic Stations*

4.7.2.1 During the reporting period the synoptic station network remained the same. No new station was opened and no station was upgraded. The routine synoptic observations were remarkably improved. Most stations received quite high ascents.

4.7.2.2 The National Meteorological Station Network comprises of the following Observatories:

| 24-Hour Station | 21-Hour Station | 18-Hour Station | 12-Hour Station |
|-------------------------------------|------------------------|------------------------|------------------------|
| Jomo Kenyatta International Airport | Meru | Voi | Nyeri |
| Moi International Airport | Nakuru | Makindu | Moyale |
| Malindi Airport | | Narok | Thika |
| Kisumu Airport | | Lodwar | Machakos |
| Kitale | | Mandera | Kisii |
| | | Marsabit | Nyahururu |
| | | Embu | Kabete |
| | | Wajir | Msabaha |
| | | Lamu | |
| | | Eldoret | |
| | | Wilson Airport | |
| | | Garissa | |

4.7.2.3 Some of the above mentioned stations operate as both agromet and synoptic stations. There are Meru, Embu, Nyeri, Thika, Machakos, Nyahururu and Kabete.

4.7.2.4 The Department also operates one part-time station, Magadi.

4.7.3 *Upper Air Observations including Pilot Balloon Ascents*

4.7.3.1 The Department maintained the three radio-sonde stations, namely Nairobi Dagoretti, Garissa and Kericho. Out of the three, only Dagoretti radio-sonde was fully operational. There were two ascents

made daily, one for 0000 GMT and the second one for 1200 GMT. Kericho did one ascent daily for 0600 GMT. The Dagoretti Upper Air Unit maintained its standard of daily upper air reports during this period. There were no intensive or research ascents done. However, our routine ascents were done at 1100 GMT and at 2300 GMT daily. There were 751 ascents done and the highest level reached was 006 mb in June 1979 and the lowest level was 240 mb in May 1979.

4.7.3.2 Wind speed and direction was obtained by the use of an optical theodolite. The Garissa radio-sonde was on and off most of the time. Pilot Balloon ascents were done whenever the weather conditions allowed. The Garissa Upper Air Unit continued to experience problems mainly equipment breakdown and shortage of consumables. Technicians based in Nairobi were unable to maintain the equipment properly, especially WF3 Radar and hydrogen generator. This was due to shortage of technicians. The operational wing which is badly cracked and considered dangerous to staff and equipment was not repaired although the Planning section kept on writing to the Ministry of Works on this problem.

4.7.3.3 Two more stations started doing pilot balloon ascents during this period. These are Marsabit and Garissa. There were fifteen stations which performed pilot balloon observations

The following is a table showing the number of ascents done by each station during the period:

| Station | Number Possible | Number Made | % | Number above 150,000 | % | Highest | Date |
|----------|-----------------|-------------|----|----------------------|----|---------|----------|
| Nakuru | 730 | 578 | 79 | 449 | 78 | 69,141 | 22-9-79 |
| Kisumu | 730 | 443 | 61 | 231 | 52 | 51,769 | 25-4-79 |
| Makindu | 730 | 385 | 53 | 42 | 11 | 28,280 | 18-10-78 |
| Garissa | 730 | 372 | 51 | 107 | 29 | 54,982 | 16-3-79 |
| Mombasa | 730 | 347 | 48 | 55 | 16 | 47,186 | 17-7-78 |
| Kitale | 730 | 317 | 43 | 222 | 70 | 69,700 | 29-10-78 |
| Narok | 730 | 246 | 34 | 209 | 90 | 55,700 | 3-11-78 |
| Mandera | 730 | 213 | 29 | 88 | 41 | 50,255 | 28-1-79 |
| Voi | 730 | 198 | 27 | 36 | 18 | 31,890 | 12-7-78 |
| Meru | 739 | 1801 | 25 | 97 | 54 | 36,100 | 27-1-78 |
| Lodwar | 730 | 170 | 23 | 58 | 34 | 42,190 | 26-9-78 |
| Malindi | 730 | 153 | 21 | 42 | 28 | 42,070 | 29-10-78 |
| Marsabit | 670 | 92 | 12 | 50 | 54 | 55,913 | 3-6-79 |
| Wajir | 730 | 66 | 9 | 27 | 40 | 30,800 | 26-9-78 |
| Embu | 730 | 55 | 8 | 18 | 33 | 22,400 | 23-3-79 |

4.7.4 Rainfall Observations and Inspection

During this period three inspections were made. The rainfall inspectors during these three safaris inspected three hundred rainfall stations. In the early part of this period, the rain gauges were not available and the measuring glasses were very few.

