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SEMI-ANNUAL PROGRESS REPORT
MARCH 1986 THROUGH AUGUST 1986
CENTRE REGIONAL DE TELEDETECTION DE OUAGADOUGOU (CRTO)

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ABSTRACT

Due to a number of constraints, the Chief of Party undertook only two sensitization missions to Mauritania and Ghana respectively. Nevertheless, the results of these missions were highly successful, since they resulted in requests to CRTO for assistance in establishing a national remote sensing center in Mauritania and a remote sensing unit at the University of Ghana.

The Anglophone remote sensing course which started with a delay of twenty four days, was attended by six trainees from three different countries. With the exception of one trainee, who performed poorly in the introductory phase, all trainees performed quite satisfactorily in the examinations.

A large number of equipment in the photographic laboratory were in need of repair and/or maintenance. This was carried out successfully by Spectral Data Corporation's photographic engineer. Thus, prior to the photographic engineer's departure from Ouagadougou, the photographic laboratory at CRTO was fully operational.

It is recommended that CRTO select more carefully candidates for both the Anglophone and Francophone training sessions.

Furthermore, it is suggested, that CRTO make a serious effort to allocate funds for purchase of material necessary for public relations and sensitization activities.

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ANGLOPHONE TRAINING COURSE

The six-month Anglophone remote sensing training course scheduled to begin on April 1, 1986, actually started with a delay of twenty four days. This was mainly due to the fact that CRTO did not make a formal course announcement. The two member-states that did send trainees, assumed that the course is usually scheduled around January, every year. One of the trainees, Mr. Heubert Ewane was told of the date during the Chief of Party's (COP) visit to Cameroon.

The course was divided into three months of remote sensing principles, and three months of applications in geology, forestry and cartography.

Names of trainees, technical background and country of origin are as follows:

<u>NAME</u>	<u>DEGREE OR DIPLOMA</u>	<u>COUNTRY</u>
Ellis Clottey	Diploma in Cartography	Ghana
Mark C. Eshun	-	Ghana
Heubert Ewane	Diploma in Forestry	Cameroon
J.B. Massah	B.S. in Geology	Liberia
Felix T. Morlu	B.S. in Geology	Liberia
Thomas Quarshie	Certificate in Cartography	Ghana

Messrs. Ewane and Quarshie attended only the second half of the course, since they had previously participated in the introductory course at CRTO.

A total of ten examinations were administered during the introductory phase of the Anglophone course. The results are as

follow:

T I T L E	Clottey	Eshun	Massah	Morlu
Stereo Test	B	A	A	A
Fundamentals of Remote Sensing	C	C	C	B
Elements of Photographic Systems	A	F	B	A
Elements of Aerial Photo Interpretation	A	F	B	B
Photogrammetry	A	F	A	A
Aerial Thermography	B	C	A	A
Multispectral Scanners and Pattern Recognition	A	F	A	C
Microwave Remote Sensing	B	F	D	A
Spaceborne Remote Sensing	A	F	D	A
Mathematics	D	F	B	A

For sample examination questions, refer to Attachment A.

One of the trainees, Mr. M.C. Eshun, upon completion of the first half of the course, was requested to withdraw from the course, and sent back to Ghana.

For the applications part of the course, a test site approximately 150 kilometers south of Ouagadougou in Burkina Faso was selected(see Attachment B). Two one-week field trips are planned for early September 1986.

In addition to the COP, Dr. Paul Mika and Mr. Peter Gilruth

participated in the Anglophone course. Furthermore, Mr. Gilruth and the COP gave a number of lectures to the Francophone trainees (the five-month Francophone course on agricultural statistics started on April 1, 1986).

Text books used for the Anglophone course were:

- Remote Sensing and Image Interpretation, by Thomas M. Lillesand and Ralph W. Kiefer
- Remote Sensing Principles and Interpretation, by Floyd F. Sabins, Jr.
- Manual of Remote Sensing, second edition, published by the American Society for Photogrammetry and Remote Sensing
- Remote Sensing in Geology, by Barry S. Siegal and Allan R. Gillespie
- LARS Mini-Course Series, produced by Purdue University

Overall, the quality of teaching was excellent. Furthermore, the ratio of instructors to trainees was practically on a one to one basis.

SENSITIZATION MISSIONS TO MEMBER-STATES

During the period of March 1-August 31, 1986, only two sensitization missions were undertaken by the COP, for the following reasons:

- The Director General of CRTO did not approve of missions to Benin and Togo, stating that these two countries were " too close ". Instead he suggested visits to Tchad and the Central African Republic(neither country is a member of CRTO).
- Due to the late start of the Anglophone course, the COP was asked by the Director of the Training Department to postpone his missions.
- Three weeks was spent in the U.S. to attend the FEWS conference, the Annual Convention of American Society for Photogrammetry and Remote Sensing, and visit EROS Data Center in Sioux Falls, South Dakota.
- Mr. Muktar S. Kamara, a hydrogeologist at CRTO having been " punished " was not allowed to participate in the first part of the Anglophone course. Thus, the COP had to substitute for Mr. Kamara.
- During the visit of the evaluation team, the presence of the COP in Ouagadougou was essential to provide information and data to members of the team.
- Funds were not available.

Mission to Mauritania

The mission to Mauritania was initiated when the Ministry of Mines and Industry contacted the U.S. Embassy in Nouakchott, to determine to what extent satellite remote sensing could be used in a mineral exploration study of the entire country. The inquiry

was subsequently passed by the U.S. Embassy to the AID mission which after contacting AID/Washington, was informed to get in touch with CRTO.

Meetings were held with the following government officials:

- H.E. Minister Hamdi Samba Diap, Ministry of Procurement and Transportation and President of the National Remote Sensing Committee
- Mr. Izak Rajal, Secretary General, Ministry of Mines and Industry
- Mr. Majid Kamil, Secretary General, Ministry of Fisheries and Maritime Economy
- Mr. Kamal Sheikhouna, Director General, Mauritanian Office of Geological Research(OMRG)
- Mr. Abdolkader Al-Saleh, Director, Department of Mines and Geology, Ministry of Mines and Industry
- Mr. Mamadou Sarr, Director, Department of Topography and Cartography, Ministry of Procurement and Transportation, and member of the National Remote Sensing Committee
- Mr. Diabira Fousseynou, Technical Director, Mauritanian Office of Geological Research(OMRG)

During the meetings with Messrs. Izak Rajal and Abdolkader Al-Saleh, it was suggested to:

- Select and purchase a partial coverage of Landsat Thematic Mapper imagery, bands 4,5 and 7 and a limited number of computer compatible tapes of selected parts of Mauritania. The choice of sites should be based on absence of sand sheets or sand dunes, good outcrop exposure and some knowledge of hydrothermal alteration zones.
- Contact AID/Mauritania and other potential donor agencies for funding to purchase the above mentioned imagery through CRTO.
- Select several geologists/mining geologists to

participate in the next Francophone remote sensing course at CRTO, scheduled for October 15, 1986.

- The Mauritanian trainees would under supervision, select a number of TM scenes for visual and numerical analysis. Based on this preliminary study, a number of target areas encompassing zones of hydrothermal alterations would be delineated.
- Upon completion of their training at CRTO, the Mauritanian scientists would return to their country accompanied by a CRTO geologist, who for a period of six to eight weeks will assist them to do the field work.
- The next phase of the study, which consists of detailed mapping, geochemical analysis and possibly geophysical survey of selected test sites, depends on availability of funds.

However, the response of the Ministry of Mines and Industry officials was to the effect that they expected total funding for the mineral exploration of the entire country through U.S. financial and technical assistance, with practically little or no participation of Mauritanian scientists.

During the meetings with Minister Hamdi Samba Diap and Mr. Mamadou Sarr, the establishment, last year, of a National Remote Sensing Committee was discussed. Since it is intended to establish a National Remote Sensing Center in Nouakchott, it was suggested that CRTO upon request would assist Minister Diap to define the requirements of such a center in terms of manpower, equipment etc.. Minister Diap stated that he will submit such a request to CRTO.

Minister Diap and Mr. Sarr approved the proposal submitted to the Ministry of Mines and Industry to conduct a mineral exploration survey using Landsat data of selected test sites with the active participation of Mauritanian scientists and CRTO's assistance.

The secretary General of the Ministry of Fisheries and

and Maritime Economy was briefed on the applications of remote sensing, specifically, in mapping coastal zones, thermal ocean currents, monitoring concentrations of phytoplanktons and sediment plumes. He expressed his ministry's interest in the training at CRTO, and acquiring multitemporal Landsat imagery of Mauritania's coastline.

Topics discussed with officials of the Mauritanian Office of Geological Research(OMRG) centered on the capabilities of CRTO to train geologists, as well as, services available at the Center such as users assistance, digital image processing facility and the photographic laboratory. Samples of black and white and false color composites produced at CRTO covering south western Mauritania were displayed. The response of OMRG officials was that they would contact AID/Mauritania for availability of funds to purchase imagery through CRTO. Furthermore, interest was shown to send geologists to attend the next Franco-phone training course.

A film and slide presentation was conducted at OMRG, with emphasis on application of Landsat imagery in mapping hydrothermal alteration zones and the significance of lineaments in their association with mineral deposits and subsurface water.

Meetings were held with the following AID officials:

- Mr. Donald F. Miller, Mission Director
- Mr. Willson Lane, Agricultural Development Officer
- Mr. Kenneth Lizzio, Assistant Agricultural Development Officer
- Ms. Nancy Hooff, Program Assistant
- Ms. Teresa Fogelberg, FEWS Project Officer
- Ms. Cynthia Wise, Human Resources Development Officer

A meeting was also held with Mr. H. Perlow, Economic and Political Counselor, U.S. Embassy.

Director Miller was briefed on the substance and results

of the meetings with Mauritanian officials. A film on the applications of spaceborne remote sensing together with slides of CRTO were presented to the entire staff of the AID mission.

As a result of the mission to Mauritania, a request was submitted by the Ministry of Procurement and Transportation to CRTO for assistance in establishing a national remote sensing center. A document to this effect was prepared by the COP(see Attachment C). However, the proposed organization diagram(included in Attachment C), was rejected by the Director General of CRTO, who considered it to be too ambitious and not within the capabilities of Mauritians.

Furthermore, the names of three candidates were submitted by the Mauritians for participation in the forthcoming 9-month Francophone remote sensing training course.

Mission to Ghana

Ghana was visited between June 7-14, 1986. The purpose of the mission was to sensitize governmental authorities on the uses and limitations of remote sensing, and assess Ghana's interest to use the services of CRTO.

Meetings were held with the following officials:

- Mr. Renner, Secretary, Department of Lands and Natural Resources
- Professor G. Benneh, Pro-Vice-Chancellor, University of Ghana, Legon, Accra
- Mr. G.O. Kesse, Director, Geological Survey Department
- Mr. I. Abu, Director, Surveying Department
- Ms. C. Obang-Boampong, Acting Director, ERPS, Ministry of Agriculture
- Mr. Giri, Project Manager, FAO, Crop Early Warning System

- Dr. B.W. Garbrah, Director, Environmental Protection Council, Ministry of Industry, Science and Technology

During the meetings with Department of Lands and Natural Resources officials who were already familiar with CRTO, the following topics were discussed:

- Most of the Ghanians who have been trained at CRTO in the past, are not college graduates. Since courses offered at the Center are at the graduate level, it would be highly desirable to send more qualified trainees, who could really benefit from the training.
- Some of the new developments at CRTO, specifically, the digital image analysis facility and the Geographic Information System(GIS) which will be funded by the World Bank and the UNDP were described in detail.
- Since Ghana has already a National Remote Sensing Committee headed by the Secretary of Transportation and Telecommunications, it was suggested that CRTO could assist the Committee to establish a National Remote Sensing Center, where the twenty two technicians and scientists who were previously trained at CRTO could be working.
- The Geological Survey in cooperation with a West German company is going to conduct a survey of southwest Ghana, with the objective of preparing 1:125,000 maps. It was suggested that the Geological Survey submit a request to CRTO, to order from EOSAT TM bands 4,5 and 7 imagery of the area.

A film and slide presentation was conducted at the Geological Survey, mainly stressing geological remote sensing applications by focusing on spectral signatures of hydrothermal alteration zones and the significance of lineaments in mineral exploration. Slides were also shown of facilities at CRTO.

At Secretary Renner's suggestion, a number of meetings were held with Professor G. Benneh, Pro-Vice-Chancellor of the University of Ghana in Accra. Professor Benneh expressed his interest to set up in a large lecture room a small remote sensing unit in the Geography Department. He subsequently submitted a request to CRTO for assistance to prepare a project design paper which upon receipt, will be discussed with potential donor agencies such as USAID, the World Bank, FAO, UNDP, as well as, Ghanaian governmental organizations.

Furthermore, it was suggested to Professor Benneh to send two of the staff members who were trained at ITC in Holland to attend a course on digital image processing at CRTO.

A film and slide presentation was conducted at the Department of Botany for the teaching staff and graduate students.

In the discussions with Department of Agriculture officials who were not familiar with remote sensing or CRTO, the capabilities and services available at the Center were described and copies of the Anglophone remote sensing syllabus and brochures about the Center were distributed. Furthermore, it was pointed out, that so far, only one agriculturist from the Department has attended the introductory course at CRTO. It was suggested to send more trainees to CRTO.

The Director of the Environmental Protection Council, Dr. Garbrah, indicated that his Department is very concerned about the effects of desertification in the northern part of the country, specifically, an area located between latitude north 9 degrees and 10 degrees and longitude west 3 degrees and east 1 degree. He stated that he will submit a request to CRTO for a technical and cost proposal. Furthermore, trainees will be sent to CRTO to study the effects of desertification in northern Ghana.

A meeting was held with the World Bank representative in

Accra. According to Dr. Seung H. Choi, there are no reliable statistics on the extent of forest cover in Ghana, the last study was done in the early 1960's. There is a project identification paper which will be published in August 1986 jointly by the World Bank, CIDA(Canadian International Development Agency) and the United Kingdom. Dr. Choi suggested that CRTO contacts Mr. Hvi-berg-Hansen who is in charge of the West Africa Projects Division at the World Bank to explore the possibility of conducting joint forestry survey studies using remotely sensed data.

Mr. William S. Lefes the AID Director in Ghana was briefed on the results of meetings with Ghanian officials, specifically, the interest expressed by Professor Benneh in obtaining funds to establish a small remote sensing unit. In addition to the Director, Messrs. Lawrence A. Meserve and Emmanuel Atieku were briefed on the activities at CRTO.

Pursuant to Professor Benneh's request to CRTO for assistance, Dr. Paul Mika and the COP prepared a document defining the requirements for the establishment of a twelve station remote sensing unit(see Attachment D).

ACTIVITIES OF THE PHOTOGRAPHIC LABORATORY

Mr. Jim Sorenson, the photographic engineer, arrived at Ouagadougou on June 13, 1986, and stayed until August 11, 1986. During this period, he prepared a list of supplies and spare parts for the photographic laboratory(see Attachmnet E), and repaired the following equipment:

- Image Maker number 1, color processor
- Chemical pre-heater number 1
- Image Maker number 2, color processor
- Chemical pre-heater number 2
- Tank section IM number 1
- Versamat continuous processor
- Durst 184 enlarger
- 301 color head, Durst enlarger
- Color analyzer

Furthermore, Mr. Sorenson prepared a camera mount for aerial photography of the Nazinga Game Ranch.

Mr. Sorenson spent sometime with Mr. Sidi Muktar Sangare, a photogrammetrist/surveyor, from Mali, who joined CRTO as photographic engineer in July 1986. However, because of a heavy work load(repairing equipment), and the short time left, Mr. Sorenson could not devote more of his time training Mr. Sangare.

Mr. Sangare who has no experience in photographic processing, should be trained locally for at least a period of nine to twelve months.

Mr. Sorenson upon completion of his assignment at CRTO, left Ouagadougou for Toulouse, France, to visit the photographic laboratory at SPOT Image. The purpose of the visit was to establish with the French, the type of equipment which has to be procured for the photographic laboratory at CRTO.

MISCELLANEOUS ACTIVITIES

Under the term of the Contract between Spectral Data Corporation and USAID, initially the sum of \$ 20,000.00 was allocated for the procurement of a microcomputer for digital image processing and a geographic information system. However, in the revised budget the \$ 20,000.00 was reduced to half. Furthermore, since CRTO is interested only in a business microcomputer, the following package was approved by the Director General, and subsequently an order was submitted to Spectral Data Corporation:

- IBM PC-AT (Model 5170-239), 512 KB-RAM, 30 MB, H.D., 8MHZ
- Speed enhanced, 12 function keyboard, 1.2 MB
- Floppy disk
- Epson FX-286 Printer with cable
- Monochrome monitor with parallel port
- DBase 3 (in French)
- Multiplan (in French)
- PC DOS 3.2 operating system
- Non-interruptible 220V, 50Hz power supply

A list of references on remote sensing which have become recently available through the same publishing company, John Wiley and Sons, Inc., was submitted to the Director General for purchase. The books are:

- Remote Sensing in Civil Engineering, edited by T.J.M. Kennie and M.C. Mathews
- Theory of Microwave Remote Sensing, by Leung Tsang, Jin A. Kong and Robert T. Shin
- Satellite Oceanography, by I.S. Robinson
- Mapping for Aerial Photographs, second edition, by C.D. Burnside
- Satellite Microwave Remote Sensing, edited by T.D. Allan

- Remote Sensing in Meteorology, Oceanography, Hydrology, edited by A.P. Cracknell
- Cloud Investigation by Satellite, by R.S. Scorer
- Computer-Aided Data Analysis, by William R. Green

A pamphlet in French, describing the responsibilities, activities and services available at CRTO was updated and translated by the COP into English(see Attachment F).

