THE CONTEMPORARY NON-MOTORISED-LOOMS AND THEIR WEAVING DESIGNS IN THE NIGERIAN ARMY: PROBLEMS AND PROSPECTS

BY

PATRICK ONEH ADA

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF ARTS INDUSTRIAL DESIGN

DEPARTMENT OF INDUSTRIAL DESIGN

FACULTY OF ENVIRONMENTAL DESIGN

AHMADU BELLO UNIVERSITY, ZARIA.

SEPTEMBER 1985.

APPROVED

SUPERVISOR	INTERNAL EXAMINER
(MRS. SANSTROM, AUGUSTA)	(DR.T.B. OGUNTONA).

CHIEF EXAMINER	EXTERNAL EXAMINER
(Y.D. HASSAN).	Dr. P. O. ADEGBILE.

FACULTY OF ENVIRONMENTAL DESIGN

AHMADU BELLO UNIVERSITY ZARIA.

CERTIFICATION

This thesis entitled: "The Contemporary Non-Motorised Looms and Their Weaving Designs in the Nigerian Army: Problems and Prospects" written by Patrick Oneh Ada meets the regulations governing the award of the degree of M.A. Industrial Design of Ahmadu Bello University and it is approved for its contribution to knowledge and literary presentation.

Augustus Sandstrom Date: 12/12/85
Chairman
Supervisory Commitee

[illegible] Date: 12/12/85
Member
Supervisory Committee

[illegible] Date: 12/12/85
External Examiner

[illegible] Date: 12/12/85
Head of Department

[illegible] Date: 13-1-86
Dean
Postgraduate School

D E D I C A T I O N

This study has been dedicated to my late father and mother

C O P Y R I G H T

Name of Candidate: ADA ONEH PATRICK

Title of Thesis: The contemporary Non-motorised looms and their weaving designs in the Nigerian Army: Problems and prospects.

Permission is hereby given the Ahmadu Bello University Zaria to reproduce single copy of this thesis for scholarly either for scientific or technological research purposes only.

The author reserves other publication rights and neither this thesis nor extensive extracts from it may be printed or reproduced without the author's written permission.

D E C L A R A T I O N

I, PATRICK ONEH ADA, hereby declare that this is an original work of mine and that it has not been submitted else where for award of any degree.

ACKNOWLEDGEMENTS

In both the collection of materials and the writing of the report for this study, I have received tremendous helps from many people both in authority and as individual or groups. The number of these people; including experts in weaving, authorities, services and others are so enormous that five to eight pages might be needed for the appreciation of everyone's effort in this study.

However, space has placed on me certain constraints that all such individuals' name have not been mentioned here. It is believed that those concerned should be awared, that their efforts have been highly commendable in this study.

Nevertheless, the few that immediately come to mind should be mentioned as follows: Mrs Augusta Sandstrom, for her courageous spirit of advice and tolerance through the period of supervision of this research. This spirit of leadership must not be forgotten in this acknowledgement.

The first among the typists was Simon Obekpa, who not only supported this study financially and materially, but the patience and care taken in the preparation of all the initial type scripts, cannot be forgotten.

To; Rashidi, Faculty Office, S. Adikwu, department of French, all of Ahmadu Bello University Zaria; Matthew Ogundare and Corporal Abiodun Moses of Base Ordnance Depot, Kaduna, the same acknowledgement is extended for typing the drafts and the final scipts respectively. To the rest typists whose names have not been mentioned, I say thank to you all.

Dr. S.A. Adetoro, Head of Textile Design Section, Department of Industrial Design, Ahmadu Bello University, Zaria for your fatherly advice and suggestions on this study. The same thank also goes to Dr Abbas, Head of the Ceramics section in the Department of Industrial Design, Ahmadu Bello University, Zaria, who, not only gave the same advice on the topic but also helped in reading parts of my drafts and offered useful suggestions.

Dr. S.A. Daniel, Head of the Reference Section, Kashim Ibrahim Libarary Ahmadu Bello University, Zaria. Also deserved special acknowledge for reading most parts of the drafts of this Thesis with similar useful suggestions.

The same acknowledgement has been extended to the following people: Y.D. Hassan, the Head of the Department of Industrial Design, Ahmadu Bello University, Zaria, and all other members of staff in the Department for their various moral and material supports whese names have not been mentioned here.

Special thank to Dr T Oguntona the Co-ordinator post-graduate studies department of Industiral Design, Ahmadu Bello University Zaria for his devoted effort and enconraging advice in this study.

The following technicians also deserved special thank without which the construction of the loom might have not been possible: Mr Linus Adikwu, mechnical Engineering department, Mr Pam, department of Fine Art., all of Ahmadu Bello University Zaria; Mr Hames Okpe and private Alphorisis Abah Depot Nigerian Army Zaria. Also Mr Yusufu Jimoh a hand crafted weaving technician department of Industrial Design, Ahmadu Bello University Zaria deserved similar special acknowledgement.

Acknowledgement has also been extended to all others who had in one way of the other aided me with the materials in this study.

I must likewise give a special thank to all the members of my family for their various suports whether morally, materially or financially, throughout the period of this course. Your contious prayers and patience will ever be remembered; most especially my little ENESI ONE ADA who would always wished to be by me side.

Finally, I must thank the various authorises in the Nigerian Army through the Director of Ordnance Services (DOS) without whose the necessary recommendations and sponsorship for this study would not have been possible. Thank you all everyone.

ADA ONEH PATRICK.