4.8 Services to the Public including enquiries and show

4.8.1 Climatological enquiries came from Government Departments, Schools, building contractors, industries and the general public both local and overseas. The enquiries came by letters, by telephone and others by people visiting the Department. Altogether the enquiries were about 220 during the year.

4.8.2 The Department participated in the Nairobi International show 1978 under the Ministry of Power and Communications.

4.9 Instruments Section

4.9.1 General

In this reporting period the section was involved in several activities both inside and outside the workshop. The instruments which were received in the workshop from outstations were immediately repaired and released to the stations. Those instruments which required calibration were also calibrated and sent to the stations. One of the instrument officers, Mr. Akaki worked on electronic instruments throughout the period in the workshop and helped maintain the WF3 radars both at Headquarters and Garissa. Four thermohygrographs were calibrated for ICIPE and medical research. Three clocks belonging to Hydromet were repaired. Maximum, minimum and soil thermometers were also checked. A hot wire anemometer for Institute was repaired. The Integrator and rain samples were also repaired. The section also participated in the preparation of the Department Show Stand.

4.9.2 Instrument Inspection Visits

4.9.2.1 Several visits were made to Garissa Meteorological Station to repair the WF3 radar. It was packing up soon after the faults were rectified.

4.9.2.2 Nanyuki Airforce Base was visited several times during this reporting period. The Instruments Assistants repaired the recorders during these visits. Some of the spare parts for these recorders were ordered but by the end of the year they have not been received.

4.9.2 The instruments for Lodwar Meteorological station were transferred from their previous site to the new compound.

4.9.2.4 The Senior Instruments Officer travelled to Mombasa to check Anemometer bases preparation and cabling work which was being done by Aerodromes Department. He also attended a site meeting held in Mombasa Airport. The purpose of this meeting was to confirm with the Directorate of Civil Aviation whether or not they would be utilizing wind system at the new control tower. Several other visits were made to Mombasa by the staff from Instrument section as a follow up.

4.9.2.5 One Instrument Assistant at a time accompanied the Principal Meteorologist Observatory during his inspection visits. The instrument assistants repaired the instruments on site. It was quite a difficult exercise as most of the instruments were out of order and the visits were done almost continuously. But they were quite a success. Three trips were undertaken. The first one covered Thika, Embu, Nyeri, Nanyuki, Meru, Marsabit, Wajir, Garissa, Moyale and Mandera. The second one covered Katumani, Makindu, Voi, Mombasa, Malindi, Msabaha and Lamu. Lamu Station had not been visited for a long time and new instruments had to be installed. These included Dines Raingauge and thermohygrograph. The third covered Eldoret, Kitale, Lodwar, Kakamega, Kisumu, Kisii, Kericho, Narok, Nakuru and Nyahururu.

4.9.2.6 The Instrument Assistants put up instrument enclosure and instruments for the two new Agromet Station namely Kakamega and Msabaha. They also installed a station for the Awendo Sugar Company in South Nyanza.

4.10 Printing Section

4.10.1 The printing section of the Kenya Meteorological Department is responsible for printing operational forms and publishing meteorological memoirs, pamphlets, agrometeorological data, summary of rainfall, weather of Kenya, monthly farming weather bulletins and other documents connected with meteorology. It has a staff of fourteen printing assistants and four auxilliary staff.

4.10.2 During the year under review different types of publications and forms were printed as follows:

| | |
|-----------------|--------------|
| (a) Form No. 6a | 2,630 copies |
| (b) Form No. 10 | 8,000 copies |

| | |
|-------------------|---------------|
| (c) Form No. 42 | 14,000 copies |
| (d) Form No. 92 | 16,000 copies |
| (e) Form No. 114 | 8,000 copies |
| (f) Form No. 291 | 10,000 copies |
| (g) Form No. 631 | 14,000 copies |
| (h) Form No. 639a | 8,000 copies |
| (i) Form No. 646 | 9,000 copies |
| (j) Form No. 666 | 7,000 copies |

4.10.3 The section also printed research reports No. 2/79 and No.3/79. About 1,000,000 sheets of paper were used. It also undertook to print many different forms for the Hydrometeorological Survey of Lakes Victoria, Kyoga and Mobutu Sese Seko.

4.10.4 During the period under review, 185 books were bound.

4.10.5 The smooth operation of this section was hampered by lack of staff and the fact that most equipment are quite old.