FINANCIAL STATUS OF THE CONTRACT

Contract AFR-0420-C-00-5040-00 has a budget of \$559,107
An amount of \$404,209. about 72 percent of the budget was
expended for the six months ending 31 August, 1986. The
details of each line item in the budget is summarized below.

TOTAL EXPENDITURES THROUGH 28 FEBRUARY, 1986

<u>Category</u>	<u>Budget Amount</u>	<u>Expended To Date</u>	<u>Balance Remaining</u>
Salaries	\$ 100,890.	\$ 63,81.	\$ 37,075.
Overhead	92,516.	58,522.	33,994.
Consultants	38,016.	41,967.	(3,951.)
Travel & Transportation	47,220.	31,074.	16,146.
Allowances	95,318.	74,799.	20,519.
Other Direct Costs-DBA Ins.	<u>2,774.</u>	<u>2,774.</u>	<u>-0-</u>
	\$ 376,734.	\$272,951.	\$103,783.
G & A	<u>145,796.</u>	<u>104,814.</u>	<u>40,982.</u>
	\$ 522,530.	\$377,765.	\$144,765.
Fixed Fee	<u>36,577.</u>	<u>26,444.</u>	<u>10,133.</u>
	\$ 559,107.	\$404,209.	\$154,898.

COMMODITIES

During the twelve month period of the contract ending 31 August 1986, a total of \$16,667.93 was utilized to supply commodities to CRTO. Commodity procurement was accomplished using contract AID/afr-C-1521. A summary of this expense is:

Books & Teaching Materials	6,181.68	
Photographic Lab. Supplies	4,122.86	
Spare Parts	<u>2,470.91</u>	
Commodities Total		11,775.45
Freight Charges		3,229.80
Insurance		538.70
Inland Freight, Postage etc.		<u>1,123.98</u>
	Total	16,667.93

A detailed list of commodities procured is contained in Attachment G.

RECOMMENDATIONS

As stated in the first Semi-Annual Progress Report, CRTO should make a serious effort to make a formal course announcement at least six months before the start of each session. The course announcement should be accompanied with the following documents:

- Pamphlet on CRTO, e.g. Attachment F.
- Detailed syllabus(available in English but not in French).
- Registration forms.

Furthermore, CRTO should encourage certain member-states, such as: Algeria, Congo, Mauritania, Benin, Niger and Liberia to send more trainees. On the other hand, when countries such as Congo and Mauritania are eager to send several trainees, CRTO should accept the request.

The process of selecting trainees should be more thorough than it presently is. It is unrealistic to accept technicians (with high school diplomas) and university graduates for the same course which is primarily intended for graduates with a minimum of bachelor's degree.

The sensitization missions could be more effective if the COP had access to recent Landsat TM or SPOT imagery of member-states. It should be pointed out that of the limited TM imagery available at CRTO, most of it is of Burkina Faso. Furthermore, there is only one SPOT imagery available at CRTO, which is again of Bukina Faso. CRTO should purchase at least a minimum of TM and/or SPOT imagery of all member-states for public relations.

The Director General of CRTO, should be more amenable to a minimum of expenditure associated with the reproduction of Landsat false color composites at 1:250,000 scale to be presented as gifts to member states during sensitization missions.

As suggested many times, CRTO should make video cassette copies of its 16 mm films on remote sensing and present them free of charge to member-states.

The selection of Mr. S.M. Sangare as photographic engineer, is not a very good choice. He lacks any training and appears not to be adequately motivated. The photographic laboratory which represents the " heart " of CRTO needs a capable and conscientious manager, willing to learn photographic processing and equipment maintenance and repair. Since Mr. Sorenson's departure from Ouagadougou, one of the enlargers and the Image Maker have broken down, lacking qualified technicians, the production at the photographic laboratory has been seriously affected.

Finally, it must be pointed out, that the Director General of CRTO should make more use of the presence of the COP at the Center. Needless to say, the COP's time could be used more productively than translating letters, or, agenda and minutes of meetings.

FINAL EXAMINATION - PHOTOGRAMMETRY

Friday 16 May 1986

ATTACHMENT A

Time allowed : 1 Hour

Attempt All questions

- Q.1. Assume a vertical photograph was taken at a flying height of 5000 m above sea level using a camera with a 150 mm focal length lens. Determine the photo scale at points A and B, which lie at elevations of 1000 m and 1500 m.
- Q.2. Describe any one method of determining the height of an object on a vertical aerial photograph. Derive all equations used.
- Q.3. Draw a neat diagram to illustrate how a stereo model is formed.
What are the requirements for a stereo model ?
- Q.4. What are the main features of a pocket stereoscope and a mirror stereoscope ?
Briefly describe the principle of any single image photogrammetric instrument.
- Q.5. Briefly explain any five parameters you would consider when preparing specifications for new aerial photography of a project area.
- Q.6. The difference in parallax between a reference point at ground level and the top of a building is 2.50 mm. The flying height is 2000 m above the same reference point, the air base is 1500 m, and the focal length of the camera is 152.00 mm.
Determine the height of the building above the reference point.

Aide memoire :
$$\Delta h = \frac{(H - h) \Delta p}{b + \Delta p}$$

DIRECTION DE LA FORMATION

FINAL EXAMINATION - ELEMENTS OF AERIAL
PHOTO INTERPRETATION

Friday 23 May 1986

Time allowed : 1 Hour

Attempt all questions

- Q.1 Draw diagrams to show the differences between vertical, low oblique and high oblique photographs.
- Q.2 Briefly describe how aerial photographic techniques can be applied in any five disciplines.
- Q.3 What are the advantages of
- a) Black-and-white infrared photography
 - b) Colour photography
 - c) Colour infrared photography
 - d) Thermal infrared photography.
- Q.4 Briefly describe any five key elements of photo interpretation you would use to identify features on a photograph.
- Q.5 An aircraft, equipped with a standard aerial camera ($f = 152$ mm, format = 230 mm x 230 mm) takes photos of the terrain at an altitude of 5000 m above ground. If the overlap is 60 %, calculate
- a) The ground coverage of one photo
 - b) The total ground coverage of two consecutive photos
 - c) The ground coverage of one overlap.

CRTO

Anglophone Remote Sensing Training Course

Examination

May 29, 1986

Please answer all four questions

1. Describe the different steps involved in processing a black and white film.
2. Define the following terms: a. Additive primary colors b. Substractive colors c. High pass filter c. Bandpass filter.
3. Describe and discuss the advantages of múltiband(multilens) cameras over single lens frame cameras in terms of spectral signatures(spectral response patterns).
4. If you had to distinguish between natural healthy vegetation and artificial turf, what kind of film would you use in your camera and why.

GOOD LUCK

REGIONAL REMOTE SENSING CENTER

OUAGADOUGOU

Examination

June 26, 1986

Please answer all four questions

1. With the help of a diagram, describe the operation of a multispectral scanner system.
2. Define the following terms: a. Instantaneous field of view
b. Dichroic grater c. Signal to noise ratio.
3. Describe the advantages of the multispectral scanner system over multiband photography.
4. What is supervised classification?

GOOD LUCK

REGIONAL REMOTE SENSING CENTER

OUAGADOUGOU

EXAMINATION

July 1, 1986

Please answer all questions.

1. Describe the radar system parameters that determine resolution.
2. Describe how wavelength affects a radar system's ability to distinguish the " texture " of different types of ground cover.
3. Describe how topography and material characteristics of a ground scene affect the amplitude of reflected radar signals.

REGIONAL REMOTE SENSING CENTER

OUAGADOUGOU

Examination

July 8, 1986

Please answer all four questions

1. Describe the sensor systems on board Landsat-5. How do they differ from Landsat-3?
2. Describe with the help of a diagram how Landsat-5 acquires data and transmits them to receiving stations in the U.S.
3. What parts of the spectrum are bands 4,5,6, and 7 of the MSS system on Landsat sensitive to? What color might the following features have on a false color composite?:
 - a. Riverine vegetation.
 - b. Light brown bare soil.
 - c. A clear water body.
 - d. A dark red lateritic(ironstone)capped surface.
 - e. A small village in Burkina Faso.
4. Although relatively poor resolution can be considered a disadvantage of Landsat MSS imagery, what are the compensating advantages of the system?

GOOD LUCK

ATTACHMENT B

" PROPOSAL FOR THE STUDY OF SELECTED ASPECTS OF THE
WATER AND VEGETATION RESOURCES OF NAZINGA GAME RANCH,
BURKINA FASO USING REMOTE SENSING TECHNIQUES "

Introduction

Nazinga Game Ranch is located approximately 150 kilometers south of Ouagadougou in Burkina Faso. The Ranch's site of about 800 square kilometers is of low relief, lying between 270 and 325 meters above sea level. Its vegetation cover is predominantly brush and wooded savanna, reflecting the region's tropical temperature and 1,000 mm mean annual rainfall which occurs mainly from June through August.

In cooperation with the government of Burkina Faso and with financial support from various public and private donor agencies, Mr. Clark Lungren, a Canadian missionary is directing development of the Ranch as a source of food from controlled " harvesting " of game and fish with most of the game destined for sale to the local population.

Purpose and Scope

The study proposed here is based on the premise that management of game and fish populations requires knowledge of the prevailing vegetation and water resource bases in order to assess their carrying capacities. The purpose of the study, then, is to contribute to this knowledge some of what can be learned from analyzing remotely sensed data.

The scope of the study is limited, firstly, to information

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that can be derived from remotely sensed data and available supporting maps and documents. Though field work will be carried out to verify conclusions reached from data analysis, intensive field investigations of hydrogeologic and botanical phenomena will not be pursued. Secondly, limitation of time(3 months); availability of data(aerial photography, Landsat data, supporting documents); and capability of the researchers(they are being trained) necessarily puts constraints on the study's scope. Finally, because of the foregoing constraints, only about 330 square kilometers of the Ranch's 800 square kilometers extent will be analyzed. Investigation will be extended over a larger area only if time allows.

Study Objectives

The following objectives are proposed:

1. To produce a map of a portion of the Ranch's structural geology and geomorphic features particularly as they may be relevant to assessing potential ground and surface water resources.
2. To develop a methodology by which vegetation can be spatially differentiated and classified according to remotely-sensed image characteristics.

If time permits and if expected suitable remotely-sensed data become available, two additional objectives are proposed:

3. To determine whether any significant areas of soil erosion have developed during the past 35 years.
4. To develop a technique for aerially monitoring game watering holes using large scale 35mm photography.

Tasks

Though all trainees will participate in the tasks necessary to attain each objective, individuals will be assigned responsibility

for the final products according to their professional interests.

Objective 1: Hydrogeological Map

1:50,000 scale panchromatic aerial photography covering approximately 330 square kilometers in the southern portion of Nazinga Game Ranch will be analyzed by all trainees to identify and delimit rock outcrops, exposed ground, geomorphic features, and lineaments that offer clues to the region's structural geology. Work will be done on transparent plastic overlays using the " effective area " technique so that the information can later be compiled onto a single map using the " Map-O-Graph ". If the photographic laboratory's work schedule permits, a mosaic of 1:50,000 scale panchromatic aerial photography will be constructed and will be analyzed to seek major structural features that might otherwise be overlooked on the individual aerial photographs.

Landsat imagery, including a 1:200,000 scale false color composite and black and white scenes of channels 5 and 7 for both wet and dry seasons, will provide spectral reflectance information as well as information on drainage patterns and major structural features. Though of small scale, available geologic maps will also be utilized. Information derived from the foregoing sources will be incorporated in the final map of, as yet, undetermined scale.

Mr. J.B. Massah, Jr. will oversee the visual interpretation portion of the project. Mr. T. Quarshie will be responsible for interpretation and compilation of a separate map of drainage patterns. He will also assist Mr. Massah in producing the final hydrogeological map.

Digital processing of data from two 256X256 pixel areas covering the study area will be carried-out on the Center's

" Pericolor, Numelec " computer in an attempt to enhance geologic structural features. Linear stretching and filtering are two of the techniques that will be employed in an attempt to enhance features such as major fractures, joints, and drainage patterns. Natural color 35 mm photography will be taken of imagery as displayed on the screen. Any new information obtained will be incorporated in the final map.

Mr. F.T. Morlu will be responsible for the digital processing portion of the project.

Objective 2: Vegetation Image Classification

The same remotely sensed data sources and " effective area " method of map compilation will be employed in the vegetation study as in the hydrogeological project. However, the emphasis will be an image analysis of vegetation cover rather than attempting to identify and describe different types of vegetation. Image delineation and classification on photographic and Landsat visual materials will be based on the elements of color, tone, texture, and pattern. Canopy density and crown size will be measured for additional information. Several vegetation maps and documents will furnish supporting data.

Mr. Ewane will be responsible for overseeing the visual interpretation portion of this project. He will be assisted by Mr. E. Clotney in preparing a final map.

Digital image analysis of vegetation will also be carried-out. Indices based on differing spectral reflectance characteristics of variations in vegetation cover will be the basis for image classification. Density slicing techniques will be used to help delimit discrete classes. Information derived from digital processing will be compared with the image classes obtained from the visual interpretation and incorporated into the final map compilation where appropriate.

Mr. F.T. Morlu will be responsible for digital processing portion of the project. Mr. E. Clottey will assist Mr. Morlu in incorporating digitally derived information onto a map of image classes that reflect variations in vegetation cover.

Objective 3: Significant Soil Erosion Detection

If time permits and existing 1984 1:50,000 scale panchromatic aerial photography can be obtained, an attempt will be made to identify areas of significant soil erosion and to measure their areal extents. By comparing the already available 1:50,000 scale panchromatic aerial photography flown in 1951 with the recent photography mentioned above, areas of advancing and new erosion can be detected. These sites will be delineated on transparent plastic overlays and their areas measured with a dot planimeter. Small 1:50,000 scale maps showing the above information will be produced for each site with significant erosion.

Mr. E. Clottey will oversee this portion of the project and will be responsible for the final maps.

Objective 4: Game Watering Hole Monitoring

The photographic laboratory engineer, Mr. J. Sorenson, has constructed a 35 mm camera mount suitable for attachment on an ultra-light aircraft owned by the Nazinga Game Ranch for census and anti-poaching activities. If time permits and current aircraft repairs are punctually completed, a methodology for aerially monitoring game watering holes on a periodic basis throughout the year will be developed.

By flying large scale natural color 35 mm photography missions during both rainy and dry seasons, the Ranch's staff should

be able to monitor the seasonally changing spatial distribution of watering holes and measure the changing areal extent of individual watering holes.

All trinees will participate in the project by planning experimental missions and designing an appropriate year-around monitoring methodology.

Field Work

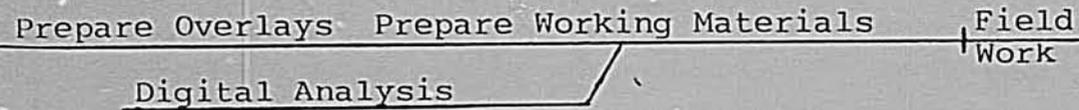
All laboratory analysis and working documents are planned to be completed by the second half of August 1986. Shortly after August 22, verification, correction, and amplification of laboratory work will be carried out over a period of approximately one week at the Nazinga Game Ranch site.

The six remaining weeks following completion of field work will be used for drafting maps and preparing the final report. Each trainee will be responsible and credited for writing that section of the report dealing with his tasks as assigned above. The individual sections will be intergrated into a cohesive comprehensive report.