ABSTRACT

The purpose of this study was to draw the attention of the Nigerian Military audience to the variety of roles that the contemporary non-motorised looms and their weaving designs could play in the Military Environmomtt (within the limits of this hand-crafted Textile Technology), The research has tried to explain this technology in some practical approaches, in order that the appreciation of its objectives can be fully understood.

The problem of the study was the determination of products and training as the roles of the contemporary non-motorized looms in the services of the Nigerian Army and, how practically these roles could be demonstrated. Significance of the study was based on the need for the Army to utilize for self-reliance the local resources including materials, skills and techniques.

The population was made up of selected workshops and institutions which had weaving - training programmes. Weavers, teachers, and administrators in both the Military and civilian sections of the selected population, as well as the literature sources were consulted on this subject during an initial pilot survey.

The local construction of a table loom, basic laboratory tests and practical weaving projects were carried out. The laboratory tests included the determination of yarn counts and an analysis of an imported Nigerian Army Corps belt. Elements of weaving design such as changes of yarn count (thread thickness), threading and lifting (shed opening) sequences, and colour effect were tested practically on the loom and on design paper. A special study was made of the reproduction of Army Corps belts.

Based on the analysis of data in this study, it is observed from the results/findings that the Nigerian Army could utilize the contemporary non-motorised looms in some of its training and development programmes. Specifically, it was confirmed that all of the contemporary non-motorised looms found in Nigeria in this study are capable of producing the various Military corps belts and other basic woven fabrics for local consumption. However, among the problems observed was the need for further research specifically on this weaving technology and its income - producing capabilities in Nigeria today, to yield information as to job opportunities for both the Nigerian Military and civilian public. An understanding of the consumer and his needs must also be researched in the future, to guide future training programmes.

TABLE OF CONTENTS

	PAGE
Acknowledgements	I
Abstracts	II
List of Figures	III
List of Plates	IV
Definition of terms/Abbreviation and Symbols	V
CHAPTER ONE	
Introduction	1
Background of Study	4
Content of Problem	5
Statement of Problem	6
Objectives of the Study	7
Research questions	8
Study assumption	9
Scope of the Study	10
Significance of study	11 - 12
Population	12 - 13
CHAPTER TWO	
Literature Review	14 - 30
CHAPTER THREE	
Methodology	
Pilot Survey	31
Loom construction	32 - 35

PAGE

Basic Laboratory Test ..... 35 - 39

Weaving Practicals 43

Practical reproduction of NA Corps Belts 54

CHAPTER FOUR

Finding and Results 64

Weaving in ABU Zaria 64

Utohu Yusufu Weaving Industry 65

The Nigerian Armed Forces Rehabilitation Training Centre, Oshodi 68

The Textile Training Mills Auchi 69

Nigerian Army Ordnance Corps 73

Weaving University of Nigeria, Nsukka 74

Finding on loom construction 76

Laboratory Test 79

Finding on NA Corps Belts 84

CHAPTER FIVE

Summary/Conclusion 92

Observations 96

Recommendation 98

Appendix .....

LIST OF FIGURES

Figure 1.	Sketch of the grooves	Page	33
" 2.	Beater or Reed casing	"	34
" 3.	Heddles' construction guide	"	35
" 4.	Plan of a colour effect	"	44
" 5.	A six harness draft for yarn count effect	"	46
" 6-10.	Examples of shape and variety designs	"	48-53
"11-13.	Drafts for the NA Corps Belts	"	53
" 14.	An example of ABU Zaria Weaving Design	"	54-68
" 15.	Name as a Weaving design from Okene	"	69
"16-17.	Patterns from Auchi Textile Training Mills	"	72
18.	A Pattern draft from the University of Nigeria - Nsukka	"	76

LIST OF PLATES

Plate	I.	The Constructed Loom	Page	
"	II.	Colour Effect	"	44
"	III.	Effect of yarn count	"	54
"	IV.	Shape and variety	"	56
"	V(a-o)	Examples of various Corps Belts in the Nigerian Army	"	57- 8
"	VI	Nigerian Army Corps Belts of the Okene made	"	67

DEFINITION OF TERMS, ABBREVIATIONS AND SYMBOLS

A. ARMY Terms:

DEPOT - A store section for receiving, keeping, maintaining and issuing of Military items or equipment to dependent units and indivituals.

DIVISION - It is the largest Nigerian Army administrative body of men and materials. There are over three of such Divisions in the Nigerian Army organisations through which instructions and orders are passed for their compliance and execution.

CORPS - This is a term used to differentiate or categorise the various functions being performed throughout the Army. Education, Medical, Signal, Ordnance are examples of the Corps in the Nigerian Army.

REHABILITATION CENTRE - As regards this study, Rehabilitation Training Centre, Oshodi, is the institution where the retiring personnel,

both officers and other ranks are sent for a trade-skill Training before they finally leave the active service.

PROCUREMENT - A system by which the Nigerian Army Ordnance Corps obtains or look for stores (items) for the Army.

MESS - A recreational centre in the Nigerian Armed Forces where meals, social activities, and exchange of ideas for better understanding particularly between Senior and Junior Officers take place. Two major types of this Mess exist in the Forces, the commissioned Officers' Mess and non-commissioned Officers' Mess.

ORDNANCE SCHOOL - This is the Nigerian Army institution where personnel for Ordnance Services are trained for procurements, receipt issues and maintenance on the items and equipments.