5. East African Institute for Meteorological Training and Research

5.1 Administrative and Support Services

5.1.1 Staff Matters

5.1.1.1 Performance of work at the Institute Hostel was greatly improved when three cooks were employed in January. Hitherto, cooks at the Hostel had been working under great strain, most of the times not getting their off duties. Under the ten per cent recruitment drive, two cooks, one boiler attendant and eight subordinate staff were employed. Cleanliness both at the Hostel and teaching blocks has improved appreciably.

5.1.1.2 Students of Strathmore College who were being accommodated at the Hostel were asked to vacate their rooms by the end of December to give room to Institute trainees enrolled for the academic year 1979. During the reporting period, the numbers of residents at the Hostel ranged from 80 to 118.

5.1.1.3 Most of the Institute staff took their leave in December and January. During the second half of the reporting period, a leave roster was prepared and was working well.

5.1.2 Vehicles seconded to the Institute by WMO

A landcruiser, registration number 40UN 368K was returned to the UNDP in unroadworthy condition following a road accident. The

Institute continued to use the other two vehicles — a toyota station wagon and a bus, registration numbers 40UN 310K and 40UN 186K respectively. For most of the reporting period, the bus was not used as it had problems; the arrangements for repair took unnecessarily too long to finalise. This caused the trainees of Course B. 39 to go on their training tours to Egerton College, KARI, Wambugu Farmers Training Centre and Katumani Agricultural Research Station by lorry.

5.1.3 *New Government Identity Cards*

A Government identity card team was invited to issue new identity cards to all Meteorological Department staff working at Dagoretti Corner. Other persons from the staff village and the surrounding area were issued with the identity cards in the Department too.

5.1.4 *Accounts and the Store*

During the period under review, the revenue collected at the Institute was as follows:

| | | |
|---|------|------------|
| (i) Hostel charges | Ksh. | 408,001.35 |
| (ii) Tuition fees | Ksh. | 142,477.00 |
| (iii) Sale of meals | Ksh. | 11,111.00 |
| (iv) Sale of Departmental publications by Library | Ksh. | 7,400.00 |

5.2 **General Services**

5.2.1 *Library Services*

5.2.1.1 The Kenya Meteorological Department Library provides a comprehensive coverage of the literature of meteorology and allied subjects. It caters mainly for the staff of the Department, researchers and pupil meteorologists, but is also accessible to the professional users outside the Department such as engineers.

5.2.1.2 During the period under review, the Department sponsored three senior members of staff including the Librarian and the senior Library Assistant to attend the third International Standing conference of Eastern and Central and Southern African Librarians which was held at the Kenya Science Teachers College. The theme of the conference was "The Development of Information System - An African Approach."

5.2.1.3 This gesture by the Department showed how much interest it attaches to the library profession.

5.2.1.4 The library shelving for the new reference library was received and fitted and the section is now fully operational.

5.2.1.5 A huge consignment of documents from the International Civil Aviation Organization and the World Meteorological Organization was received, processed and despatched to outstations, viz. Jomo Kenyatta Airport, Eastleigh, Mombasa and Nanyuki. The library now holds and maintains an up-to-date and comprehensive list of these documents in those stations.

5.2.1.6 The Departmental publications continued to be of great demand by institutions, industrial and commercial interests, researchers and private individuals. The demand was in fact highlighted during the last Agricultural Show at Jamhuri Park, Nairobi, where a number of publications were displayed at the Department's stand.

5.2.1.7 The British Council Books Co-ordinating Committee recommended and approved that a presentation be made to our library to the value of £3,000 (i.e. £2,800 for books, £100 for journals spread over two years and £100 for British Library Photocopy Coupons). The Librarian had finalised the orders and the books were expected to arrive in the following financial years.

5.2.1.8 The Librarian attended a seminar at the Kenya National Library Service Headquarters. The participants who were mainly senior cataloguers were introduced to the new edition of the Anglo-American cataloguing Rules. The seminar was organized by the British Council in conjunction with the Kenya Library Association. The Director of the seminar, Mr. Hamilton from the United Kingdom had an opportunity to visit our library.

5.2.2 *Library Statistics.*

New books accessioned - 1,600,

Departmental publications issued - 1,050.

Value of Departmental publications distributed and sold - see 5.1.4 above.

5.2.3 Departmental Publications issued in the year 1978/79

5.2.3.1 Periodical Publications

- (i) Issued weekly — Rainfall at selected stations in East Africa
- (ii) Issued monthly — Farming weather
- (iii) Issued Annually — The weather of East Africa during the year 1974

Meteorological data recorded at Agricultural hydrological and synoptic stations in Tanzania during the year 1974.