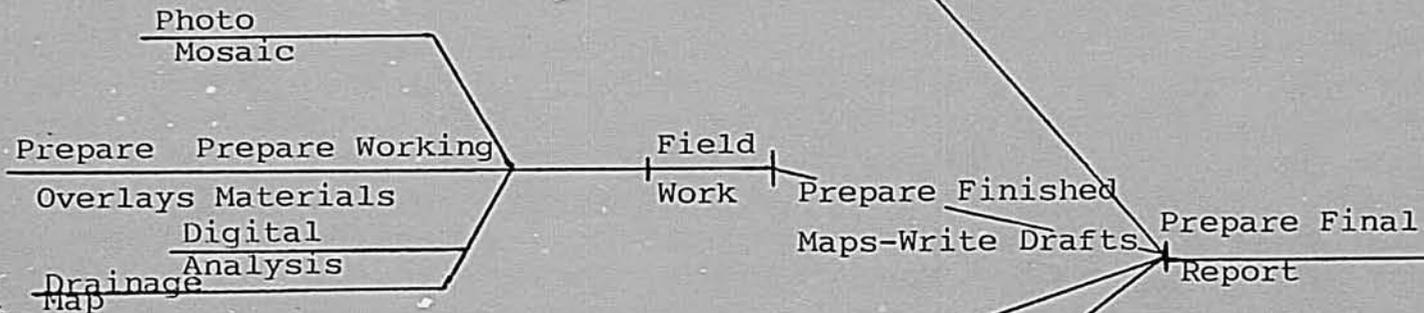
WORK SCHEDULE

<u>JULY</u>		<u>AUGUST</u>				<u>SEPTEMBER</u>				<u>OCTOBER</u>		
14	21	28	4	11	18	25	1	8	15	22	29	6

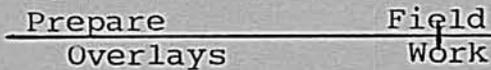
VEGETATION IMAGE ANALYSIS



HYDROGEOLOGY



EROSION STUDY



WATER HOLE STUDY



Ellehadj

الجمهورية الإسلامية الموريتانية
République Islamique de Mauritanie

ATTACHMENT C

شرف - اتحاد - عدل
Honneur - Fraternité - Justice

Ministère de l'Équipement des Transports
et des Télécommunications

Direction de la Topographie
et de la Cartographie

وزارة التجهيز ، النقل

والمواصلات

ادارة البتوغرافيا والخرائط

رقم / وت نم / اتخ

037 / METT / DTC

Nouakchott, le 05 JUIL 1986 نواكشوط في

Centre Régional de Télédétection
B.P. 1762 OUAGADOUGOU

Arrivée ... 3.1.1111... 1986...

Sous N° ... 1184 / H. 2109

Le Directeur المدير

à Monsieur le Directeur Général الى

du C.R.T.O.

BP. 1762

Ouagadougou

Burkina FASO

Objet: Création d'un Centre
National de Télédétection.

Monsieur le Directeur Général,

Mon Pays envisage la création d'un Centre National de Télédétection pour la coordination des activités de l'ensemble des secteurs utilisant la télédétection.

Pour nous permettre de réaliser cette étude, j'ai l'honneur de vous demander de bien vouloir nous assister en nous faisant parvenir un projet dans ce sens. Ce projet sera discuté au niveau de notre Comité National de Télédétection.

Veuillez agréer, Monsieur le Directeur Général, l'expression de ma haute considération.



ISLAMIC REPUBLIC OF MAURITANIA

Ministry of Procurement, Transport
and Telecommunications

TRANSLATION

Department of Topography and
Cartography

July 5, 1986

Subject: Establishment of a National Remote Sensing Center

Dear Mr. Director General,

My country is envisaging to establish a National Remote Sensing Center to coordinate the activities of all governmental organizations using remote sensing.

In order to implement this project, I have the honor to solicit your assistance by submitting a proposal. This proposal will be discussed by our National Remote Sensing Committee.

Sincerely yours,

Sarr Mamadou

KE/SH

29 AOUT 1986

359 CRTO/DAU

à Monsieur SARR Mamadou
Directeur de la Topographie
et de la Cartographie
Ministère de l'Équipement
des Transports et des
Télécommunications
NOUAKCHOTT (MAURITANIE)

Monsieur le Directeur,

Suite à votre lettre du 5 Juillet 1986, nous avons le plaisir de vous soumettre les documents suivants :

- liste d'équipement suggérée pour la création d'un Centre National de Télédétection
- liste de publication en français et anglais sur la télédétection.

En plus du personnel de la Direction de la Topographie et de la Cartographie, initialement, il faudra envisager le personnel suivant pour le Centre :

- Un ingénieur labo photo, un technicien labo photo
- Un archiviste
- Un documentaliste
- Un technicien responsable de l'équipement.

Bien entendu, la formation du personnel technique et scientifique est très importante. Le CRTO pourra fournir à votre personnel des stages de formation divers, tels que :

.../...

- Cycle de télédétection appliquée, cycle de 9 mois
- Stages spécialisés : stage sur les techniques photographiques, traitement avec ordinateur, etc.
- Séminaires de courtes durées (une semaine à dix jours) pour décideurs, planificateurs, etc.

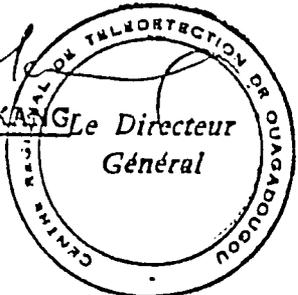
Le montant total est de 95,761.00 dollars américains. Toutefois, à cette somme, il faudra ajouter le montant de \$ 130,000.00, prix d'équipement pour l'installation d'un Laboratoire photographique. Dans cette somme, les frais de construction du Laboratoire, plomberie et travaux d'électricité ne sont pas inclus.

Pour toute information supplémentaire, nous restons à votre entière disposition.

Veillez agréer, Monsieur le Directeur, l'expression de mes sentiments les meilleurs.

Pour le Directeur Général et P.O.
Le Directeur de la Formation


J.P. OKANG Le Directeur
Général



P.J. :

TRANSLATION

Mr. Sarr Mamadou
Director
Department of Topography and
Cartography, Ministry of Procurement
Transportation and Telecommunication
Nouakchott, Mauritania

August 29, 1986

Dear Mr. Director,

Reference your letter of July 5, 1986, we have the pleasure to submit the following documents:

- Suggested list of equipment for the establishment of a National Remote Sensing Center.
- List of publications in French and English on remote sensing

In addition to the staff of the Department of Topography and Cartography, initially you should consider the following personnel for the Center:

- A photographic engineer, and a photo lab technician
- An archivist
- A librarian
- One technician in charge of the equipment

Needless to say, training of the technical and scientific personnel is of outmost importance. CRTO can provide your staff the following training courses:

- A nine-month applied remote sensing course
- Specialized courses: photographic processing, digital image analysis etc..

- Short seminars(one week to ten days) for decision makers, planners etc..

The grand total is U.S. \$ 95,761.00. However, one should add the sum of \$ 130,000.00 for equipping a photographic laboratory. This sum is exclusive of the cost associated with civil engineering, plumbing and electrical work.

We are entirely at your disposal for any additional information.

Sincerely yours,

Leon Okio
Director General

Attachs.: a/s

LISTE D'EQUIPEMENT

MICROORDINATEUR

Les spécifications sont les suivantes :

- VIP (Video Image Processor)
- S-100 Chassis de microordinateur complet avec interphase vidéo, et microprocesseur Z-80
- Moniteur couleur RGB avec écran de 13 pouces
- Interphase parallèle pour adapter un ordinateur hôte, en particulier le PC
- Logiciel RIPS, contenant plus de 30 programmes de traitement d'image, d'après le logiciel développé par le Gouvernement Américain
- Manuel de l'utilisateur

Prix \$ 7.400.000

IBM - XT ou compatible, configuré comme suit :

- Mémoire de 512 KO
 - 2 Unités de disquettes
 - Disque dur 20 MEG.0
 - Adaptateur monochrome
 - Moniteur Amdek 310A Prix \$ 3,850.000
 - Régulateur de tension MS-600 \$ 1,650.00
 - Expédition, assurance, manutention \$ 2,000.000
- TOTAL \$ 14,900.000

Fabriqué par : DIGITAL IMAGE INC

1595B OCEAN AVE.

BOHEMIA, NEW YORK, 11716, U.S.A.

ARTICLE	PRIX	QUANTITE	MONTANT
Radiomètre, EXOTECH Model 100 B x M + T + S avec filtres pour MSS, TM et SPOT	\$ 7,150.00	1	\$ 7,150.00
Table de dessin (95 cm x 120 cm)	\$ 225.00	8	\$ 1,800.00
Tabouret à dessinateur	\$ 45.00	8	\$ 360.00
Table lumineuse	\$ 400.00	3	\$ 1,200.00
Lampe de Bureau	\$ 50.00	8	\$ 400.00
Tiroir de rangement (92 cm x 120 cm)	\$ 300.00	2	\$ 600.00
Equipement de rangement divers (110 cm x 46 cm x 165 cm)	\$ 400.00	1	\$ 400.00
Système DIAZO sur calque en couleur	\$ 2,500.00	1	\$ 2,500.00
Stéréoscope à miroir	\$ 900.00	4	\$ 3,600.00
Barre à parallaxe	\$ 150.00	2	\$ 300.00
Stéréoscope de poche	\$ 40.00	8	\$ 320.00
Projecteur de diapositives 35 mm et écran	\$ 450.00	1	\$ 450.00
RETROPROJECTEUR	\$ 200.00	1	\$ 200.00
Appareil photo	\$ 150.00	1	\$ 150.00
Compas / Déclinomètre	\$ 95.00	2	\$ 190.00
Table à dessin	\$ 15.00	8	\$ 120.00
Equerre 30°/60°	\$ 2.00	8	\$ 16.00
" 45°	\$ 2.00	8	\$ 16.00
Règle	\$ 1.00	8	\$ 8.00
Planchette	\$ 5.00	8	\$ 40.00
Compas à pointe sèche	\$ 1.00	8	\$ 8.00
Stencil	\$ 15.00	8	\$ 120.00
Stylos à encre pour stencil	\$ 25.00	8	\$ 200.00
Papier à dessin et film en plastique	\$ 20.00	8	\$ 160.00
Stéréo Zoom Transfer Scope, 220 V, 50_Hz	\$ 18,330.00	1	\$ 18,330.00

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ARTICLE	PRIX	QUANTITE	MONTANT
Crayon, gomme, encre	\$ 6.00	8	\$ 48.00
Film Diazo chromatique (jaune, magenta, Cyan)	\$ 35.00	5	\$ 175.00
Produits photographiques et digitaux de LANDSAT et SPOT			\$35,000.00
Expédition			\$ 7,000.00
<u>T O T A L :</u>			<u>\$80,861.00</u>
<u>TOTAL PLUS MICROORDINATEUR :</u>			<u>\$95,761.00</u> =====

Stéréo Zoom Transfer Scope, fabriqué par : BAUSCH AND LOMB
OPTICAL SYSTEMS DIVISION
P.O. BOX 450
ROCHESTER, NEW YORK, 14692, U.S.A.

Radiomètre fabriqué par : EXOTECH INCORPORATED
1200 QUINCE ORCHARD BOULEVARD
GAITHERSBURG, MARYLAND 20878, U.S.A.

Autres articles mentionnés peuvent être obtenus de :

- FORESTRY SUPPLIERS INC.
205 WEST RANKIN STREET, BOX 8397
JACKSON, MISSISSIPPI 39204, U.S.A.
- BEN MEADOWS COMPANY
3589 BROAD STREET
ATLANTA, GEORGIA 30366, U.S.A.

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Utilisation de la Télédétection dans les Sciences de la Terre	Jean-Yves SCANVIC	Bureau de Recherches Géologiques et Minières - N° 7, 1983
Télédétection des Ressources Terrestres	A. BOTHOREL	Mem. Sci. de la terre, Université et Marie CURIE, PARIS - N° 83-11,
La télédétection en géologie structurale	J.M. BROSSE	Thèse Doct. ès Géol. Appl., Université ORLEANS - 1975
Application de la télédétection à l'étude de la Biosphère	Colette M. GIRARD et Michel C. GIRARD	MASON et Cie. PARIS - 1975
Apport des images orbitales (ERTS-1) à la connaissance géologique et structurale d'un bassin sédimentaire	CAVALIER C., et al.	Rev. Photointerpretation, 1973-2, Technip
Méthodologie de la recherche par télédétection des coupes non affleurantes	DUTARTRE P. et al.	BRGM 82 - SGN 692, GEO
Méthode d'étude et de recherches de l'eau souterraine des roches cristallines. Atlas de photointerprétation	Comité Interafricain d'Etudes Hydrauliques, T. 3	
Télédétection et anomalies géochimiques à Echassières	LEFEVRE J.	Chronique de la recherche minière Fr., N° 453 - 1980

2/3

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Inventaire du potentiel géothermique de la Tunisie
au moyen des images LANDSAT

SCANVIC J.Y. et SFIELTJES L.

BRGM 79, SGN 422 GEO - 1979

Perspectives d'application géologique de la
Télétection thermique spatiale

SCANVIC J.Y.

Géochronique, Fr., N° 3 - 1982

Application de la télétection à la recherche
d'eau souterraine en milieu crayeux

SCANVIC J.Y. et WEECKSTEEN G.

Colloque Rouen, Doc BRGM, Fr.,
N° 3 - 1978

Observation de paysage d'Afrique dans le visible
et l'infrarouge thermique. Expérience "Cithare"

VIELLEFOSSE M.

Rapport I, CNES, TOULOUSE - 1979

Manuel de Télétection

BARIOU R.

Sodipe S.A., 15, rue de Terre-Neuve
75020 PARIS

Télétection des ressources terrestres

BOWLING, N. et al.

ESRO CR, 1973

Télétection et stéréophotogrammétrie dans les
sciences de la terre

Paul S.

DOIN, PARIS - 1973

La thermographie - Questions techniques et
problèmes de l'interprétation

TORRES C.

Revue Photo-interprétation - 1973

Physique et théorie du radar

DARRICAUD J.

Sodipe, 1973 - 2 Tomes

L'automatisation de la photo-interprétation de la
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BAUDOIN, A.

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2

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E D I T E U R

Cartographie automatique de données de télédétection

David DERIES, Joly, VERGER

Société Française de Photogrammétrie
1976 - N° 62

Classification automatique des données Multispectrales utilisant l'analyse des correspondances

MONGET J. M.

Bulletin de la Société Française de
Photogrammétrie, 1976 - N° 62

Les données LANDSAT et un exemple de leur utilisation

VERGER, F.

CEGET, CNRS - 1976

La prise de vue aériennes à très basse hauteur, appliquée à la géotechnique et à l'écologie littorales

GALIBERT G.

Bulletin de la Société Française de
Photogrammétrie, 1975 - N° 61

Les sciences de la Terre et l'heure des satellites

POUQUET J.

PUF 1971, Coll. Sup.

La télédétection en écologie

BALDACCI, BORGHI, LOCCI

Bulletin IGN, N° 23 - 1973

Directions tectoniques télédétectées par radar latéral

Gilbert J.P. et Paul S.

Photogrammetria, 32 - 1976

Apport des images (NOAA-3) dans l'observation des grands courants de matériels éoliens au SAHARA

MAINGUET et GUY

Revue Photo-interprétation, 1974 -

La télédétection des courants océaniques à l'aide des images de ERTS

Maul George A.

Revue Photo-interprétation, 1973 -

LES PRINCIPALES REVUES

1. Bulletin de la Société Française de Photogrammétrie, 2 Avenue Pasteur
94160 SAINT-MANDE
2. Revue Photo-interprétation
Edition TECHNIP - PARIS 17 Rue GINOUX
3. International Journal of Remote Sensing Taylor and Francis Limited,
Rankine Road, Basingstoke, Hants RG24 OPR, United Kingdom
4. Journal of Photogrammetric Engineering and Remote Sensing
American Society for Photogrammetry and Remote Sensing, 210 Little Falls Street,
Falls Church, Virginia 22046, U.S.A.
5. Remote Sensing of Environment
Elsevier Publishing Company, P.O. Box 330, Amsterdam, Holland
6. I T C Journal
P.O. Box 6, Enschede, Holland
7. Photogrammetria
Elsevier Publishing Company
P.O. Box 330, Amsterdam, Holland

FILMS PEDAGOGIQUES SUR LA TELEDETECTION

1. "La télédétection, un nouveau regard sur la terre". Film de 16 mm.
Les Films du Château, 12 rue du Château 92250, La Carenne - Colombes, France.
2. "Mineral Exploration, The use of Remotely Sensed Data". Film de 16 mm.
3. "Vegetation Assessment, The use of Remotely Sensed Data". Film de 16 mm.

Les 2 films ci-dessus peuvent être acquis de : AMERICAN SOCIETY FOR PHOTOGAMMETRY
AND REMOTE SENSING, 210 HITTLE FALLS STREET,
FALLS CHURCH, VIRGINIA, 22046, U.S.A.

4

REFERENCES BIBLIOGRAPHIQUES SUR LA TELEDETECTION (EN ANGLAIS)

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Remote Sensing Principles and Interpretation	Floyd F. Sabins Jr.	W.H. Freeman and Co., Publisher San Francisco, 1978
Remote Sensing of Earth Resources	Bryan M. Leonard	Detroit Gale Research, 1979
Remote Sensing and Ecosystem Management	Lavigne, D.M.	John Wiley and Sons, New York, 1978
Introduction to Remote Sensing of the Environment	Richason, B.F	Dubuque, Iowa, Kendall-Hunt, 1978
Remote Sensing: The Quantitative Approach	Swain, P.H.	Mc Graw, New York, 1978
Terrain Analyses and Remote Sensing	Townshend, J.R.	Allen University, New York, 1981
Computer Image Processing and Recognition	Ernest L. Hall	Academic Press, New York, 1979
Photogrammetry	Frances H. Moffitt and E.M. Mikhail	Harper and Row, New York
Proceedings of the Fall Convention 1982, 1983, 1984, 1985		American Society for Photogrammetry and Remote Sensing, 210 Little Falls St., Falls Church, VA 22046, U.S.A.