B. ARMY ABBREVIATIONS AS USED IN THIS STUDY

NAFRC	-	Nigerian Armed Forces Rehabilitation Centre.
NA	-	Nigerian Army.
NAOTS	-	Nigerian Army Ordnance Training School.
NAPC	-	Nigerian Army Pay Corps.
NAOC	-	Nigerian Army Ordnance Corps
NAEC	-	Nigerian Army Education Corps.
NAB	-	Nigerian Army Band.
NAST	-	Nigerian Army Supply and Transport
NASIG	-	Nigerian Army Signals.
NARM	-	Nigerian Army Armourd Corps.
NMS	-	Nigerian Military School.
OKNA/BELT	-	Okene Nigerian Army Belt (Okene Made).
DOS	-	Director of Ordnance Services.

DEFINITION OF WEAVING TERMS USED IN THIS STUDY

Lifting Plan	-	Order or sequence in which the levers or pedals (in case of foot looms) are raised or pressed to produce sheds for the passing of weft yarn (picks).

CHAPTER ONE

1. 1 INTRODUCTION:

A link has been created as a result of the developments that have taken place in the breach between the traditional weaving system and the motorised type of looms in Nigeria today. A brief look into this space between the two cultures (traditional weaving and the motorised weaving cultures) will give the picture of this link as the contemporary non-motorised-looms with their weavers. These weavers are the contemporary, institutionally-trained weavers such as the graduates of Textile Design from any institution of higher learning, particularly, Universities, Polytechnics and Colleges of Advance Studies.

The emergences of this link came with the impact of weaving being taken as one of the academic subjects in institutions of higher learning; it was influenced by foreign education within the Nigerian system of education. The Nigerian Arts and Crafts were also affected by these influences.

We could, therefore, identify two types of

non-motorised looms and their weavers today in Nigeria. These are the traditionally brought up weaver and his/her loom and the contemporary Nigerian Institutionally-trained weaver and his/her loom. This study is concerned with the latter and his/her significance to a Nigerian Army Programme.

1.2 DISTINCTION BETWEEN THE TWO CLASSES OF HAND LOOMS

The contemporary non-motorised looms in function could be described as the looms between the Nigerian traditional types and the modern, power-driven industrial looms. These looms are also operated through the use of manual effort and techniques, either by hand or by foot system, for producing woven fabrics. They can be grouped into two main classes: floor and table looms. The looms are of various sizes, structures, numbers of harness capacity and weave widths.

Some of these looms have metal parts in their features which include: metal harnesses, heddles, rachets and reed. Examples of these looms are those found in the Textiles Section of Ahmadu Bello University, Zaria University of

Nigeria, Nsukka and Yaba College of Art and Technology Textile Section, Lagos, and Auchi Textile Training Mills. Infact, the looms at Auchi Textile Training Mills, University of Nigeria, Nsukka and Yusufu weaving Workshop, Okene have their harnesses and heddles made out of wood and thread twines respectively; while at Ahmadu Bello University, Zaria both metal and non-metal materials have been used in construction of the looms. They either have been imported or locally constructed.

The table looms in this category are useful mainly for training purposes but could be used in the production of woven fabrics of lesser width. On the other hand, the floor loom types are ideal for production of considerably wider pieces which can be sold for commercial purposes. Some of these looms in this class can hold up to sixteen harnesses for possible intricate designs which other classes might be lacking; Ahmadu Bello University, Zaria, University of Nigeria, Nsukka and Auchi Textile Training Mills have such looms.

Nigerian traditional groups of looms include the broad, vertical loom used primarily by women, and the narrow, horizontal loom with heddles and treadles used by men.

Although horizontal, narrow-band looms can not produce wide pieces, their speed and the finest quality of their narrow bands have not been duplicated on other looms. Huge wheels of these strips of weaving were once used as currency in Nigeria, particularly as Bride Price. Garments sewn from the narrow bands still are valued highly in Nigeria; in some parts, the narrower, the more costly.

The vertical, broad type of traditional loom has limitation in the length of its fabrices; but, for the wider fabric and pattern designs, they have a great advantage over the men's strip-weave looms. The large pieces woven on the traditional women's loom in Nigeria command handsome prices.

1.3 BACKGROUND OF STUDY

Two main motivational factors have been responsible for the selection of this topic for

the research. They area: the researcher's background training in Textile Design which includes Weaving Study, and his services being rendered in the Ordnance Corps, the Army branch that procures, receives and distributes clothing items, throughout the force. As a result of these experiences, the observation has been made of the potential of an Army Weaving Programme, contributing in two major areas. These areas are: means of training development and means for production.

1.4 CONTEXT OF THE PROBLEM

The Nigerian Army and contemporary weaving design have services to offer to each other. No evidence was found that this area has been fully studied. There is, generally a lack of awareness of the possible roles of this weaving technology in the Nigerian Military. There have been various calls from the former Nigerian Head of State and other notable Army Leaders for both individuals and institutions to become self-reliant. It seems appropriate to study the weaving potentials and problems within this unmotorised technology.

1.5 STATEMENT OF THE PROBLEM

The problem of this study, is the determination of products and skills as potential roles of contemporary weaving design and production in the services of the Nigerian Army and how practically these roles can be carried out with the use of local resources.

1.6 OBJECTIVES

The objectives of this study are:

1. To provide a better understanding of the use of weaving skills and fabrics of the contemporary non-motorised looms and their weaving design within the needs of the Nigerian Army.
2. To study and to document the practical construction of the contemporary non-motorised looms locally.
3. To explore the possible production through the use of the non-motorised techniques, of some basic fabrics within the Army's needs.
4. To examine some of the elements which affect the weaving designer's products.

such as, the yarn count, colour effect, threading, lifting and denting orders.

5. To make the findings/recommendations available to appropriate military authority.

6. To recommend the Nigerian Military clothing environment as another area for future research work in order to improve the quality of the Military fabrics of this country.