5.2.3.2 *New Departmental Publications received*

- (i) *Research Report No. 4/78* *Is temperature maximum or minimum at the Equator? - By G.C. Asnani and D.N. Wambura, August 1978.*
- (ii) *Research Report No. 5/78* *Rainfall in Africa - by Laban Ogallo, September 1978.*
- (iii) *Research Report No. 1/79* *Some aspects of the seasonal feature of the Southern Hemisphere Subtropical jet stream - by J.K. Patnaik, P.M.R. Kiangi and J.K. Nganga, January, 1978*
- (iv) *Research Report No. 2/79* *Strong westerlies over Nairobi in the upper troposphere - by T.S. Chaggar, April 1979.*
- (v) *Research Report No. 3/79* *Stationary barotropic induced flow over tropical belt - by F.H.M. Semazzi, May 1979.*
- (vi) *Pamphlet series No. 9* *Total solar eclipse - February 16, 1980 - By Kenya Meteorological Department, May 1979.*

5.3 **Training Activities**

5.3.1 It was stated in 1977/78 annual report that acquiring text books for trainees was rather difficult. This situation has not improved yet. A limited supply of text books on meteorology was available at the University of Nairobi bookshop. But only non-Kenyan trainees were able to buy these books. According to the office of the Director of Personnel Management, there is no provision for text books allowance for Kenyan trainees at our Institute.

Table 5.3.2. Detailed summary of Courses held within the period covered by the report

| Country Course & Duration | Kenya | Uganda | Tanzania | Malawi | Zambia | Botswana | Lesotho | Seychelles | Gambia | Ethiopia | Somalia | Nepal | Total | Successful Trainees |
|--|-------|--------|----------|--------|--------|----------|---------|------------|--------|----------|---------|-------|---------------------|--|
| W M O Class II Course No 14 17.1.77 to 22.12.78 | 1 | | 7 | 4 | 2 | | | | | | | | ^{*1} 14 | 12 |
| W M O Class II Course No 15 8.1.79 to 12.12.80 | | | 4 | 2 | 3 | 6 | 2 | 3 | | | | | 20 | Continuing |
| W M O Class II Course No 16 16.1.78 to 14.12.79 | 4 | 3 | 3 | | 2 | | 1 | 3 | | 5 | 1 | | ^{*2} 22 | Continuing |
| W M O Class III Course No 1 8.1.79 to 7.9.79 | 15 | | | | | | | | | | | | 15 | Continuing |
| W M O Class IV Course B 38 29.5.78 to 22.9.79 | 8 | 14 | | | | 6 | 1 | 2 | | | | | 31 | 31 |
| W M O Class IV Course B 39 8.1.79 to 4.5.79 | 30 | 9 | | | | | | | | | | | ^{*3} 39 | 31 |
| W M O Class IV Course B 40 29.6.79 to 5.10.79 | 34 | | 10 | | | | | | | | | | 44 | Continuing |
| Refresher Course No 8 9.10.78 to 15.12.78 | 19 | | | | | | | | | | | | 19 | All Awarded Certificates of Attendance |
| Specialized Course Agromet No A 3 16.1.78 to 13.7.78 | | | | | | | | | 2 | 2 | | | 4 | 4 |
| Specialized Course Agromet No A 4 8.1.79 to 6.7.79 | | | | 2 | | | | | | | | 1 | 3 | Continuing |
| Operational Training Course No 8 5.7.78 to 22.1.79 | 4 | 3 | 1 | | | | | | | | | | ^{*4} 8 | 6 |
| Advance Forecasters Course No 6 8.1.79 to 22.1.79 | | 2 | 3 | | | | | | | | | | 5 | 5 |

* 1 One Tanzanian left before completing the Course * 3 Four Kenyans left before completing the Course

* 2 Two Kenyans left before completing the Course * 4 Two Kenyans left before completing the Course

5.3.2 During the period under review, a number of training courses ended, others continued and new ones were started. All these professional courses are shown in table 5.3.2.

5.3.3 The Institute offered service courses in meteorology to Air Traffic Controllers and Telecommunications trainees from the East African School of Aviation and to trainees of the Staff Training School of the Ministry of Water Development.

5.3.4 Other courses/seminars in which the Institute was not directly involved were held at the Institute. In September, the Institute gave facilities to the International Atomic Energy Agency to hold a one week seminar. The host for this seminar was the Ministry of Water Development. A number of delegates to this seminar were accommodated in the Institute Hostel. From the middle of May to the end of June, facilities were extended to a training course for Senior Clerical Officials from the Ministry of Power and Communications.