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Civil Engineering Applications of Remote Sensing		American Society of Civil Engineering, New York, 1980
Remote Sensing Applications for Mineral Exploration	William Smith, Ed.	Academic Press
Remote Sensing for Environmental Sciences	Erwin Schanda, Ed.	Springer Verlag, 1976
Photogeological Regional Mapping	J.A.E. Allum	Pergamon Press
Remote Sensing Laboratory Manual	Floyd F. Sabins, Jr.	Remote Sensing Enterprises, P.O. Box 2893, La Habra, CA, U.S.A.
Bibliography of Remote Sensing in Forestry	Brian J. Myers and Ian E. Craig	Division of Forest Research, CSIRO, P.O. Box 4008, Canberra, A.C.T. 2600 Australia
Manual of Remote Sensing	Second Edition	American Society for Photogrammetry and Remote Sensing, 1983
Remote Sensing in Geology	Barry S. Siegal and Allan R. Gillespie	John Wiley and Sons Inc., New York, 1980
Proceedings of the 17th, 18th and 19th International Symposium on Remote Sensing of Environment	Center for Remote Sensing Information and Analysis, Environmental Research Institute of Michigan, Ann Arbor, Michigan, U.S.A.	

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Multilingual Dictionary of Remote Sensing		American Society for Photogrammetry Remote Sensing, Falls, Church, VA, U.S.A.
Extraction of Information from Remotely Sensed Images		American Society for Photogrammetry Remote Sensing, Falls Church, VA U.S.A.
Remote Sensing in Civil Engineering	T.J.M. Rennie and M.C. Mathews, Editors	University of Survey, U.K., John Wiley and Sons Inc.
Theory of Microwave Remote Sensing	Leung Tsang and Jin A. Kong	John Wiley and Sons Inc.
Satellite Oceanography	I.S. Robinson	John Wiley and Sons Inc.
Mapping for Aerial Photographs, 2nd Edition	C.D. Burnside	John Wiley and Sons Inc.
Satellite Microwave Remote Sensing	T.D. Allan, Editor	John Wiley and Sons Inc.
Remote Sensing in Meteorology, Oceanography, Hydrology	A.P. Cracknell	John Wiley and Sons Inc.
Computer-Aided Data Analysis	William R. Green	John Wiley and Sons Inc.

MONTANT TOTAL (expédition inclus) : \$ 5,000.00

CENTRE NATIONAL DE TELEDETECTION

Le Centre National de Télédétection peut être envisagé, dans sa structure, de la manière suivante :

1. DIRECTION DE LA FORMATION :

- Fournir aux Scientifiques, et techniciens une formation de base leur permettant ainsi d'utiliser les techniques de la télédétection.
- Entreprendre des séminaires pour les décideurs, dans le but de disséminer une connaissance générale de la télédétection et l'utilité que peut porter cette technique dans l'exécution des projets divers.

2. DIRECTION DE L'ASSISTANCE AUX UTILISATEURS :

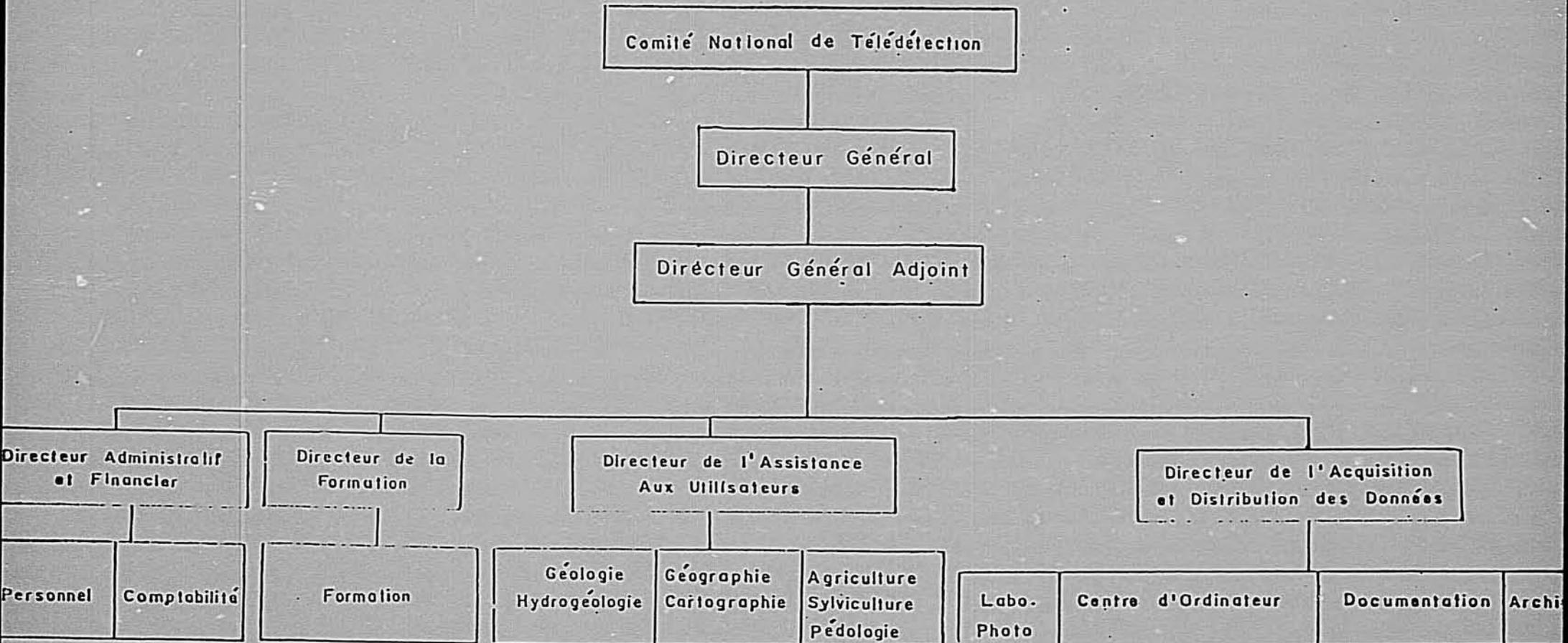
- Conseil et appui aux chargés d'études ou de recherches.
- Prestation de service sur contrat.
- Opération d'étude, de recherche - développement dans les domaines différents tels que : géologie, hydrogéologie, agropastoralisme, sylviculture, etc.
- Appui et assistance à la formation.

3. DIRECTION DE L'ACQUISITION ET DISTRIBUTION DES DONNEES

- Laboratoire de photographie pour la reproduction en noir et blanc ou couleur d'images de satellites.
 - Centre d'ordinateur pour traitement numérique des données satellites.
 - Documentation : comportera plus d'une collection d'ouvrages sur la télédétection.
 - Archives, collection d'images de satellite, photographies aériennes, ainsi que différentes cartes (géologique, hydrogéologique, topographique, etc...).
- 4/3

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Centre National de Télédétection, Nouakchott,
République Islamique de Mauritanie



UNIVERSITY OF GHANA

LEGON, ACCRA

Telegrams & Cables: *UNIVERSITY, LEGON*

*In case of reply
please quote*

My Ref. No......

Your Ref. No......



Telephone: *Accra 75381 Est. 9249*

from The Pro-Vice-Chancellor

15th June, 1986.

Dear Sir,

REQUEST FOR ASSISTANCE TO SET UP A REMOTE
SENSING UNIT IN THE UNIVERSITY OF GHANA

The University of Ghana is planning to set up a Remote Sensing Unit based in the Department of Geography. The proposed unit will undertake research into resource appraisal and monitoring, rural and urban land use, and mineral exploration. It will also support the teaching programme in this field in the Departments of Geography and Geology.

A well equipped unit can provide the necessary data for implementing and monitoring some aspects of the Government's Economic Recovery Programme.

We are seeking assistance in preparing a project proposal which will be submitted to Government and other funding agencies for support. We shall therefore be very grateful if your Center will assist us in preparing the project document. Any other form of assistance, advisory or otherwise now and after the Unit has been set up will be most appreciated.

Yours faithfully,

A handwritten signature in cursive script, appearing to read 'G. Benneh'.

(G. Benneh)

Pro-Vice-Chancellor

The Director,
Regional Remote Sensing Center,
Ouagadougou,
Burkina Faso.

UNIVERSITY OF GHANA

LEGON, ACCRA

Dr. E. Okio

Telegrams & Cables: UNIVERSITY, LEGON

In case of reply
please quote

My Ref. No. A.5/9

Your Ref. No. _____



Telephone: Accra 73351 Ext. 9240

18th July, 1986.

from The Pro-Vice-Chancellor

Dear Dr. Okio,

Thank you so much for your letter of 15th July,
1986 Ref. 283/CRTD/DF.

I am grateful to you and the centre for agreeing to
help us prepare a project document on the proposed Remote
Sensing Unit in the University of Ghana.

There are three photo labs on campus. The details are
as follows:

1. GEOLOGY DEPARTMENT

(a) The space for this lab is about 40 sq. meters. This
is made up of a Dark Room (4.5 sq.m.), a chemical store (4.5 sq.m)
and space for other equipment (30 sq.m).

(b) There are two enlargers TYP74210, made in Czechoslovakia
and a dryer. Enlarger can take negative film 120 and 35mm.

(c) The maximum size photo that can be printed is 30cm x 40cm.

ARCHAEOLOGY DEPARTMENT

(a) Lab occupies a small space of 2m x 4m with extra space
of 2m x 4m for drying.

(b) There is one enlarger - DURST 609 of Italian make. It
has a dual purpose (as an enlarger and a projector). This
enlarger can take all types of negative sizes.

(c) The maximum size photo that can be printed is 30cm x 40cm.

3. INSTITUTE OF AFRICAN STUDIES

(a) Space of photo lab is approximately 8 sq. meters.
Facilities that exist is the same as that of the Geology Department.

These photo labs mostly print pictures taken from fieldwork under-
taken by both lecturers and students.

It is proposed that a better equipped photo lab be esta-
blished as part of the Remote Sensing Unit which will be based in
the Department of Geography. The intention is to print black and
white as well as colour satellite imagery and conventional aerial
photographs of various scales. The Department has a large room
which can be used for the photo lab. It measures about 10 meters
by 8 meters.

Dr. Leon OKIO,
Director General,
Regional Remote Sensing Centre,

Centre Régional de Télédétection
B.P. 1702 QUAI DE LA LIBERTÉ

Arrivée 30 JUIL 1986

SOUS N. 486/H2103

Professor G. Benneh
Pro-Vice-Chancellor
University of Ghana
Legon, Accra
Ghana

PROJET DE LETTRE

Dear Professor Benneh,

Reference your letters of June 13 and July 18, 1986, please find attached the following documents:

- Attachment A: List of equipment.
- Attachment B: Suggested list of remote sensing publications and training films.
- Attachment C: Outline for a Project Identification Document.

Regarding Attachment C, we have outlined for your guidance, some of the salient issues that should be addressed. We feel that this document could be more effectively completed by your staff.

With reference to your letter of July 18, 1986 regarding the installation of a photographic laboratory as a part of the remote sensing unit, our photographic engineer is not presently here to provide detailed information and will not be back until at least October 1986. We can say, however, the approximate cost of a photographic laboratory such as you envision would be U.S. \$ 130,000.00. In addition there would be the costs involved in installing and modifying such items as plumbing, electricity, and structure of the area proposed to house the laboratory. A cost estimate would require on-site inspection.

Please note that the grand total of \$ 58,694.00 is the cost to establish a 12 station remote sensing unit.

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If we can be of further assistance, please feel free to contact us.

Sincerely yours,

Leon Okio
Director General

Attachs.: a/s

ATTACHMENT A

LIST OF EQUIPMENT

1. MICROCOMPUTER

VIP- Video Image Processor(V-1000)	
S-100 bus microcomputer chassis complete with video interface circuitry and Z80 based CPU	
Color RGB monitor with 13-inch screen diameter	
Parallel Interface Host Adaptor board for use .with PC	
RIPS program package one containing more than 30 image processing programs based on original U.S. Government software	
Operator's manual	\$ 7,400.00
IBM XT equivalent configured with the following:	
512 memory	
2 Floppy drives	
20 MEG hard disk	
Monochrome Adaptor Board	
Amdek 310A Monitor	\$ 3,850.00
Uninterruptible power supply MS-600	\$ 1,650.00
Shipping/Insurance/Handeling	\$ 2,000.00
<u>TOTAL</u>	<u>\$ 14,900.00</u>

Manufactured by: DIGITAL IMAGE INC.
1595B Ocean Ave.
Bohemia, New York, 11716, U.S

<u>ITEM</u>	<u>UNIT PRICE</u>	<u>QUANTITY</u>	<u>COST</u>
Drafting/Work Table (37 1/2"X48")	\$ 225.00	12	\$ 2,700.00
Drafting stools	\$ 45.00	12	\$ 540.00
Light tables	\$ 400.00	4	\$ 1,600.00
Drafting lamps	\$ 50.00	12	\$ 600.00

<u>ITEM</u>	<u>UNIT PRICE</u>	<u>QUANTITY</u>	<u>COST</u>
Flat file-5 drawers(36"X47")	\$ 300.00	3	\$ 900.00
Materials and small equipment storage cabinet(43"X18"X65")	\$ 400.00	1	\$ 400.00
Color transparency Diaz processing and developing system	\$ 2,500.00	1	\$ 2,500.00
Mirror stereoscope	\$ 900.00	6	\$ 5,400.00
Parallax bar	\$ 150.00	3	\$ 450.00
Pocket stereoscope	\$ 40.00	12	\$ 480.00
Map-0-Graph for scale change	\$ 3,500.00	1	\$ 3,500.00
ARS Mini-Courses inc- cluding slides and tapes Purdue University, U.S.	\$ 152.00	25	\$ 3,800.00
5 mm Audio-Visual slide projector and screen	\$ 450.00	1	\$ 450.00
Transparency overhead projector	\$ 200.00	1	\$ 200.00
Set of 1:50,000 scale topographic maps of Ghana	\$ 2.00	230	\$ 460.00
Compass/Clinometer	\$ 95.00	3	\$ 285.00
8 mm Camera	\$ 150.00	2	\$ 300.00

<u>ITEM</u>	<u>UNIT PRICE</u>	<u>QUANTITY</u>	<u>COST</u>
T-Square	\$ 15.00	12	\$ 180.00
30o/60o Triangle	\$ 2.00	12	\$ 24.00
45° Triangle	\$ 2.00	12	\$ 24.00
Ruler	\$ 1.00	12	\$ 12.00
Clipboard	\$ 5.00	12	\$ 60.00
Protractor	\$ 1.00	12	\$ 12.00
Lettering stencil set	\$ 15.00	12	\$ 180.00
Lettering pen. set	\$ 25.00	12	\$ 300.00
Drafting paper and plastic overlay roll	\$ 20.00	15	\$ 300.00
Pencils, erasers ink, etc..	\$ 6.00	12	\$ 72.00
Chromatic Diase film(yellow, magenta, cyan)	\$ 35.00	9	\$ 315.00
Landsat photographic products and data disks			\$ 10,000.00
Shipping cost			\$ 5,000.00
		<u>TOTAL</u>	<u>\$ 41,044.00</u>

Most of the above items can be obtained from:
Forestry Suppliers Inc., 205 W. Rankin St/Box 8397, Jackson
Mississippi 39204, U.S.A

or:

Ben Meadows Company
3589 Broad Street, Atlanta, Georgia 30366, U.S.A.

Please note that the sum of \$ 41,044.00 is the cost of furnishing, equipment and supplies for a twelve station remote sensing training laboratory of approximately 1,000 square feet.

ATTACHMENT B

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SUGGESTED LIST OF REMOTE SENSING PUBLICATIONS

<u>TITLE</u>	<u>AUTHOR</u>	<u>PUBLISHER</u>
Remote Sensing and Image Interpretation	Thomas M. Lillesand and Ralph W. Kiefer	John Wiley and Sons Inc., Publisher, New York, 1979
Remote Sensing Principles and Interpretation	Floyd F. Sabins Jr.,	W.H. Freeman and Co., Publisher, San Francisco, 1978
Remote Sensing of Earth Resources	Bryan M. Leonard	Detroit Gale Research, 1979
Remote Sensing and Ecosystem Management	Lavigne, D.M.	John Wiley and Sons, New York, 1979
Introduction to Remote Sensing of the Environment	Richason, B.F.	Oubuque, Iowa, Kendall-Hunt, 1978

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<u>TITLE</u>	<u>AUTHOR</u>	<u>PUBLISHER</u>
Remote Sensing: The Quantitative Approach	Swain, P.H.	Mc Graw, New York, 1978
Terrain Analyses and Remote Sensing	Townshend, J.R.	Allen University, New York, 1981
Computer Image Pro- cessing and Recognition	Ernest L. Hall	Academic Press, New York, 1979
Photogrammetry	Frances H. Moffitt and E.M. Mikhail	Harper and Row, New York
Proceedings of the Fall Convention 1982, 1983, 1984, 1985		American Society for Photo- grammetry and Remote Sensing, 210 Little Falls St., Falls Church, VA 22046, U.S.A.