1.7 RESEARCH QUESTIONS

The following are the research questions designed to guide the study:

1. What step could be taken to provide a better understanding of the roles of the contemporary weaving in the Nigerian Military Programmes?
2. What type of the contemporary weaving scheme can be developed to meet the needs of the Nigerian Army Programmes?
3. To what extend can such weaving programmes be exploited in the Nigerian Military environment?

4. What is the relationship between the weaver's training and the cloth he or she produces?
5. Which are some of the basic clothing items of Nigerian Army needs that could be locally produced through the use of the handcrafted woven techniques?
6. What resources are required for construction of contemporary non-motorised looms?
7. Are there such local resources for the construction of NML, contemporary non-motorised looms?
8. How could colour effect, yarn count, threading, lifting and denting orders affect the weaving designers final products?
9. What is the relationship between the potential fabrics produced through the hand-weaving and the fabrics consumed through the Nigerian Army use?

1.8 CONSIDERATIONS OF THE STUDY

The study covers an exploratory survey of weaving with contemporary non-motorised looms, their designs, weave patterns and resulting fabrics in selected Nigerian workshops.

Two major focal points are: the consideration for making these looms available for training in the Nigerian Armed Forces Rehabilitation Training Centre and, considered use of these looms for the production of some basic textile needs for the members of the Force.

The use of available local resources (materials, skills and techniques) is the main priority of this study.

1.9 ASSUMPTIONS

The following assumptions have been made for this study:

1. That the present Nigerian Military could utilise the services of the contemporary non-motorised looms and their weaving designes in its programmes.
2. That the roles of contemporary weaving in creating products and training skills could be presented through this study.
3. That the background training of a weaver and the materials available, control the weaver's final product.

4. That the use of non-motorised looms could be a means towards job opportunity and self-reliance for the trainees in the Nigerian Army Forces Rehabilitation Training Centre.
5. That there is a possibility for the local construction of non-motorised looms in the Nigerian Military environment.
6. That the various Nigerian Army Corps belts could be produced through the use of the contemporary hand-weaving techniques.

1.10 SCOPE OF THE STUDY

This study is limited to a brief survey of representative experiments towards the manufacture by hand of some basic textile products for use by Nigerian Army Personnel.

A hand-built, non-motorised, table loom, locally produced under the researcher's instructions, located at Ahmadu Bello University, Zaria, the 'three basic weaves', and three yarn counts (readily available in the local markets) were employed. Special concentration was focused on the creation of Army Corps Belts examples.

1.11 SIGNIFICANCE OF THE STUDY

There is no wide-spread knowledge concerning the roles the contemporary hand-weaving craft can play in this country; the Nigerian Military is not an exception. This tends to have restricted the contemporary hand-weaving to training aids by many organisations, to the neglect of production services.

In the case of the Nigerian Military, the use of this resource appears to be totally absent since its elimination from the Nigerian Army Forces Rehabilitation Training Centre scheme in the 1970s. As a result, there is continous reliance on foreign supply and local contract award, even for basic clothing items for the Army such as the Corps belts.

The production through this technology of the Nigerian Army Corps belts and other basic fabrics for Military needs could improve quality control of these fabrics, as Military Personnel who use the items, would themselves be on the direct production and supervision lines.

There is evidence that Nigerian Military textile items could be developed through students

and staff in their studies. Two examples can be cited here. In the 1984/85 Academic Session, two final year students of Textile Design Section in the Department of Industrial Design made products which could be of Military interest. One was a Nigerian Army camouflage uniform; it was a printed design, tailored for the uniform. The other other was a fold-away, portable, free-standing baby bed which could be useful in homes and in Military Hospitals. This washable, padded bed is a tubular, woven product.

A greater social relationship could be fostered between the Nigerian Military and Civilian Sector through the exchange of products and design ideas. Specialization and healthy competition could be part of this relationship.

1.12 POPULATION

Six institutions/workshops in six locations in Nigeria were survey during tours in November, 1984 and April/May, 1985, namely: Alhaji Yusufu Utohu Weaving Industry, Okene, Textile Training Mills, Auchi, Nigerian Army Rehabilitation Centre, Oshodi, University of Nigeria Textile

Workshop, Nsukka, and Textile Section, Department of Industrial Design, Ahmadu Bello University, Zaria, and The Nigerian Army Central Ordnance Depot, Yaba.

The looms, assessed along with the design of their constructions, the products of these looms, the designs for these fabrics and the yarns utilised in creating these products, all form a part of the population for the study.

CHAPTER TWO

2. 1 LITERATURE:

LITERATURE REVIEW

Generally there appears to be scanty literature published directly on this subject. This might be a carry over problems of what Eicher, (1976) had reported, that African Tectiles have been one of the ignored arts of the people which were neglected so long, until that exhibition of 1974, organised under the famous Museum of Modern Arts and National Gallery.

In a contribution, Lamb and Holmes, (1980) pointed out that the cause could be attributed to the lack of interest earlier colonial ethnographers showed on the African fabrics. They cited people like Temple and Talbot, (1926) who discussed African weaving in a superficial manner. The post-colonial Nigerian material culture students mostly concentrated themselves in dyeing, printing and fashion aspect of the arts.

In addition to the general negligence, most of the existing literature on Nigerian Textiles concentrated on the traditional aspect of the Technology to the extent that little or nothing

has been recorded about the Nigerian contemporary weaving designers and their work (the institutionally trained type of the designers and their looms).

Lamb and Holmes, (1980) were of the opinion that traditional weaving might have come to Nigeria at different times and routes and attributed that to the influence of movement of people from one place to another for various reasons.