5.3.5 Mr. J.K. Njihia attended a “**Regional Training Seminar for National Meteorological Instructors**” in Cairo from 4 to 14 December and Mr. K. Owuor attended a Management Development Course at KIA from 7 May to 8 June.

5.4 Research Activities

5.4.1 During the period under review, meteorologists in the Department were engaged in a wide range of activities. Completed research findings were published as Departmental Publications (see 5.2.3). These publications included contributions from the Department of Meteorology, University of Nairobi.

5.4.2 The following research projects were completed and were awaiting publications:

- (i) The Nairobi Heat Island — by R.E. Okoola.
- (ii) Graphical methods for forecasting minimum temperature at Jomo Kenyatta Airport — by M.N. Mwebesa.
- (iii) **Vertical** Profiles of horizontal divergence over Nairobi area, Kenya by R.E. Okoola.
- (iv) The relationship between plant density, global radiation and yield of maize crop — by J. Kagia Njihia.

- (v) Measurements of diffuse solar radiation at Dagoretti Corner, Nairobi — by P.A. Mwingira.

5.4.3 The following research projects were still going on and the progress was good by the end of the period under review:

- (i) Diurnal variation of precipitation in East Africa by G.C. Asnani and J.H. Kinuthia. This paper was nearing completion by the end of the period under review.
- (ii) Net radiation over a banana field in Mombasa and its relation to global radiation by P.A. Mwingira. This paper was nearing completion by the end of June.
- (iii) Development of numerical weather prediction models for East Africa by D. Wambura and N. Pyuzza.
- (iv) Analysis of pentad rainfall for agricultural purposes in Kenya by S.B. Otengi.
- (v) Diurnal and seasonal variation of precipitation in East Africa by A.W. Majugu.
- (vi) Atmospheric turbidity over Kenya by P.A. Mwingira
- (vii) A study of the water and energy balance for particular crops by P. Olunga.
- (viii) Tropospheric wave disturbances in East Africa by L.N. Njau.
- (ix) Diagnostic mesoscale study of Lake Victoria by G. Obua.

5.4.4 During this period, three seminars were held at the Institute.

These were on:

- (i) Diurnal variation of precipitation in East Africa. The seminar was given in October by Prof. G.C. Asnani of the Department of Meteorology, University of Nairobi.
- (ii) Research on crop water use and drought response in East Africa. This seminar was given in February by Dr. Ian Stewart, an agrometeorologist with USAID/KARI Project, Muguga.
- (iii) An overview of the ICL 2950 computer. This Seminar

was given in May by the Director, Institute for Computer Science, University of Nairobi. This computer had just been installed and tested at the Institute for computer science. It had attracted wide interest due to its ability to handle research calculations which the existing one could not handle.

5.5 Mt. Kenya Pollution Station — Bridging Operation Phase

5.5.1 It is now a year since the final presentation of Mt. Kenya Project feasibility study report. Mt. Kenya project has continued to exist under Bridging Operation Phase as recommended in the last meeting of Scientific Advisory Working Group (SAWG) which took place at Kenyatta Conference Centre between 27 and 30 June 1978.

5.5.2 The purpose of the Bridging Operation Phase is to maintain in minimum programme consisting of the following:

- (i) Observations from an Automatic Weather Station at Timau Hill site on Mt. Kenya.
- (ii) Measurements of condensation nuclei (CN) concentrations by means of a Portable Gardner CN Counter conducted at Timau Hill site.
- (iii) Observations of precipitation for precipitation chemistry at Meru Meteorological Station, a selected site near Timau Hill.

5.5.3 The implementation of decisions passed during the last meeting of SAWG, started immediately and on 27 September 1978, an automatic Weather Station was installed at Timau Hill site, the selected site for establishment of Mt. Kenya Baseline Station for Background Air Pollution Monitoring Network (BAPMON) for climatic change.

5.5.4 The Bridging Operation is being carried out under full financial support from the Meteorological Department, Messrs L.N. Njau, a meteorologist (co-ordinator) and P. Kahutu, an instrument officer, have been maintaining the Bridging Operation activities by hiring services of porters/mountain guides from Naro Moru Settlement Scheme and hiring equipment from Naro Moru River Lodge.