TITLE

AUTHOR

PUBLISHER

Civil Engineering Applications
of Remote Sensing

American Society of Civil Engi-
neering, New York, 1980

Remote Sensing Applications
for Mineral Exploration

William Smith, Ed.

Academic Press

Remote Sensing for Environ-
mental Sciences

Erwin Schanda, Ed.

Springer Verlag, 1976

Photogeological Regional
Mapping

J.A.E. Allum

Pergamon Press

Remote Sensing Laboratory
Manual

Floyd F. Sabins, Jr.

Remote Sensing Enterprises,
P.O. Box 2893, La Habra, CA,
U.S.A.

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<u>TITLE</u>	<u>AUTHOR</u>	<u>PUBLISHER</u>
Bibliography of Remote Sensing in Forestry	Brian J. Myers and Ian E. Craig	Division of Forest Research, CSIRO, P.O. Box 4008, Canberra, A.C.T. 2600 Australia
Manual of Remote Sensing	Second Edition	American Society for Photogram- metry and Remote Sensing, 1983
Remote Sensing in Geology	Barry S. Siegal and Allan R. Gilespe	John Wiley and Sons Inc., New York, 1980
Proceedings of the 17th, 18th and 19th Interna- tional Symposium on Remote Sensing of Envi- ronment	Center for Remote Sensing Information and Analysis, Environmental Research Institute of Michigan, Ann Arbor, Michigan, U.S.A.	
Journal of Photogrammetric Engineering and Remote Sensing	American Society for Photogrammetry and Remote Sensing, Falls Church, VA, U.S.A.	

<u>TITLE</u>	<u>AUTHOR</u>	<u>PUBLISHER</u>
International Journal of Remote Sensing	Taylor and Francis Ltd, Rankine Road, Basingstoke, Hants RG24 OPR, United Kingdom	
Multilingual Dictionary of Remote Sensing	American Society for Photogrammetry and Remote Sensing, Falls Church, VA, U.S.A.	
Extraction of Information from Remotely Sensed Images	American Society for Photogrammetry and Remote Sensing, Falls Church, VA, U.S.A.	
Remote Sensing in Civil Engineering	T.J.M. Rennie and M.C. Mathews, Editors	University of Surrey, U.K., John Wiley and Sons Inc.
Theory of Microwave Remote Sensing	Leung Tsang and Jin A. Kong	John Wiley and Sons Inc.
Satellite Oceanography	I.S. Robinson	John Wiley and Sons Inc.

2

<u>TITLE</u>	<u>AUTHOR</u>	<u>PUBLISHER</u>
Mapping for Aerial Photographs, 2nd Edition	C.D. Burnside	John Wiley and Sons Inc.
Satellite Microwave Remote Sensing	T.D. Allan, Editor	John Wiley and Sons Inc.
Remote Sensing in Meteo- rology, Oceanography, Hydro- logy	A.P. Cracknell	John Wiley and Sons Inc.
Computer-Aided Data Analysis	William R. Green	John Wiley and Sons Inc.

REMOTE SENSING TRAINING FILMS

Mineral Exploration, 'The Use of Remotely Sensed Data, 16 mm film		American Society for Photo- grammetry and Remote Sensing
Vegetation Assessment, 'The Use of Remotely Sensed Data	"	"

Total cost of publications inclusive of sea freight: \$ 2,750.00

ATTACHMENT C

OUTLINE FOR A PROJECT IDENTIFICATION

DOCUMENT

Project Summary

A brief summary of the project describing effects and benefits should be outlined.

Title of Project

Should state the project's official title, i.e. Remote Sensing Unit, University of Ghana, Legon, Ghana.

Departments Concerned

Departments of Geography and Geology.

Project Objectives

a. To train Ghanian scientists(university undergraduates, graduates and government employees) in remote sensing technology and applications.

b. Conduct remote sensing surveys and studies in the context of ongoing and future developmental projects in Ghana, i.e. desertification monitoring, coastal erosion, geological mapping etc..

Project Purpose

To conduct training, research and operational projects in Ghana, with the objective of mapping, inventorying and monitoring the natural resources.

Cost and Financing

Total cost: U.S. \$ 58,654.00

Source of funding: Government of Ghana, USAID, World Bank, FAO, UNDP.

Expected Project Impact

This part should describe in detail the expected benefits on the educational aspects as well as national developmental projects.

Project Management and Organization

This part should contain a description and organization chart showing responsibilities allocated to different university officials for project implementation and management.

PROJECT SUMMARY

Date :

Reference No. :	Title of project :	
-----------------	--------------------	--

Country :	Region :	District :
-----------	----------	------------

Departments concerned (complete address of responsible person) :

Project objectives :

Estimated total cost :

External financing requested :

Summary description of project :

Project Duration :

Expected implementation date :

Amount already committed : _____

Donors :

contacted -----

already involved -----

Established by (name, title) :
Signature :

Documents available :

Yes No



N° 297 / CRTO/DAU *off*

ATTACHMENT E

Ouagadougou, le 22 JUIL. 1966

LE DIRECTEUR GENERAL
The Director General

(ARM) 7/29

LETTER # 0735

USAID / BURKINA FASO

Rec'd 7/23

ACTION: *RLO/CRTO*

DUE DATE: *8/5*

DISTRIBUTION: *DIR*
OPR OFM CHRON
NAN:

REMARKS: *Reply sent July 25*

Sent to Mr. Lucke July 25

Copy

to Mr. Herbert MILLER
Director
USAID/BURKINA
OUAGADOUGOU

Réf. :

Objet :

Dear Mr. MILLER,

Please find attached a list of spare parts, chemicals and products which represent the immediate need of the photographic laboratory. I understand that the total cost, including shipping is approximately U.S. \$ 35,000.

Would you kindly make the necessary arrangement to order these supplies as soon as convenient.

Thanking you in advance for your assistance and cooperation.

Sincerely yours,

[Signature]
Léon OKIO
CENTRE REGIONAL DE RECHERCHE ET D'INSTRUCTION DE OUAGADOUGOU
Le Directeur Général

Attach. : a/s

FROM KODAK

- 1 - 4 RLS 40" x 100' KODABROME II RC CONTRAST 1
- 2 - 3 RLS 40" x 100' " " " " 2
- 3 - 1 RLS 40" x 100' " " " " 3
- 4 - 4 RLS 40" x 100' " " " " 5
- 5 - 5 BOX 16" x 20" 50 SH " " " " 1
- 6 - 10 BOX 16" x 20" 50 SH " " " " 2
- 7 - 2 " " " " " " " " 3
- 8 - 10 BOX 16" x 20" 50 SH " " " " 4
- 9 - 3 BOX 16" x 20" 50 SH " " " " 5
- 10 - 20 BOX 10" x 10" 50 SHEET 4421 AEROGRAPHIC DUP FILM
- 11 - 2 RL 36" x 100' KODAGRAPH PROJECTION POSITIVE FILM
PP4
- 12 - 2 RL 42" x 100' KODAGRAPH PROJECTION FILM P4
- 13 - 25 EA D-19 DEVELOPER 1 GAL SIZE
- 14 - 15 EA KODALITH DEVELOPER 1 GAL SIZE
- 15 - 25 PAIR PHOTOGRAPHIC COTTON GLOVES LARGE
- 16 - 1 EA KODAK PUBLICATION OF THE FOLLOWING
- L-5 -- INDEX
 - R-50 -- PRODUCTS
 - R-50 -- PRICE LIST
 - G-50 -- COMPASS
 - J-80 -- R3, R-3000 PROCESS

19

23

Z-119A -- E-6

Z-129 -- R-3. R-3000 CHEM

17 - 6 BOX 16" x 20" 50 SH EKTACOLOR PLUS PAPER
18 - 2 " 10 x 10 50 SH " " "
19 - 6 BOX 16" x 20" 50 SH EKTACHROME 21 PAPER
20 - 20 EA EKTACHROME R-3000 FIRST DEVELOPER 1 GAL
21 - 20 EA EKTACHROME R-3000 COLOR DEVELOPER 1 GAL
22 - 20 EA EKTACHROME R-3000 BLEACH FIX 1 GAL
23 - 20 EA EKTAPRINT 200 DEVELOPER 1 GAL
24 - 2 EA " " " 3 1/4 GAL
25 - 20 EA EKTAPRINT 2 BLEACH FIX 1 GAL
26 - 10 EA FLEXICOLOR DEVELOPER 1 GAL
27 - 10 EA FLEXICOLOR BLEACH 1 GAL
28 - 2 EA KODAK OPAQUE 146 - 4312
29 - 20 EA FLEXICOLOR FIX 1 GAL
30 - 10 EA EKTACHROME FILM PROCESSING KIT PROCESS E-6
1 GAL

KODABROME II RC 10 x 10

31 - 1 EA 250 SH 10 x 10 N-1 180 - 8153
32 - 1 EA " " " N-2 192 - 3580
33 - 1 EA " " " N-3 192 - 3413
34 - 5 EA 4108 VARICOLOR II 8 x 10 10 SH
35 - 1 EA COLOR PRINT VIEWING KIT KODAK

- 36 - 50 PKG OF 50 SHEET KODAK LENS CLEANING PAPER 154-6027
- 37 - 2 PKG 10 SH 8 x 10 VARICOLOR PRINT FILM 4111
122 - 1373
- 38 - 1 PKG 10 SH 16 x 20 VARICOLOR PRINT FILM 4111
- 39 - 1 EA KODAK ACHROMATIC MAGNIFIER 5 x 147-9336
- 40 - 1 EA 50 SH 8 1/2 x 11 KODALITH AUTOSCREEN
ORTHO FILM 2563 198-8062
- 41 - 1 EA 100 SH 8 x 10 KODALITH PAN FILM 2568
- 42 - 1 RL 36 x 100 KODAK PRECISION LINE FILM LP7
- 43 - 1 RL 30 x 100 KODAK PRECISION LINE FILM LPD7
169-4629

FROM KING CONCEPTS FOR IMAGE MAKER

TWO SER NO. 2626 220 V 50 HZ

- 44 - 2 EA 11007 TIMING BELT PULLEY
- 45 - 1 EA 20133 FILLER TUBE SUPPORT ASSY
- 46 - 1 EA 10796 KNOB ASSY
- 47 - 2 EA 20511 EXTENSION SHAFT ASSY WITH PULLEY FOR
TIMING BELT
- 48 - 2 EA 10439 LEFT END CRADLE BEARING
- 49 - 1 EA 0205-0007 3/8" ID x 1/2" LONG EVLON BEARING
- 50 - 1 EA 20246 CRADLE MOTOR ASSY
- 51 - 1 EA 30074 CABINET HEATER FAN
- 52 - 10 EA 0201-1764 STAINLESS 10-32 x 2" PAN HEAD MACHINE SCREWS

- 54 - 1 EA 10001A POWER SUPPLY BOARD (PC)
- 55 - 2 EA 20250 LEVEL SWITCH ASSY
- 56 - 1 EA CHEMICAL RECOVERY SYSTEM
- 57 - 1 EA PROGRAM R-3000
- 58 - 2 EA FILM HOLDING BAR 8 INCH INCLUDE SCREWS FOR
5 x 10 TANK
- 59 - KING CONCEPTS
FOR IMAGE MAKER SER NO. 1433 110 V 50HZ
- 59 - 1 EA 91028 PUSH BUTTON SWITCH - LIGHTED - DOUBLE
POLE-MOMENTARY ACTION
- 60 - 1 EA 10403 PUMP
- 61 - 4 EA 10317 THERMAL FUSE
- 62 - 1 EA 30075 CABINET AIR TEMP CONTROL ASSY
- 63 - 2 EA 10402 FLOAT SWITCH ASSY
- FOR PRE-HEATER
- 64 - 2 EA 91057 RELAY
- 65 - 2 EA 91062 RESISTOR 10K 2W
- 66 - 2 EA 91055 INTEGRATED CIRCUIT
- 67 - 2 EA 91026 TRIAC
- 68 - 1 EA 20073 PRINTED CIRCUIT BOARD
- 69 - 1 EA 20056 500W HEATER

FROM X-RITE CO.

4101 RODGER B. CHAFFE DR. S.E.

GRAND RAPIDS MI 49508

70 - 1 EA PC BOARD ASSY PART 606-01 FOR MODEL 606 NO
165 220V 50HZ SILVER RECOVERY UNIT
1 EA POWER TRANSFORMER

SEARS

71 - 1 EA 3/8 IN DRILL 9HT 1112 CORDLESS REVERSIBLE

72 - 1 EA POWER PACK 9HT 11121

73 - 1 EA 30 PC SCREWDRIVER - BIT SET 9HT 25654

74 - 5 EA DRILL BIT 1/16 9HT 66901

75 - 4 EA " " 5/64 9HT 66902

76 - 2 EA " " 13/64 9HT 66911

77 - 2 EA " " 7/32 9HT 66912

78 - 1 EA " " 1/4 9HT 66914

79 - 1 EA WIRE WHEEL BRUSH FINE 9HT 64972

80 - 1 EA SAW SABRE 9HT 17209

81 - 1 EA DRILL PRESS 10 IN 9 HT 21333 E

82 - 1 EA SCREW STARTER 9 HT 41024

83 - 2 EA LIGHT 9 HT 93195

84 - 1 EA MAGNIFIER 9 HT 3636

85 - 1 EA HEX KEY SET 9HT 46675

86 - 1 EA 9 KEY SET 9 HT 46283 STD

87 - 1 EA BIT SET 9HT 45163

88 - 1 EA SOLDERING IRON 9HT 51049
89 - 1 EA CENTER PUNCH 9HT 40541
90 - 1 EA INSPECTION MIRROR 9 HT 4098
91 - 2 EA WIRE BRUSH 9 HT 3665
92 - 1 EA SOLDER GUN 140 W 9HT 54036
93 - 1 EA TAP - DIE METRIC SET 9 HT 52008
94 - 6 EA TAP 4-40 9 HT 52192
95 - 2 EA TAP 6-32 9 HT 52194
96 - 2 EA TAP 8-32 9 HT 52196
97 - 2 EA TAP 10-32 9 HT 5220
98 - 2 EA TAP 10-24 9 HT 52198
99 - 1 EA TAP WRENCH 9 HT 4065
100 - 1 EA HACK SAW 9 HT 3554
101 - VOID
102 - 2 PKG SAW BLADES 9 HT 65854
103 - 2 PKG SAW " 9 HT 65852
104 - 1 EA TAPER REAMER 9 HT 5479
105 - 1 EA WRENCH PIPE 14 IN 9 HT 30842
106 - 1 EA STEEL RULE 9 HT 40991
107 - 2 EA CLAMPS 6 IN 9 HT 66726
108 - 1 EA SAW 10 FINE 9 HT 36215 C
109 - 1 EA ELECTRICAL TERMINAL KIT 9 HT 82151
110 - 1 EA ELECTRICAL TOOL 9 HT 6092

111 - 1 EA WORKLIGHT SET 5922
112 - 1 EA COLDF CHISEL 7/8 9HT 42976
113 - 1 EA ADJUSTABLE BENCH 4 IN 9 HT 44602
114 - 1 EA " " 8 IN 9 HT 44603
115 - 1 EA " " 10 IN 9 HT 44604
116 - 2 EA BRUSH 9 HT 41802
117 - 1 EA WRENCH SET SET 49661
118 - 1 EA 3/8 IN DRIVE BENCH SET 9 HT 44047
119 - 1 EA HAMMER 9 HT 3825
120 - 1 EA PLASTIC TIP HAMMER 9 HT 38292
121 - 2 EA VINYL TIP 9 HT 38296
122 - 2 EA VINYL TIP SOFT 9 HT 38297
123 - 1 EA METRIC SOCKET SET 9 HT 44438
124 - 1 EA 3/8 IN RATCHET 9 HT 43781
125 - 1 EA 13/16 SOCKET 9 HT 43325
126 - 1 EA 3 PC PLIER SET 9 HT 45285
127 - 1 EA ELECTRICAL PLIER 9 HT 45091
128 - 1 EA ARC JOINT 9 HT 45381
129 - 1 EA DIAGONAL 9 HT 4516
130 - 1 EA LONG NOSE CUTTER 9 HT 4518
131 - 1 EA BENT NOSE CUTTER 9 HT 4519
132 - 1 EA X LONG NOSE 9 HT 4517

- 133 - 1 EA COMPOUND SNIP 9 HT 42785
- 134 - 1 EA NO 2 PHILLIPS 9 HT 41296
- 135 - 4 EA #D - 40 90Z 9 HT 55784
- 136 - 4 EA SILICONE 9 HT 55763
- 137 - 2 RLS .40" x .100' DRY MOUNTING TISSUE
- 138 - 2 EA PARA-MAG COLLIMATING MAGNIFIER
7 X TOBIAS
- 139 - 12 EA FUSE 3 AG 1/4 AMP 250 V
- 149 - 4 BX DRY ERASE MARKERS BLACK
- 150 - 4 BX " " " 4 COLOR
- 151 - 4 EA SPRAY -O-NAMEL RUST PREVENTION
SPRAY PAINT 13 OZ EACH SPRAY
- 152 - 12 EA 3 AG 0.8 A 220V SLO-BLOW FUSE
- 153 - 1 EA VOLTAGE STABILIZER FOR DURST 184
ENLARGER CLS 301 COLOR HEAD 220 V 50HZ
- 154 - 1 EA VOLTAGE STABILIZER FOR IMAGE MAKER
110V 50 HZ
- 155 - 1 EA VOLTAGE STABILIZER FOR CLIMAGE MAKER
TWO 220V 50 HZ
- 156 - 1 EA 45" x 45" VACUUM EASLE WALL MOUNT
WITH VACUUM SOURCE
- 157 - 1 EA 30" x 40" VACUUM EASLE FOR DURST 184
WITH PUMP
- 158 - 100 FT HEAVY DUTY 3 CONDUCTOR WIRE 14 GA
- 159 - 1000 EA HEAVY DUTY 10 1/2" x 10 1/2" NEG
ENVELOPES