On the origin of looms in Nigeria, records exist, but none has been able to establish a clear stand on the exact period of the craft. Most authors left it with the claim of legends. For instance, Adetoro, (1984) refered to Afigbo, (1982) Lamb and Holmes, (1980) and Eicher, (1976) respectively, and stressed the position of these legends, concerning the origin of woven fabric in Nigeria.

However, the origin of the contemporary Nigerian institutionally trained weavers and their looms, could be traced to the time that weaving become a part of Textile Design in its Academic Course Programme in Nigerian Institutions of Higher Learning. For instance, Ahmadu Bello

University, Zaria, started some weaving courses in 1971 and at University of Nigeria, Nsukka in the 1970s.

Even beyond this, weaving had been a course programme in some organisation or institutions in Nigeria as far back as 1948. As examples, Okeke, (1984) cited Aba Textile Centre while Ayewa, (1984) spoke of Auchi Co-operative Weaving Centre.

Today, despite the problem of loom shortage, weaving as a course and enterprise seems to be gaining much attention in many Nigerian Civil Institutions or Organisations. Examples are in the University of Nigeria, Nsukka, Ahmadu Bello University Zaria, Yaba College of Technology, Auchi Textile Training Mills, Uyo Co-operative Weaving Society and Aba Textile Centre, (Visitations 1984 and 1985). On the other hand, the role of this craft has not yet been fully realised in the Nigerian Military Programme, Hameed, (1984).

Brostoff, (1978) demonstrated what it means to be a professional hand-weaver. She unfolded hand-weaving in fabric production in the most straight-forward ways. She demonstrated not only

how to start hand-weaving, the direction from which to pick it, but also how to train a prospective employee, together with the method of finding a market for the finished products. She was able to do this from her thirty-five years of experience in the field of hand-weaving.

From that experience, Brostoff, (1978) believed that the "actual process of hand-weaving was a simple mechanical co-ordination that could be learned by most beginners in a comparatively short time". However, she warned that learning to be a hand-weaving was one thing and utilizing the knowledge was another. On the prospects for hand-weaving, this book pointed out that a great variety of products were opened to this technology and stated that "hand-weaving is still the living craft".

The book also corrected the impressions which many inexperienced weavers have had about weaving and pointed out that being a professional hand-weaver did not mean trading in the products. " Someone else should handle the sales", she stated. She pointed out also that professional hand-weavers would always want to spend time and thought on how to grow within their field. She maintained that the love for woven products is

commonly shared by people.

Brostoff, (1978) has picked the period from 1500 - 1700 as hand-weaving's development time. In more recent history, according to Brostoff, multi-purpose textiles had involved many people in fabric production. She supported this claim that in the 18th century, over 150,000 hand-weavers were in their private shops in Birmingham, England Producing Fabrics. The author went further to express that - "with many people thinking about and being occupied in the weaving, there were bound to be some inventive minds concerned with finding ways to relieve the exhaustive work and improve the weaving process".

The point in the last given quotation is vital to this study. The researcher believes that with the proper integration of the hand-weaving techniques and their thorough development in Nigeria, a better and improved technological development in fabrica-by-hand production, could be accomplished. Some of the cultural wealth already known in our people would still be preserved.

From the treatment given to the historical development of the looms, one could believe that the origin of the modern industrial looms all come from the hand-weaving looms; credit for which Brostoff has given to China. Records have shown that the draw loom, Dobby and Jacquard looms all trace their origin from the hand-weaving looms, using the fly shuttle (the main tool and the theme of Brostoff's book).

Brostoff's book is related to this study through five important points, briefly summarized below:

She emphasised the principles and sources which other disciplines could offer for hand-weaving (i.e., the areas of automotive engineering with its braking system, and carpentry playing vital roles in constructing her particular fly shuttle loom).

The importance of practice could lead to perfection if only one practises the right thing with the right materials. She stated that "I would have abandoned weaving entirely had I not stumbled on an ad for a useful 64 "fly shuttle loom".

A fly shuttle loom has advantages over other non-motorised looms as the non-motorised loom has ever its counter parts (i.e., power looms). This achievement in found in producing some designs which these power looms might not be able to produce.

She stressed the importance of proper use of colour in fabric production and that maintenance of weaving records (whether experimental or for finished work) cannot be over looked.

In an earlier contribution, Hillary Chetwynd, (1969) had warned that processes of design should be carefully observed before any conclusion could be made on a design for production. The author went on to state that all records concerning weaving drafts (designs) should be maintained.

Clarke, (1974) considered textile in general as a complicated art that grew popular among members of the human race even before the ages of modern technology. He traced the evolution of fabric through the period of mechanical and scientific invention and finally to the time of man's achievement in that technology.

Some of the fundamental issues raised in this book could be seem as motivational forces for this study. For instance, the writer stated that "man had only used his skill and ingenuity to impose discipline and order on the materials and they obeyed him". The book serves as a means of telling the world of what ever an artist did and how he did it and with what materials.

The book treated weaving by the simple approach in the definition of terms, and classified weaves (as others have done) into four basic groups: the plain weave and the three other twills. It briefly discussed in historical perspective from traditional to the powerloom, demonstrating all the main stages in weaving from spinning to finishing.

The most important point to this study in this book is the critical examination of the craftmen's position in the society. Clarke, (1974) left with us the problem of the standard of workmanship in both it's technological and fashionable changing world, when he said "as the craftman's skill and productivity increase by experience and inventiveness, he changes and

enriches the community in which he lives. Thus, there is established a mutually beneficial relationship between the two". The two here means the craftman and the society. This has been one of the writings that has shown weaving to the world as one of the greatest contributions man has ever made to it. He cited an example in the city of Coventry where textiles craft played a major role in the economy for over 800 years and is still a credit in that direction. The need for increased productivity through our experience and use of skills for the benefit of the community is the essence of this reseach.