5.5.5 The trips to Timau Hill on Mt. Kenya involved a multiple number of problems. The tracks are most of the times impassable after heavy rains. Some parts of tracks are rocky and very steep, creating a

threat to human lives. Two incidents have been encountered on these rocky bends, but with neither a catastrophe on human lives nor damage on the vehicle. Drivers with enough experience in the mountain tracks have been our emphasis, but experience has proved that very few of these drivers wish to make a second trip up the mountain. Referring to the hiring of equipment at the Lodge, the charges have been raised to exorbitant rates and we may be forced in the near future, to buy our own equipment. However, the activities of the Project have continued steadily under these difficulties.

6. Administrative, Planning, Finance and Supply

6.1 Staff Administration

6.1.1 Following the transfer of the Department to the Kenya Civil Service the post of Administrative Officer (Principal Assistant Secretary) which existed in the East African Meteorological Department was abolished and a post of Senior Executive Officer, which was later created, remained vacant. Because of this shortage of Administrative staff, Mr. E.G. Njoroge, Principal Meteorological Officer was called upon to perform administrative duties in addition to his technical schedule. He performed these duties throughout this period.

6.1.2 Eleven officers of different cadres retired on attaining the age of fifty five years. One Meteorological Supervisor voluntarily retired after attaining the age of fifty years while one Meteorological Assistant was retired in the Public interest and another on medical grounds.

6.1.3 Professional and technical personnel continued to resign to take up better paid jobs in the private sector and the parastatals. This adversely affected the work of scientific and technical sections. A total of 104 officers deserted office or resigned. One of our Cooks, Mr. M. Libwoni, died in July 1978 following a short illness.

6.1.4 The Public Service Commission of Kenya appointed a Security Officer in October and an Electrician in January. In addition the Department recruited thirty Meteorological Assistants, fifteen Communication Assistants, seven Engineering Assistants and three Instrument Assistants in January 1979.

6.1.5 The Department was allocated sixty one posts under the 10% staff increase as ordered by the President of Kenya. Out of these, two were artisans, nineteen semi-skilled and forty subordinate staff. The

new staff was distributed to various meteorological stations within the country after which the staff situation in the semi-skilled and subordinate cadres improved considerably.

6.1.6 *New Government Identity Cards*

A Government Identity Card team was invited to issue new Identity cards to all meteorological staff working at Departmental Headquarters, Dagoretti Corner, Nairobi. Many other persons from Meteorological Village and the surrounding area were issued with identity cards too.

6.2 **Accounting Services**

6.2.1 The Meteorological Department has three main accounts as follows:

- (i) Personal Emoluments including House Allowance. This account is controlled by the Permanent Secretary.
- (ii) Other Charges. This account is controlled by the Director.
- (iii) Development Expenditure. This account is controlled by the Permanent Secretary.

6.2.2 The position of the three accounts as at 30 June 1979 is summarised in the following paragraphs.

6.2.3 Personal Emoluments including House Allowance.

| | |
|------------------------------|--------------------------|
| Total amount authorised | sh. 18,406,920.00 |
| Total Expenditure | <u>sh. 15,651,935.00</u> |
| Balance unspent (over-spent) | sh. 2,754,984.00 |

6.2.4 Other Charges

| | |
|------------------------------|--------------------------|
| Total amount authorised | sh. 16,127,540.00 |
| Total Expenditure | <u>sh. 11,887,848.90</u> |
| Balance unspent (over-spent) | sh. 4,239,691.10 |

6.2.5 Development Expenditure.

| | |
|------------------------------|-------------------------|
| Total amount authorised | sh. 34,295,000.00 |
| Total Expenditure | <u>sh. 2,051,952.55</u> |
| Balance unspent (over-spent) | sh. 32,243,047.45 |

6.2.6 *Training*

During the year three Accounts Clerks Messrs Karan, Okuome and Wangugi attended a two months course organized by the Ministry of Power and Communications at the Meteorological Institute. Another clerk (Mr. Omollo) went to the Government Training Institute, Mombasa for a six months course in accounts. Another clerk (Mr. Obuoyo) was selected for a five months training course in Accounts at Government Training Institute, Maseno. This training has greatly improved accounting services in the Department.

6.3 **Planning and Development**

6.3.1 *Staff Housing at the Headquarters*

Construction of intermediate blocks of flats to house thirty six families at the cost of sh. 8,500,000.00 had commenced towards the end of the period under review.

6.3.2 *Extension to Printing Workshops and Offices*

This project estimated to cost sh. 5,800,000.00 was to be tendered during this period under review.

6.3.3 *Extension to Headquarters Operational Wing*

The contract of the first Contractor having been determined a second Contractor was employed to complete the undone work, which he did to the satisfaction of the Department. This Contractor did not provide a switch to fire fighting tank on top of this building since this particular job had to be done by Mather and Platt Company.