160 - 10 RLS ELECTRICAL TAPE

161 - 2 EA 2 OZ LOCK TITE ADHESIVE

162 - 12 TUBES SILICONE ADHESIVE

163 - 20 FT POLYVINAGE VINYL PLASTIC TUBING 1/8 INCH ID

FROM LITTLE GIANT PUMP .CO. , TELEPHONE 9 405)947-2511

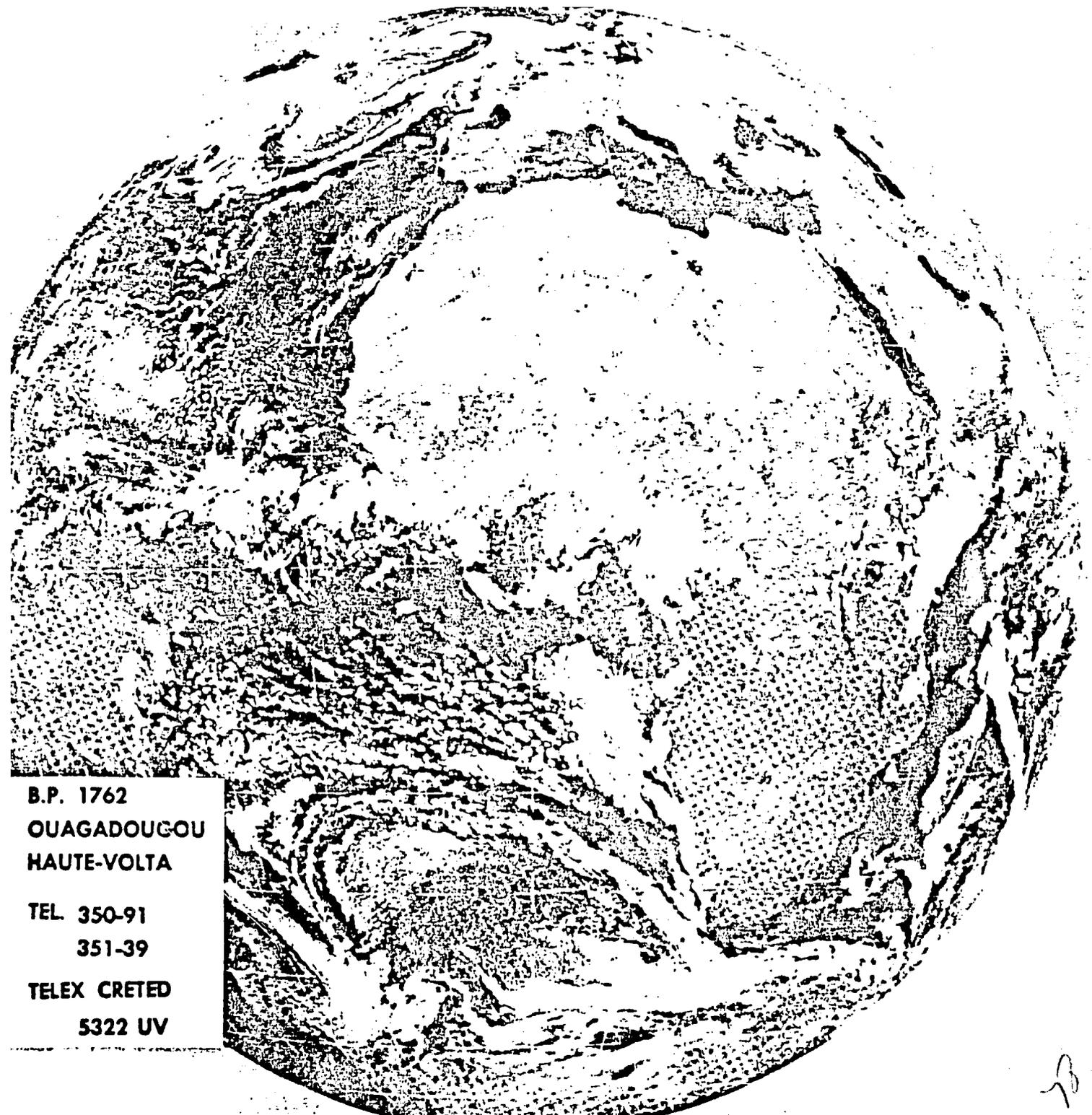
164 - 2 EA 181123 IMPELLER ASSY

165 - 1 ROLL 40"X 100' DRAFTING FILM MATT 2 SIDES

166 - 1 ROLL 40"X100' DRAFTING FILM CLEAR

**CENTRE REGIONAL DE TELEDETECTION
REGIONAL REMOTE SENSING CENTRE**

ATTACHMENT F

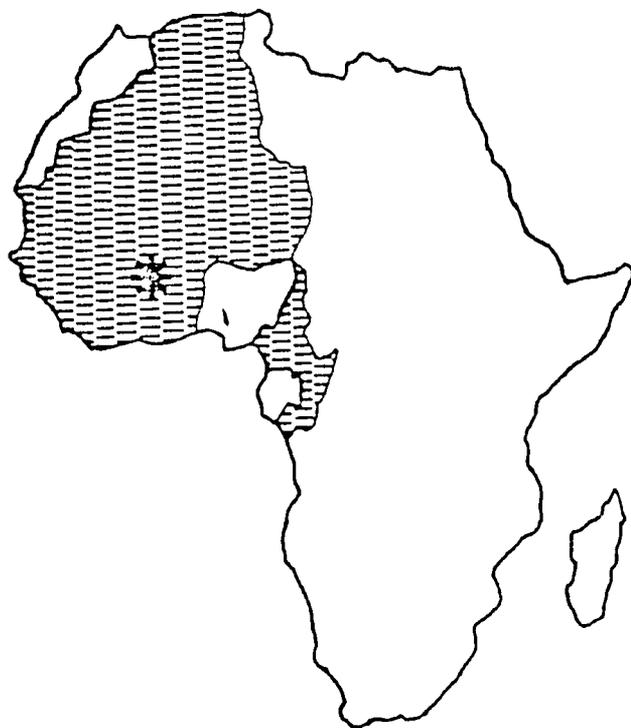


**B.P. 1762
OUAGADOUCOU
HAUTE-VOLTA
TEL. 350-91
351-39
TELEX CRETED
5322 UV**

B

REGIONAL REMOTE SENSING CENTRE
(R.R.S.C)

CENTRE REGIONAL DE TELEDETECTION,
OUAGADOUGOU
BURKINA FASO



P. O. BOX 1762
OUAGADOUGOU
TEL. 33-50-91
33-51-39
33-49-45

BURKINA FASO

TELEX: CRETED 5322BF

APRIL 1986

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REGIONAL REMOTE SENSING CENTER
(R R S C)

OUAGADOUGOU, BURKINA FASO

ESTABLISHED

March 1977, in Kinshasa, through article 313 of the United Nations Economic Commission for Africa.

FIFTEEN
MEMBER-STATES

ALGERIA, BENIN, BURKINA FASO, CAMEROON, CONGO, IVORY COAST, GHANA, GUINEA, LIBERIA, MALI, MAURITANIA, NIGER, SENEGAL, SIERRA LEONE, TOGO.

LEGAL STATUS

The Regional Remote Sensing Center in Ouagadougou is a subsidiary body of the African Remote Sensing Council. It is managed by a Ministerial Committee where each member-state has a representative. The Center has :

- A Director General
- Administrative and Financial Department
- Training Department
- User Assistance Department.

OBJECTIVES

To promote and develop the use of remote sensing among member-states by :

- Conducting Anglophone and Francophone remote sensing training courses.
- Undertaking marketing and sensitization missions.
- Technical assistance and support.
- Acquisition, archiving, processing and dissemination of remotely sensed data.

FINANCIAL STATUS
OF THE CENTER

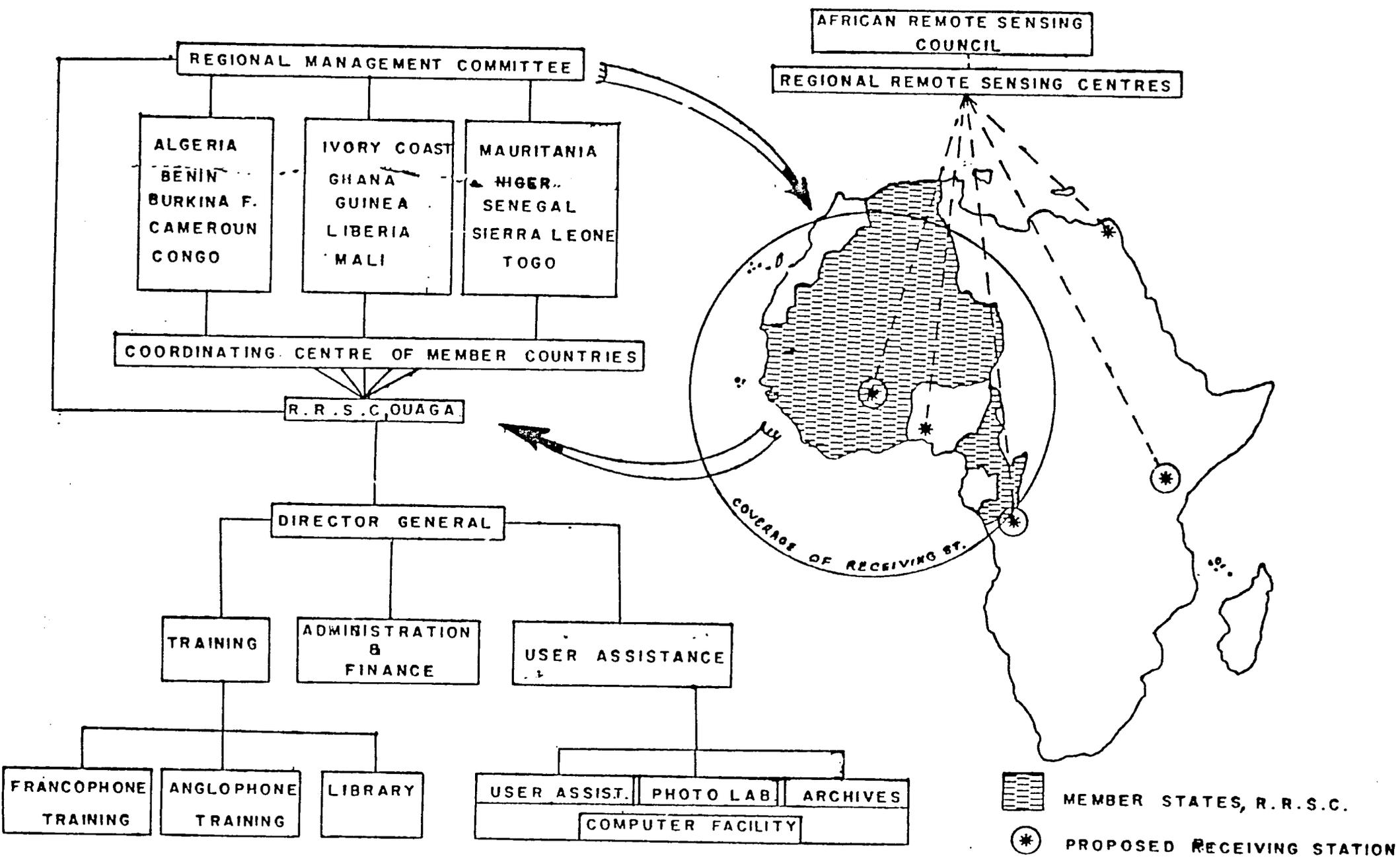
- Budget for FY 86	U.S. \$ 1,000,000
- Contribution by member-states	U.S. \$ 440,000
- Contribution by USAID since 1978	U.S. \$ 3,100,000
- Contribution by French Government per year	U.S. \$ 400,000

OPERATING -
ORGANIZATIONS

African Organizations : AGRHYMET, CEAO, CIEH, CILSS, EIER, ETSSHER, LIPTAKO-GOURMA.

International Organizations : EEC, EDF, FAO, WMU, WHO, UNDP, UNDE, UNESCO, UNICEF, UNSO.

Remote Sensing Institutions : GDIA, CNES, ORSTOM, CIRAD, French Universities, EROS DATA CENTER (U.S.), DFVLR (West Germany), ITC (Holland).



57

STATUS OF ACTIVITIES

1977 - 1986

Objectives : - Provide training facility to scientists and technicians from West and Central African states, thus enabling them to use remote sensing techniques in their respective fields.

- Sensitize decision makers, planners, managers, scientists and students on the latest development of remote sensing techniques and applications.

Facility and Staffing

- A cadre of African remote sensing experts and foreign (French and U.S.) scientists are responsible for conducting remote sensing courses.
- The following equipment is available to the trainees at the Center : digital image processing facility, mapograph, portable field radiometer, mirror and pocket stereoscopes, light tables.
- Six-month applied remote sensing courses are offered every year in both French and English.
- Specialized courses of 3 to 12 months are offered on photographic processing. Duration of course may be adjusted by request.
- Research projects are offered in cooperation with academic institutions.
- Seminars on remote sensing technology and applications are regularly conducted.

Admission : - Applicants of all nationalities who meet the requirements are accepted. Tuition fees are from U.S. \$ 1,400 - 2,800 per month, depending on type of course and duration.

Statistics on Training

From July 1978 till April 1986, 20 remote sensing training sessions have been conducted. Duration of each session was between 3 to 6 months.

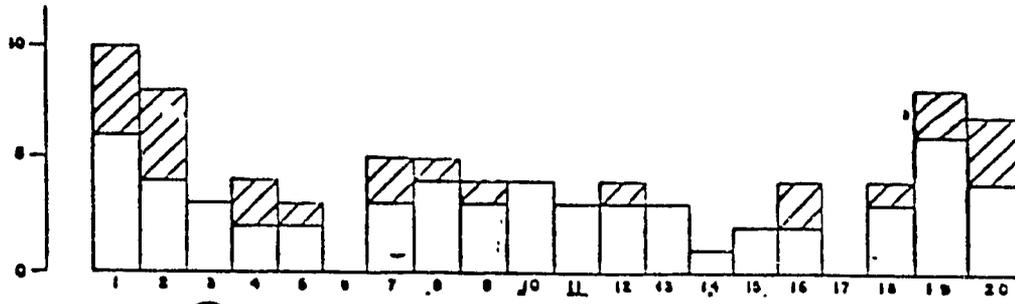
A total of 210 African scientists and technicians have been trained at the Center (See diagram on page 4).

Ten photo lab technicians have been trained.