Erogbogbo, (1984) provided a brief history of the Nigerian Armed Forces Rehabilitation Training Centre. These centres, conceptualised in 1969, are in fact the training schools or workshop centres where the members concerned receive their necessary training before they retire from the service to their civilian lives.

It is on record that Nigeria fought a civil war between 1967 and 1970. Towards the end of 1969, it became clear that the war would soon come to an end with the large population of the

Army on the shoulders of the government it is the history of the Rehabilitation Programmes after the Civil War that Erogbogbo has given. "The main purpose of the Resettlement Scheme was to find and to resettle all those disabled Nigerian Soldiers who had been affected by the war physically". To do this, apiece of land had to be acquired and an appropriate training programme also had to be designed and taught to the trainees so that the desired effect could be achieved.

The war eventually ended in January, 1970. According to Erogbogbo, the piece of land on which the first centre. (Oshodi) was built was acquired by the Federal Government in 1972 and covered about 70 hectares of land. Following the completion of the Oshodi Centre, about 2,000 disabled soldiers were sent to the centre in 1972 for guidance counselling. This was done in order to determine the residence capability abd the kind of trade/skill needed to benefit each receipient as he retired to civilian life.

The courses run at the centre were: poultry and practical agriculture for the non-commissioned officers; while commissioned officers received a

basic management course. All of the trainees, irrespective of their ranks are to under-go some period of industrial attachment before completing their course from the centre.

The durations of courses differ. Three types of period were accepted by the government. Junior, Non-commissioned Officers spend 18 months for the training; Senior Non-commissioned Officers (i.e., from Sergeant to Warrant Officer Class One) spend 9 months; Commissioned Officers spend 6 months.

It was soon discovered that the initial plan whereby 2,000 soldiers would have been turned out every 18 months became inadequate due to the large number of such soilders awaiting retirement from the service. Therefore, the Federal Government decided that four additional centres should be established to absorb the large population coming from the Army. These new centres were located at: Agege, Iseyin, Kachia and Lakushi respectively.

From 1972, the Oshodi Centre became known as the Nigerian Armed Forces Rehabilitation Centre and was given responsibility of training

soldiers from three sides of the Armed Forces (i.e., Army, Air-Force and Navy) if they are selected for that centre.

Erogbogbo, (1984) showed that over 6,000 service personnel of the Nigerian Armed Forces have so far left the Forces through this Rehabilitation Training Programme since the end of the civil war.

From Hameed Gaji, (1984) it was further understood that traditional weaving initially was included as an ancillary course in the Oshodi Rehabilitation Centre but soon was eliminated.

As a contemporary . . Textile Designer, in a Military life, the researcher looks beyond this article for greater appreciation of the Rehabilitation Training Centre's roles in the development programme of the country as stated below.

Broadly speaking, it could be important to equally consider the proper development of other areas of nation's lives (like the crafts of hand-weaving) in this rehabilitation training programme and other appropriate training centres of the Nigerian Army, (i.e., Nigerian Army Ordnance Training Centre).

The large increase in the population leaving the service through this arrangement with varied leavels of spohistication, social and economic tastes, etc., might soon face problems as they settle in their rural areas. These problems could be competition from the community, inability to effectively utilize the fund already acquired through the gratuity, and on the other hand, lack of demand or encouragement from the community for their products and services.

The discharged might not be able to assess or understand immediately, the political economical and social reality of the environment that could have helped him to avoid frustration of conflict.

On the other hand, the Military participation as part of the government's aims toward possible maximum development/utilization of the local resources (i.e., both materials, skills and technical know-how) through this weaving technology could easily spread to the villages.

The proper development of thse crafts through organised instruction both for individuals and community might have a creative impact.

The various existing resources/facilities already in some of our Military Training Workshops like the Rehabilitation Centre and the Nigerian Army Ordnance Training Centre could be considered as favourable enviroments for the gainful development of this technology for Nigerians.

Other literature which the researcher has associated with this study includes the words of the former Nigerian Head of State, (1984) already mentioned. He observed that "if our people learn from our present predicament to be creative, resourceful and self-reliant, we should have benefitted immensely from our adversity". He further charged Nigerians that "all able Nigerians should explore the opportunity for a gainful self-employment as a result of the current economic recession in the country".

It is observed that further development of our achievements in intermediate (cottage industry) textile technology could result as in China and India.

Boon, (1981) relates the Chinese belief in the interpretation of appropriate technology using

as much of the abundant labour as possible and as little of the scarce factor or capital as a way augmenting employment and total labour income. The author affirmed that the Chinese must take a firm stand by the conviction that thier creativity would have values of the production as services, thus rendering possible improved ways of living.

Nigeria's (former) Minister of Information Social Development Youth Sport and Culture, (1984) expressed that "The basic philosophy for Nigerian Industrial Development ought to be self-reliance, we should as much as possible develop or own technology, using the large pool of knowledge, man-power and natural resources available in the country".

A significant role for the hand-loom and Intermediate Technology has been realised in India. According to Metha and Agarwal, (1984), it was estimated that about 3.8 million hand-looms were engaged in various localities in India. These hand-looms "are producing some of the most exquisite fabrics", meeting some of India's demand for cloth and offering job opportunities.