6.3.4 *Improvement to Junior Houses at Headquarters*

The improvement work to the above houses were carried out and they were handed over to the Department by the close of the year. The houses had minor defects in door locks, window iron mongery and in toilets. These defects had to be rectified before paying ten per cent retention money to the Contractor. This Contractor will continue repairing the roof whenever the leakage occurs for a period of five years. The houses did not have electricity supply by the end of the period.

6.3.5 *Minor Construction at the Headquarters*

Construction works of parking space, access road, gate and gate houses were in progress for the estimated cost of sh. 740,000.00. However, murrum road work had not started by the close of the year. Fencing of the compound did not take place. All buildings at

Headquarters except Hostel and Institute blocks were redecorated by the Ministry of Works.

6.3.6 Equipment and Plants

The 50 KVA no-break generator and the air conditioner gave the Department very unsatisfactory service. The air conditioner improved by the close of the period. PABX also had poor services since the batteries were too old.

6.3.7 The Outstations

6.3.7.1 The construction of staff houses at Lodwar and Eldoret were already started. The construction of the staff houses and offices was due to start in Voi, Moyale, Garissa and Narok. It was estimated to cost sh. 16,000,000.00

6.3.7.2 Briefs for building construction of staff houses and offices for Kitale, Marsabit, Mombasa, Wajir, Mokowe, Mandera, Meru, Kericho, were submitted to the Ministry of Works for design work to be done.

6.3.7.3 Some of the staff houses which were already completed and an office block at Lodwar were handed over to the Department.

6.3.7.4 Attempts to build fabricated wooden office and staff houses at Makindu following a quit notice served to the Department by Kenya Railways did not succeed, but later the Kenya Railways rescinded its decision.

6.4 Supplies

6.4.1 General

The main functions of the Supplies Section in the Department is to procure, storekeep and distribute stores to various end-users within the Department's Headquarters and Outstations. These functions have continued to be fairly difficult due to the Government procedures of acquiring stores. However, the achievements of the Section in its functions proved more encouraging in the year 1978/79 as compared to the year 1977/78. Quite significant achievements, both quantitative and qualitative were obtained in procurement through tendering procedures. Eleven open tenders were advertised within the year and all were processed through Central Tender Board successfully. Our success in the procurement through the Ministerial Tender Board is also worth reckoning. Sixty requests were forwarded to the Ministerial Tender Board for procurement of various stores, which mainly involved

electronic spares and maintenance materials and fifty six out of these were approved. A total of one hundred and seventy quotations were sent out to suppliers.

6.4.2 Stock Control

The supplies management endeavoured a lot in improving store records. Forms S12 (Issue/Receipt Voucher) was introduced to be used by the Outstations as Form S11 (Counter Issue Requisition) was found to be inadequate. Inventory records were established and now most Stations have inventory records properly kept. Not much was done as regards to the changing of the former Community stock record cards (TR/S/2) to the Government stock records (S3), due to non-availability of these forms from the Government Printer.

6.4.3 Storekeeping

The inflow of non-common user stores was quite encouraging in that, all charts ordered from Overseas were received, teleprinter materials purchased from the local contractors were received as and when ordered without delay. But unfortunately there was constant stock out of common user stores. The yearly stock statistics revealed quite a lot concerning the poor quality of the materials collected from the Ministry of Works Supplies Branch for example pencil sharpeners. It was found out that these sharpeners had a lifespan of three days. Furniture too was found to be of very low quality. Although complaints were constantly lodged with the Ministry of Work Supplies Branch, very little was achieved.

The storehouse endeavoured to supply the Outstations with their requirements. The co-ordination with the network officer on this issue was commendable.

6.5 Transport

Transport, which was previously crippled with problems started to improve towards December 1978 when a new Transport Officer was posted to the Section and also when the Kenya Government system of repair of vehicles was better understood. Towards the end of this period nearly all vehicles that were lying idle due to mechanical problems or accidents had been repaired and were back on the road. Two old vehicles were examined by the Board of Survey and boarded but they have not been disposed of. Three new Mini-buses were bought, one was taken to Jomo Kenyatta International Airport, one to Moi

International Airport and the third was stationed at Headquarters. Two new Chassis for buses were delivered and it is hoped that once the bodies are built to these chassis the problem of transporting people working on shift will have been solved.

The Directorate of Personnel Management approved ten new post of drivers and they were recruited in March. Under the ten percent labour increase, five more drivers and two motor vehicle mechanics were recruited. After this increase, the problem of shortage of drivers was solved.