GV

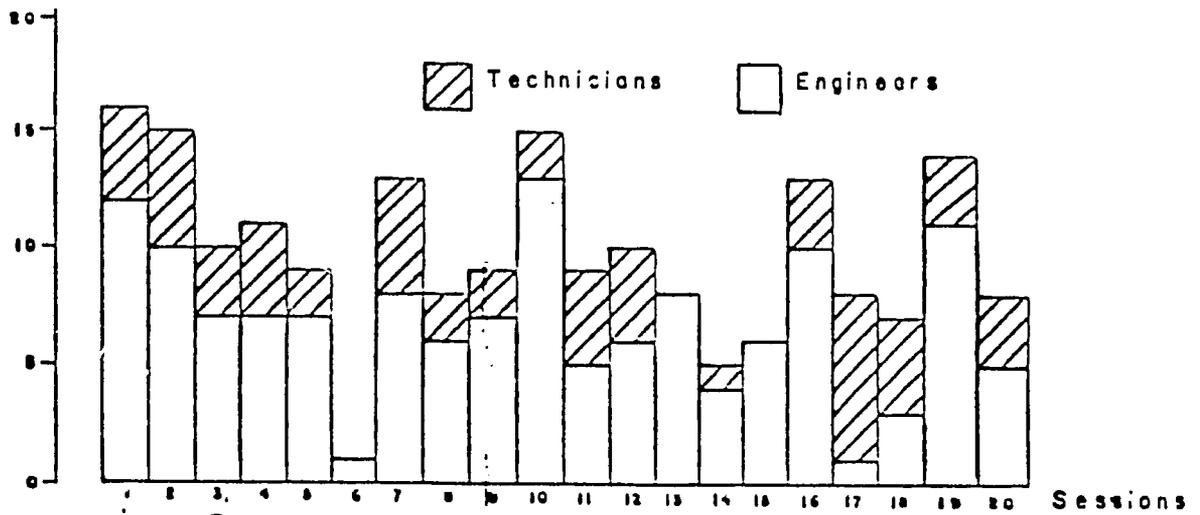
R.R.S.C: TRAINING

No. of Trainees



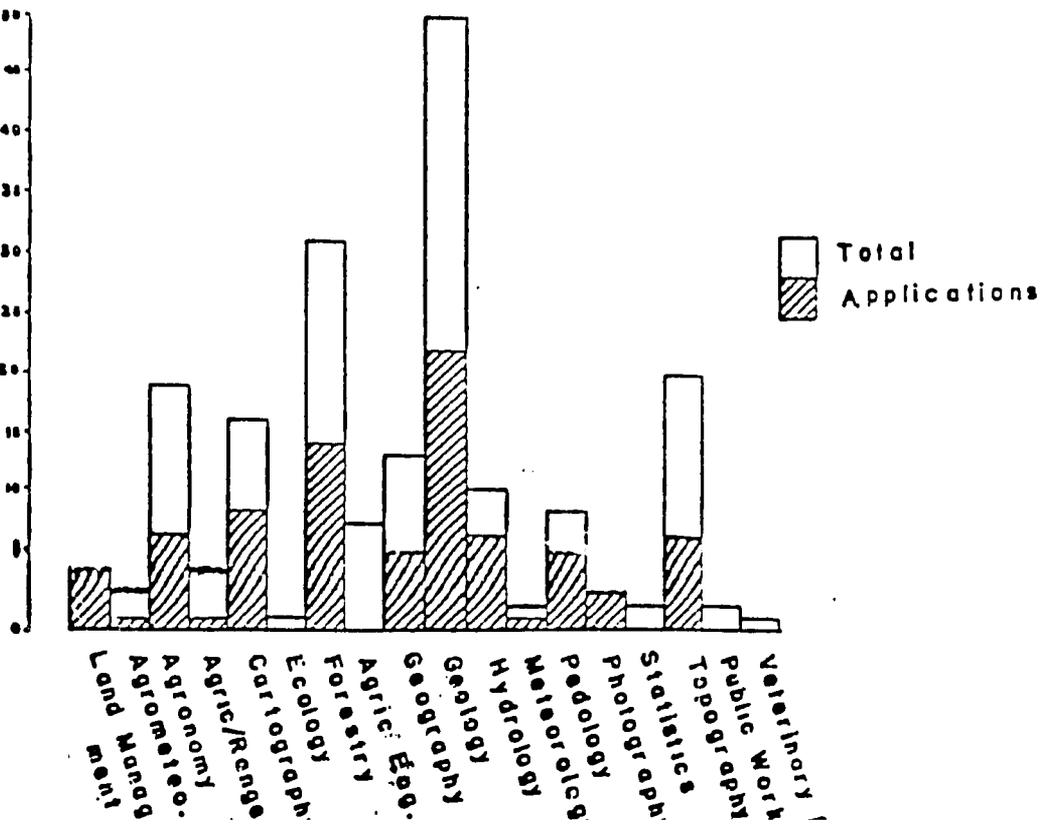
① Number of Training Sessions in Remote Sensing Applications

No. of Trainees



② Introduction to Remote Sensing Applications

No. of Trainees



Objectives

Promote the use of remote sensing technology by :

- Providing technical guidance to scientists and decision makers
- Offering consulting services
- Conducting R and D activities
- Assisting the Training Department
- Conducting seminars outside the Center.

Personnel

A cadre of remote sensing specialists, with backgrounds in geology, hydrogeology, agriculture/range management, soil science and cartography.

Projects implemented

From 1978 till April 1986, over 150 projects were completed (See diagram on page 7). However, since 1984 there has been a considerable increase in number of developmental projects completed by the Center. The cost of conducting these studies varied between U.S. \$ 3,000 - 6,000 (for small projects) to over \$ 25,000 (for regional projects).

Photographic Laboratory

A fully equipped photographic laboratory with black and white, as well as, color production capabilities. Since its operation in 1979, over 1,200 imagery have been reproduced for customers and internal use.

Reference library

Over 500 references, including reports published by the Center are available.

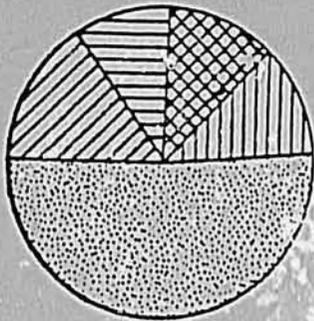
Archives

Established in 1984, it contains over 1,000 satellite imagery and aerial photographs of West Africa. Furthermore, there are some 1,000 topographic, thematic, geologic, hydrologic maps available as well.

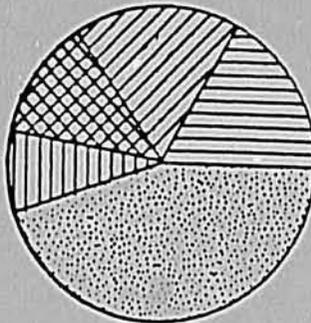
97

R. R. S. C : USER ASSISTANCE PROJECTS

No. of projects



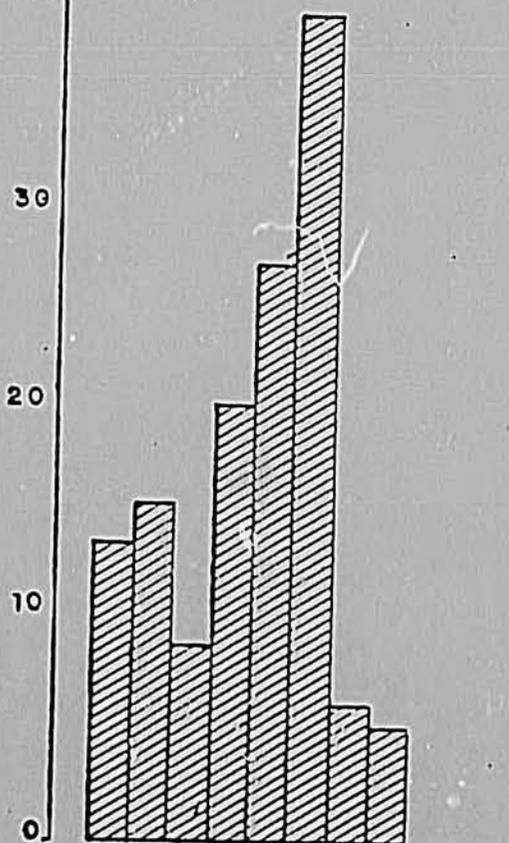
Distribution of activities



-  Application of R.R.S.C
-  Research & Development
-  Projects study
-  Training outside R.R.S.C.
-  Seminars & Sensitization missions.

① Distribution according to type of projects

No. of projects 40

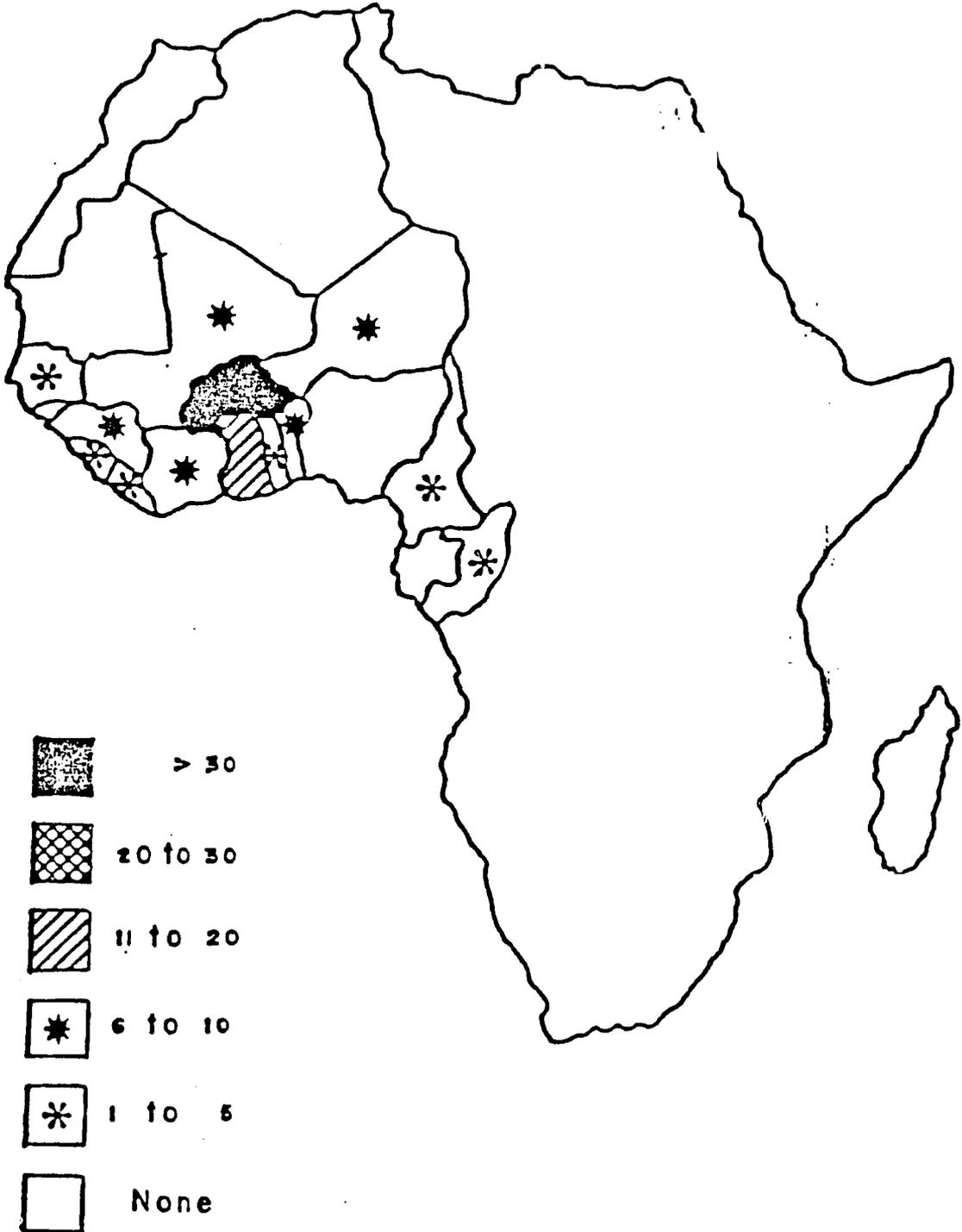


② Distribution by specialization

JS

R.R.S.C : USER ASSISTANCE PROJECTS

Number and Location



FUTURE PLANS

Since 1984, the Center has entered a new phase in its developmental history which entails :

- The establishment of receiving stations. The French Government has allocated U.S. \$ 4 million to co-finance a receiving station for the acquisition of SPOT and LANDSAT data. USAID is contemplating to invest U.S. \$ 700,000 for an HRPT receiving facility to acquire NOAA-AVHRR data.
- In 1987 a Geographic Information System (GIS) using an ERDAS microcomputer will become operational. The purpose of this system is to improve the capability of member-states to monitor, assess, analyze and manage their natural resources. Short courses on GIS will be conducted at the Center with the objective of assisting managers from various West African countries to organize in-country remote sensing/geobased demonstration projects relevant to the natural resources needs of their nation.
- Physical expansion of the Center, with the construction of amphitheaters, lecture rooms, and office space.
- Recruitment of additional remote sensing specialists.

Funding for the above activities will be assured through contribution by member-states and possibly donor agencies such as USAID, FAC, ACDI, World Bank, UNDP, UNSO, West German Government.

Towards the the end 1986, a nine-month remote sensing course will be offered. Furthermore, new courses are being offered in 1986 such as :

- Remote sensing applications to agricultural statistics.
- Remote sensing applications in hydrology and water resources management.
- Remote sensing applications in urban and rural planning.
- Cartographic analysis of demographic data.

Seminars will be conducted on the above mentioned topics, as well as, on sensor technology, desertification etc ...

The primary objective will be to concentrate on developmental projects to which remote sensing can make a significant contribution.

Regional and National Projects

- Natural resources inventory of large areas involving vegetation mapping, hydrogeological and soil studies.
- Comparative multitemporal studies encompassing ecological and demographic analysis.
- Crop forecasting and monitoring, agricultural statistics and famine early warning system.

Small Developmental Projects

- Multidisciplinary study of small regions.
- Site selection for water wells and small dams around villages.
- Environmental protection and analysis of early warning signs of desertification.
- Water and soil conservation ; preliminary and feasibility studies.
- Forest inventory, monitoring defoliation.
- Multitemporal analysis of urban and rural areas.

Other Planned Activities

- Compilation of references on the application of remote sensing by West African countries.
- Production of mosaics based on LANDSAT and SPOT imagery.
- Missions of sensitization to various African countries with the purpose of promoting the use of remote sensing.

ATTACHMENT G

**COMMODITIES SUPPLIED TO CRTO DURING THE
TWELVE MONTH PERIOD ENDING 31 AUGUST 1986.**

SPECTRAL DATA CORP.

1595B OCEAN AVENUE BOHEMIA, NY 11716 USA

No. 2526

DATE 7-8-86

SHIPPING MEMORANDUM

Centre Regional de Teledetection de Ouagadougou B.P. 1762 Ouagadougou, Burkina Faso	YOUR ORDER NO. L/C No. 698-042002 AID/afr-C-1521	OUR ORDER NO. 5073
	SHIP VIA Tom Luche to send via pouch to Ouagadougou	DATE 7-8-86

Postage \$ 3.18

QUANTITY	ARTICLES
1	Second Edition "Remote Sensing Laboratory Manual" By: Floyd F. Sabins, Jr.
1	Instructor's Key for Remote Sensing Laboratory Manual By: Floyd F. Sabins, Jr.

Signed _____

	NET WEIGHT	GROSS WEIGHT	DIMENSIONS	CUBE
LBS.	KG.	LBS.	KG.	

SPECTRAL DATA CORP.

1595B OCEAN AVENUE BOHEMIA, NY 11716 USA

No. 2521

DATE 6-20-86

SHIPPING MEMORANDUM

O Centre Regional de Teledetection de agadougou P. 1762 agadougou, Burkina Faso	YOUR ORDER NO. AID/afr-C-1521	OUR ORDER NO. 5073
	SHIP VIA Hand carried by Jim Sorenson	DATE 6-20-86

QUANTITY	ARTICLES
2 Boxes	Electrical Parts Radio Shack: # 12055 # 7967 # 7968 # 7969 # 7970 # 7971 # 7972 # 7973 # 21340 Aerographic Duplicating Film
Signed _____	

NET WEIGHT	GROSS WEIGHT	DIMENSIONS	CUBE
LBS. KG.	LBS. KG.		92

SF CENTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716 USA

No. 2505

DATE 6-3-86

SHIPPING MEMORANDUM

Peter Gilruth c/o Ben Mbugua 14 Roberta Lane Bellingham, MA 02019	YOUR ORDER NO.	OUR ORDER NO.
	AID/afr-C-1521	5073
	SHIP VIA	DATE
	Puralator \$ 18.50	6-3-86
	to be hand carried to Ouagadougou	

QUANTITY	ARTICLES
1	Photogrammetry by Francis H. Moffitt <i>Hopper P.O. 4433 \$ 40.45</i>
1	Remote-Sensing Applications for Mineral Exploration <i>"Smith" Academic Press P.O. # 4431 \$ 94.50 + ship. 1.89 96.39</i>
	for: Centre Regional de Teledetection de Ouagadougou L/C #698-042002

Signed

NET WEIGHT	GROSS WEIGHT	DIMENSIONS	CUBE
LBS. KG.	LBS. KG.		94

SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716

USA

No. 2531

DATE 8-7-86

SHIPPING MEMORANDUM

Centre Regional de Teledetection de Ouagadougou B.P. 1762 Ouagadougou, Burkina Faso	YOUR ORDER NO. L/C No. 698-042002 AID-afr-C-1521	OUR ORDER NO. 5073
	SHIP VIA Certified	DATE 8-7-86

QUANTITY	ARTICLES
1	"Proceedings of the Seventeenth International Symposium on Remote Sensing of Environment". Volumes I,II, and III.
1	"Proceedings of the Eighteenth International Symposium on Remote Sensing of Environment". Volumes I,II, and III
1	"Proceedings of the Fall Convention" (1982,1983,1984,1985)
1	"Photogeology and Regional Mapping" By: J.A.E. Allum
1	"Remote Sensing of Earth Resources" By: Bryan M. Leonard
1	"Terrain Analysis and Remote Sensing" By: Townshend J.R.
1	"Remote Sensing - The Quantitative Approach" By: Swain, P.H.
40	"Remote Sensing and Image Interpretation" By: Thomas M. Lillesand and Ralph W. Kiefer
30	"Remote Sensing Principles and Interpretation" By: Floyd F. Sabins Jr.
NOTE: These books are contained in five (5) boxes which are shipped together.	
Signed <i>Jackie Aremli</i>	

NET WEIGHT	GROSS WEIGHT	DIMENSIONS	CUBE
LBS. KG.	LBS. KG.		
	230 lbs		90

SHIPPING MEMORANDUM

BOHEMIA, NY 11716 USA No. 200-
 DATE 6-3-86

Dr. Paul Mika
 7209 16 Avenue
 Takoma Park, MD 20912

YOUR ORDER NO.
 AID/afr-C-1521

CUR ORDER NO.
 5073

SHIP VIA

DATE

Purolator # 18.50
 to be hand carried to Ouagadougou

6-3-86

QUANTITY

ARTICLES

1	Ernest L. Holl Computer Image Processing and Recognition	Academic Press P.O. 4431	\$ 36.50
1	Brion J. Myers Bibliography of Remote Sensing in Forestry 1956-1978		1.89
			\$ 38.39

For: Centre Regional de Teledetection de Ouagadougou
 L/C #698-042002

Signed *Laki Mendel*

NET WEIGHT

GROSS WEIGHT

DIMENSIONS

CUBE

SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716

USA

No. 2531

DATE 8-7-86

SHIPPING MEMORANDUM

Centre Regional de Teledetection de agadougou P. 1762 agadougou, Burkina Faso	YOUR ORDER NO. L/C No. 698-042002 AID-afr-C-1521	OUR ORDER NO. 5073
	SHIP VIA Certified	DATE 8-7-86

QUANTITY	ARTICLES
1	"Proceedings of the Seventeenth International Symposium on Remote Sensing of Environment". Volumes I,II, and III.
1	"Proceedings of the Eighteenth International Symposium on Remote Sensing of Environment". Volumes I,II, and III
1	"Proceedings of the Fall Convention" (1982,1983,1984,1985)
1	"Photogeology and Regional Mapping" By: J.A.E. Allum
1	"Remote Sensing of Earth Resources" By: Bryan M. Leonard
1	"Terrain Analysis and Remote Sensing" By: Townshend J.R.
1	"Remote Sensing - The Quantitative Approach" By: Swain, P.H.
40	"Remote Sensing and Image Interpretation" By: Thomas M. Lillesand and Ralph W. Kiefer
30	"Remote Sensing Principles and Interpretation" By: Floyd F. Sabins Jr.
NOTE: These books are contained in five (5) boxes which are shipped together.	
Signed <i>Jackie Aremli</i>	

SPECTRAL DATA CORP.