From this article, it is learned that weaving in India is mainly concentrated in a decentralised sector of around 800,000 of so-called power-looms which appear to be operated at the "cottage industry" level (in family homes): the almost 4 million hand-looms are also located in this sector.

By contrast, the "organised sector" (comprising "the composite textile mills and the weaving mills") is only allowed by the system to handle 25% of the 10 billion metres of cloth needed; the other 75% of the production has been captured by the "unorganized power looms" and the hand-looms.

Apart from the influence of foreign contact, the Nigerian cultural effect did affect the Arts and grafts of the people.

For instance, Newman Thelme, (1984) observed that "not long ago man would not become a carver or smith because he has had the tallent nor could a man become a potter, it was a woman's job or could a woman become a weaver because it was a man's job with the exception of weaving certain kind of cloth".

In another contribution, the author advised that appreciation of the aesthetic qualities of a product was good, but that the observation of the process of creation was the understanding of the move about the form.

Reference to Albers, (1965) and her picture of hand-weaving concludes this Literature Review. The author expressed that although not all, hand-weaving have contributed to Industrial Textiles, it was through the stimulating influence of Hand-Weaving that the Industry was becoming aware of new textile possibilities.

CHAPTER THREE

METHODOLOGY

3.1 PILOT SURVEY:

A preliminary survey tour of six institutions/ workshops in six locations in Nigeria was carried out as a Pilot Study. The selected workshops were each known for both their training programmes and for hand-woven fabric production within recent years. They are Textile Section, Department of Industrial Design Ahmadu Bello University, Zaria, Yusufu Weaving Workshop, Okene, Department of Fine and Applied Arts, University of Nigeria, Nsukka, Auchi Textile Training Mills, Auchi, and the Nigerian Armed Forces Rehabilitation Training Centre, Oshodi. The Nigerian Army Central Ordnance Depot, Yaba, was included since it is the clearing house for all of the tectile needs for the Army.

Only three of the five workshops visited were found to be operational; the Okene Workshop looms plus a few products were still available for observation; the Oshodi looms and products had disappeared.

The data collected was made up of measurements,

sketches and photos (unifortunatelly, most were destroyed in the printing process). Notes and observations were made of the looms used, the participants, historical and products of the workshops.

3.2 LOOM CONSTRUCTION

A copy of the existing Ahmadu Bello University, Zaria, Nigeria table looms was commissioned by the researcher through an Ahmadu Bello University, Zaria, carpenter and his hand tools. The metal harnesses plus the beam rachets were built at Department of Mechanical Engineering, Ahmadu Bello University, Zaria, Nigeria.

This table loom was selected for the construction experiment, after considering the various contemporary non-motorised looms observed during the pilot survey. A table loom was chosen for this construction experiment because it was considered appropriate and the most convenient to control in terms of cost and time factors. The main objective was to test the use of local skills, tools, techniques, and materials available which could be found also in the Nigerian Military environment.

3.2.1 DIMENSIONS

The following dimensions were prepared to guide the technicians in the construction process:

The over-all height, 46cm and horizontal (or outside) width of the loom was requested as 61.5cm. The planks supporting the two sides of the loom Frame (i.e., the ones connecting the beam stands) were to be 13.5 x 1.1 cm each.

Inside width (weaving area) to be 86cm. The required distance from the beams to the supporting table (i.e., the base of the loom feet) was 19.5cm, the beams' stand height - 27.5cm and the beams' circumference - 8cm.

Six harnesses (or heddle Frames) were requested, each to be 89cm long and 22cm high. Six grooves or harness-travels were required in the loom Frame uprights, for easy but controlled movement of the harnesses. Each groove was to be 1.5cm deep; the gap/wall separating each (FIGURE 1) groove or harness travel was to be 1.5cm thick. Six levers were fixed 18cm from the top of the uprights at the right hand side of the harnesses travel. Holes were provided as passages through

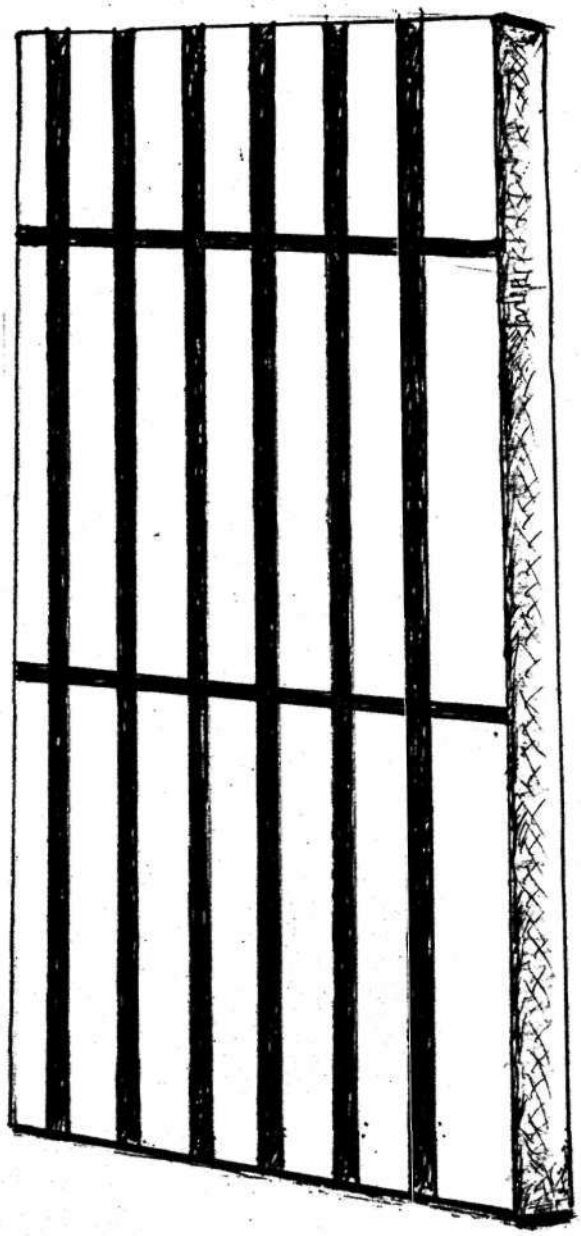
(FIGURE 1)

(a)



one of the beams stands

(b)



Grooves

The right side of the shaft which indicates the harnesses travels or the grooves.

which the cords from the levers were passed on to the respective pulleys and then to their harnesses, serially. The heddles were 22cm in height with an eye hole at their centres.