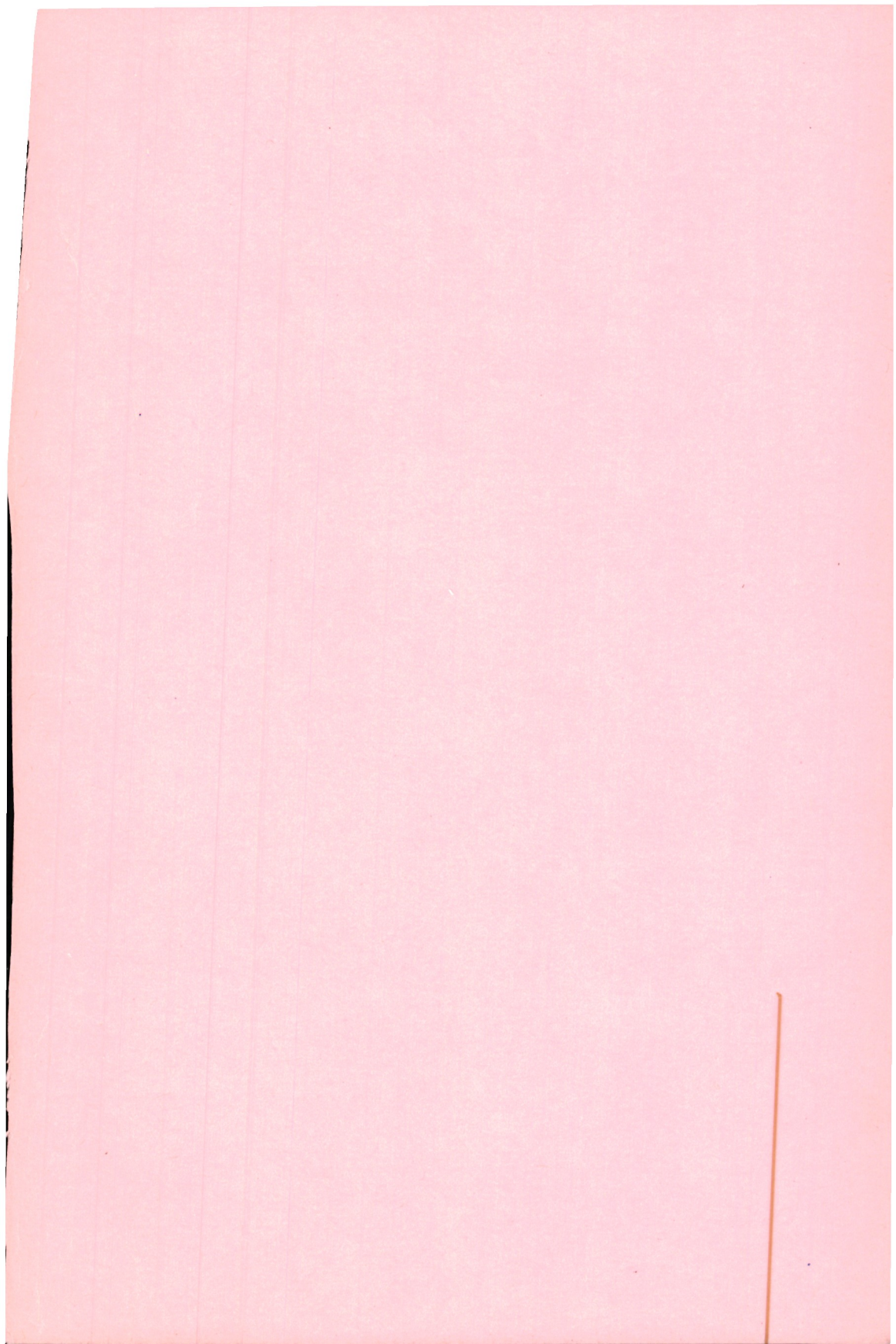
6.6 Security

6.6.1 Since October 1978, the Security Section has increased in strength. There were ten Security Guards and the number increased to twenty six during the period under review. The Department now mans its own Security System and the number of thefts has decreased.

6.6.2 Garissa, Eldoret and Lodwar Stations have now got three Security Guards each. The Department will increase the number of Security Guards in those Stations to six each and engage more for other Stations as personnel become available.

6.6.3 Eighteen Security Guards attended a one month in-service Security Course at the Administration Police College, Embakasi.

6.6.4 Generally the Section had done good work especially on Transport, investigations and accident reports on motor vehicles. These have been carried out quickly and this has enabled the Transport Officer to get authority to repair cars from time to time without delay.



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