1595B OCEAN AVENUE BOHEMIA, NY 11716 USA

No. 2526

DATE 7-8-86

SHIPPING MEMORANDUM

Centre Regional de Teledetection de Ougadougou . 1762 Ougadougou, Burkina Faso	YOUR ORDER NO. L/C No. 698-042002 AID/afr-C-1521	OUR ORDER NO. 5073
	SHIP VIA Tom Luche to send via pouch to Ougadougou	DATE 7-8-86

Postage \$ 3.18

QUANTITY	ARTICLES
1	Second Edition "Remote Sensing Laboratory Manual" By: Floyd F. Sabins, Jr.
1	Instructor's Key for Remote Sensing Laboratory Manual By: Floyd F. Sabins, Jr.

Signed _____

NET WEIGHT	GROSS WEIGHT	DIMENSIONS	CUBE
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SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716

USA

No. 2521

DATE 6-20-86

SHIPPING MEMORANDUM

Centre Regional de Teledection de
 gadougou
 . 1762
 gadougou, Burkina Faso

YOUR ORDER NO.
 AID/afr-C-1521

OUR ORDER NO.
 5073

SHIP VIA

DATE

Hand carried by Jim Sorenson

6-20-86

QUANTITY	ARTICLES
2 Boxes	Electrical Parts Radio Shack: # 12055 # 7967 # 7968 # 7969 # 7970 # 7971 # 7972 # 7973 # 21340 Aerographic Duplicating Film

Signed _____ 130

LBS.	NET WEIGHT	KG.	LBS.	GROSS WEIGHT	KG.	DIMENSIONS	CUBE
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SPECTRAL DATA CORP

1595B OCEAN AVENUE

BOHEMIA, NY 11716 USA

No. 2505

DATE 6-3-86

SHIPPING MEMORANDUM

Peter Gilruth
c/o Ben Mbugua
14 Roberta Lane
Bellingham, MA 02019

YOUR ORDER NO.

OUR ORDER NO.

AID/afr-C-1521

5073

SHIP VIA

DATE

Puralator \$ 18.50

6-3-86

to be hand carried to Ouagadougou

QUANTITY	ARTICLES
1	<p style="text-align: right; margin-right: 50px;"><i>Harper</i> <i>P.O. 4433</i> <i>\$ 40.45</i></p> <p>Photogrammetry by Francis H. Moffitt</p> <p>Remote-Sensing Applications for Mineral Exploration "<i>Smith</i>" <i>Academic Press</i> <i>P.O. # 4431</i> <i>\$ 94.50 + ship.</i> <i>1.89</i> <hr/><i>96.39</i></p> <p>for Centre Regional de Teledetection de Ouagadougou L/C #698-042002</p>
Signed <i>Julie B. [Signature]</i>	

NET WEIGHT	GROSS WEIGHT	DIMENSIONS	CUBE
LBS. KG.	LBS. KG.		<i>108</i>

SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716 USA

No. 2504

DATE 6-3-86

SHIPPING MEMORANDUM

Dr. Paul Mika
7209 16 Avenue
Takoma Park, MD 20912

YOUR ORDER NO.
AID/afr-C-1521

CUR ORDER NO.
5073

SHIP VIA

DATE

Purolator \$ 18.50
to be hand carried to Ouagadougou

6-3-86

QUANTITY

ARTICLES

1

Ernest L. Holl Academic Press
Computer Image Processing and Recognition P.O. 4431

\$ 36.50 + ship

1

Brian J. Myers
Bibliography of Remote Sensing in Forestry 1956-1978

1.89
\$ 38.39

For: Centre Regional de Teledetection de Ouagadougou
L/C #698-042002

Signed

Paul Mika

103

WEIGHT

GROSS WEIGHT

DIMENSIONS

SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NEW YORK 11716 U.S.A.

No. 2425

DATE 2-27-86

SHIPPING MEMORANDUM

TO Centre Regional De Teledetection De Ouagadougou B.P. 1762 Ouagadougou, Burkina Faso West Africa Attn: Responsable du Project USAID #698-042002	YOUR ORDER NO. L/C #698-042002 AID afr-C-1521	OUR ORDER NO. 5073
	SHIP VIA Hand Carried By Thomas C. Luche AF/RA	DATE 2-27-86

	QUANTITY	ARTICLES
1	1	Battery part for CRT0

Signed *Jacques Grembi*

	NET WEIGHT		GROSS WEIGHT	DIMENSIONS	CUBE
	KG. LBS.		KG. LBS.		104

SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716 USA

No. 2468

DATE 4-29-86

SHIPPING MEMORANDUM

Mr. Thomas C. Luche AID/AF/RA Room 4531 New State Building Agency for International Development Washington, D.C. 20523	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black;">YOUR ORDER NO. AID L/C No. 698-042002</td> <td style="width: 50%; border-bottom: 1px solid black;">OUR ORDER NO. Job #5073 L/C</td> </tr> <tr> <td style="border-bottom: 1px solid black;">SHIP VIA Pouch</td> <td style="border-bottom: 1px solid black;">Contract No. AID/afr-C-1521 DATE 4-29-86</td> </tr> <tr> <td colspan="2" style="padding-top: 5px;"> <i>Postage \$ 2.40</i> </td> </tr> </table>	YOUR ORDER NO. AID L/C No. 698-042002	OUR ORDER NO. Job #5073 L/C	SHIP VIA Pouch	Contract No. AID/afr-C-1521 DATE 4-29-86	<i>Postage \$ 2.40</i>	
YOUR ORDER NO. AID L/C No. 698-042002	OUR ORDER NO. Job #5073 L/C						
SHIP VIA Pouch	Contract No. AID/afr-C-1521 DATE 4-29-86						
<i>Postage \$ 2.40</i>							

QUANTITY	ARTICLES
2	Typewriter Ribbons Cartridge

Signed *Justin Hamel*

NET WEIGHT LBS. KG.	GROSS WEIGHT LBS. KG.	DIMENSIONS	CUBE 100
1 lb	1 lb		

SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716 USA

No. 2463

DATE 4-18-86

SHIPPING MEMORANDUM

TO Centre Regional de teledetection de Wagadougou P. 1762 Wagadougou, Burkina Faso, West Africa	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">YOUR ORDER NO.</td> <td style="width: 50%;">OUR ORDER NO.</td> </tr> <tr> <td>L/C No. 698-042002</td> <td>5073</td> </tr> <tr> <td colspan="2">Contract No. AID/afr-C-1521</td> </tr> <tr> <td>SHIP VIA</td> <td>DATE</td> </tr> <tr> <td>Certified</td> <td>4-1-8-86</td> </tr> </table>	YOUR ORDER NO.	OUR ORDER NO.	L/C No. 698-042002	5073	Contract No. AID/afr-C-1521		SHIP VIA	DATE	Certified	4-1-8-86
YOUR ORDER NO.	OUR ORDER NO.										
L/C No. 698-042002	5073										
Contract No. AID/afr-C-1521											
SHIP VIA	DATE										
Certified	4-1-8-86										

QUANTITY	ARTICLES
20 Copies	"Remote Sensing Principles and Interpretation"
20 Copies	"Remote Sensing and Image Interpretation"

Signed *Jackie Gremli*

NET WEIGHT		GROSS WEIGHT		DIMENSIONS	CUBE
KG.		LBS.	KG.		
		110 lbs			106

SPECTRAL DATA CORP.

1595B OCEAN AVENUE BOHEMIA, NY 11716 USA

No. 2532

DATE 8-22-86

SHIPPING MEMORANDUM

Centre Regional de Teledetection de Ouagadougou B.P. 1762 Ouagadougou, Burkina Faso	YOUR ORDER NO. L/C No. 698-042002 AID-afr-C-1521	OUR ORDER NO. 5073
SHIP VIA Pouch <i>for book</i>		DATE 8-22-86

QUANTITY	ARTICLES
2	Proceedings of the ERIM 19th International Remote Sensing Symposium NOTE: This book was on backorder.

Signed *J. K. B. [Signature]*

LBS.	NET WEIGHT	KG.	LBS.	GROSS WEIGHT	KG.	DIMENSIONS	CUBE
------	------------	-----	------	--------------	-----	------------	------

SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716 USA

No. ²²¹⁰~~2209~~

DATE 7-22-85

SHIPPING MEMORANDUM

Regional de Teledetection de Ouagadougou 762 ougou, Burkina Faso, West Africa Responsable de Project USAID #698-042002	YOUR ORDER NO.	OUR ORDER NO. 5073
	SHIP VIA Certified <i>liv</i>	DATE 7-23-85

QUANTITY	ARTICLES
2	Kodalith Ortho 42"x100 type 3 4556, 1973270 <i>added on # 2210</i>

Signed *Gella Woolley*

NET WEIGHT

GROSS WEIGHT

DIMENSIONS

CUBE

108

SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716 USA

No. 2210

DATE 7-22-85

SHIPPING MEMORANDUM

Regional de Teledetection de Ouagadougou 2 gou, Burkina Faso, West Africa Responsable de Project USAID 698-042002	YOUR ORDER NO. SHIP VIA Certified	OUR ORDER NO. 5073 DATE 7-23-85
---	---	--

QUANTITY	ARTICLES	
2 boxes (20 each) = total of 40	D-19 Dev. Gal/20	1464593
2 boxes (10 each) = total of 20	Kodalith Dev. 2 gal.	1465152
24 boxes (1 each) = total of 24	E-6 Kit 1 gal.	1017599
4 boxes (4 each) = total of 16	Ektaprint 2 Bleach Film 3½ gal.	1865864
3 boxes (6 each) = total of 18	C-41 Flexicolor bleach 1 gal.	1901685
5 boxes (4 each) = total of 20	Ektaprint 200 Developer 3½ gal.	1862291

Signed *Gisela Coella*

NET WEIGHT	GROSS WEIGHT	DIMENSIONS	CUBE
LBS. KG.	LBS. KG.		

SHIPPING MEMORANDUM

DATE

YOUR ORDER NO.
 AID/afr-C-1521

OUR ORDER NO.

SHIP VIA

DATE

air

QUANTITY	ARTICLES
1	1015 0001 Led Driver 7218
1	1012 0005 Hex Inverter
4	1012 0004 Shift Register
1	1001 0001 Microproc.6802
1	1002 0001 Timer (6840)
1	1006 0002 UIA (6522)
2	1003 0001 PIA (6821)
1	1011 0007 Decodes/Demux
1	1016 0001 Analog Mux/Demu
4	1010 0003 Transistor Arra
1	1014 0001 A/D Converter
1	1013 0003 OP AMP (1458)
1	1006 0001 RAM (6532)
1	1005 0001 E-PROM 2716
1	1008 0001 Triac Driver
2	0108 0001 Triac (2004)
1	0108 0004 Triac (4025A)
1	1003A Card Reader Board
1	10002A Refill Board Assy
1	10018A Cradle Relay Board Assy

Signed

Gisela Loeffler

SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716 USA

No. 2225

DATE 8-5-85

SHIPPING MEMORANDUM

Regional de Telederection de Ouagadougou ou, Burkina Faso, West Africa sponsable Project USAID #698-042002	YOUR ORDER NO. AID/afr-C-1521	OUR ORDER NO. 5073
SHIP VIA Certified <u>Box #3</u>	DATE 8-5-85	

QUANTITY	ARTICLES
12	82001 Spring Fin 3/32" X 1/2"
6	87003 Flange Bearing
1	30048 Cradle Mt. Motor
1	20001 Motor Assembly
10	91128 Fuse-12 Amp 125VAC
4	80063 Hex Nut Stainless
4	82022 Lock Washer S.S.
5	10317 Thermal Fuse Assy
6	80033 Machine Screw
2	91155 Triac 25 A 400V
1	20005 Temp Pc Board Assy
4	91055 Integrated Circuit
8	87003 Flange Bearing
1	82024 E-Ring 3J/8" Shaft
4	82021 E-Ring 1/4"
5	91154 Fuse 10Amp 125V
2	120 Spiral Reel 84013
2	220 Spiral Reel 0231-0014
2	Air Pump F/IM II 50HZ
1	1017 0001 Voltage Conv.

Signed *Gisela Coeffler*

SPECTRAL DATA CORP.

15953 OCEAN AVENUE

BOHEMIA, NY 11716 USA

No. 2224

DATE 8-5-85

SHIPPING MEMORANDUM

onal de Teledetection de Ouadadougou Burkina Faso, West Africa onsable Project USAID #698-042002	YOUR ORDER NO. AID/afr-C-1521 SHIP VIA Certified <u>Box #2</u>	OUR ORDER NO. 5073 DATE 8-5-85
--	--	---

QUANTITY	ARTICLES
5	WRITE ON 2X2 SLIDE 1409960
1	STIRRING PADDLE 1122126
4	TANK/TRAY THERMOM. 1122183
6	MN1500 B45 (4 PACK)
6	ELC PROJECTION LAMP 250W
12	ELH PROJECTION LAMP 300W
1	KODAK PUB. G-13 152 7654
1	KODAK PUB. G-14 152 7662
1	KODAK PUB. Z-121-A 1274000

Signed *Gisela Koepfle*

NET WEIGHT	GROSS WEIGHT	DIMENSIONS	CUBE
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SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716 USA

No. 2223

DATE 8-5-85

SHIPPING MEMORANDUM

Regional de Teledeteccion de Ou, Burkina Faso, West Africa Responsable Project USAID #698-042002	YOUR ORDER NO.	OUR ORDER NO.
	AID/afr-C-1521	5073
	SHIP VIA	DATE
	Certified	8-5-85
	<u>Box #1</u>	

QUANTITY	ARTICLES
6	DIR POS FLM DV 1Q 1239714
60	EN135-20 EKT100 1402072
60	En135-20 EKT100 1402072
5	8X10 EKTACHR 6118-10
5	8X10 VPL4108 L 10 1532399
20	VPS III 135-20 153-4429
20	ED135-20 EKT200 1601582
40	VPS III 135-20 153-4429
20	ESD135-36 5071 DUPE
20	VPS III 120 151-1013
20	FX135-20 PAN-X FLM 147699
20	FXP-120 PAN-X FLM 1469998
10	SX-70 TIME-10 603853

Signed *Gilda Coeller*

SPECTRAL DATA CORP.

1595B OCEAN AVENUE

BOHEMIA, NY 11716

USA

No. 2210

DATE 8-9-85

SHIPPING MEMORANDUM

Regional de Teledetection de Ouagadougou 762 ougou, Burkina Faso, West Africa Responsable de Project USAID #698-042002	YOUR ORDER NO. AID/afr-C-1521 SHIP VIA Certified	OUR ORDER NO. 5073 DATE 8-9-85
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QUANTITY	ARTICLES	
40	D-19 Dev. Gal/20	1464593
20	Kodalith Dev. 2 gal.	1465152
15	Ektaprint 2 Bleach Film 3½ gal.	1865864
13	C-41 Flexicolor Bleach 1 gal.	1901685
2	Koddith Ortho 42"x100 type 3 4556	1973270

Signed *Gisela Koppeler*

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