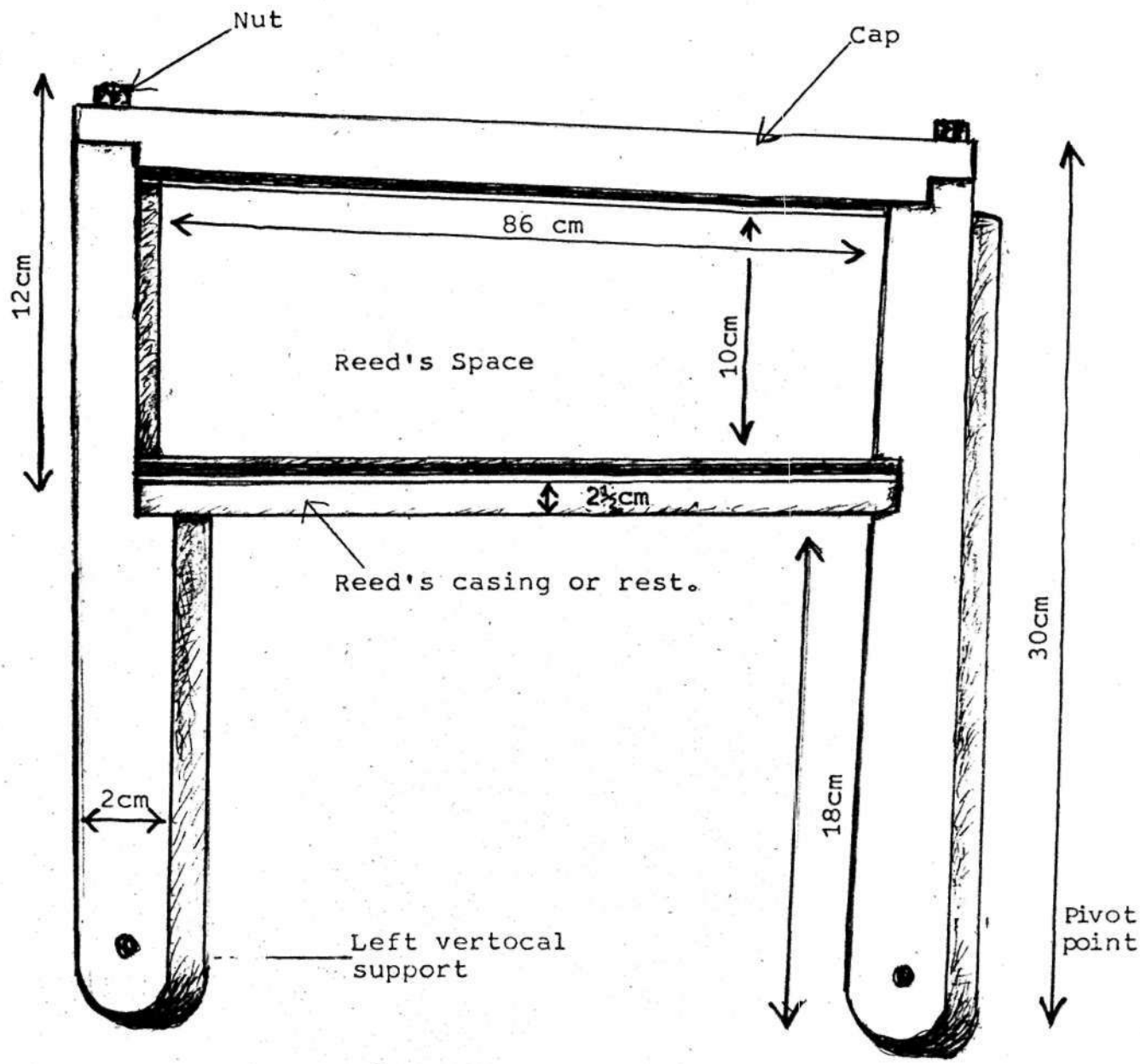
The beater/reed frame (figure 2) was required to rotate on a pivot rod for purposes of beating the weft insertion (pick) into the cloth. It also was required to be a adaptable for changing of reeds. From the base to the reed casing - 18cm. From reed casing to the upper limit or cap, 12cm. Wooden reed case 87.5cm long ; thickness of the wood, 2.5cm. Both upper and lower grooves in which the reed rests were to be 1.1cm in depth.

3.2.2 MATERIALS

The main items used for the construction of this loom were: wood, metal and cotton twine (threads). The ideal wood needed should have been the Iroko Plank, but, for the limited time available to the researche, only packing wood, already dried enough has been used. The wood has been used for the body of the loom; the metal was used for the six harnesses and rachet

(FIGURE 2)

THE REED FRAME



(A rough sketch of the reed's frame)

including nuts and belts. The heddles were made of cotton threads or twines.

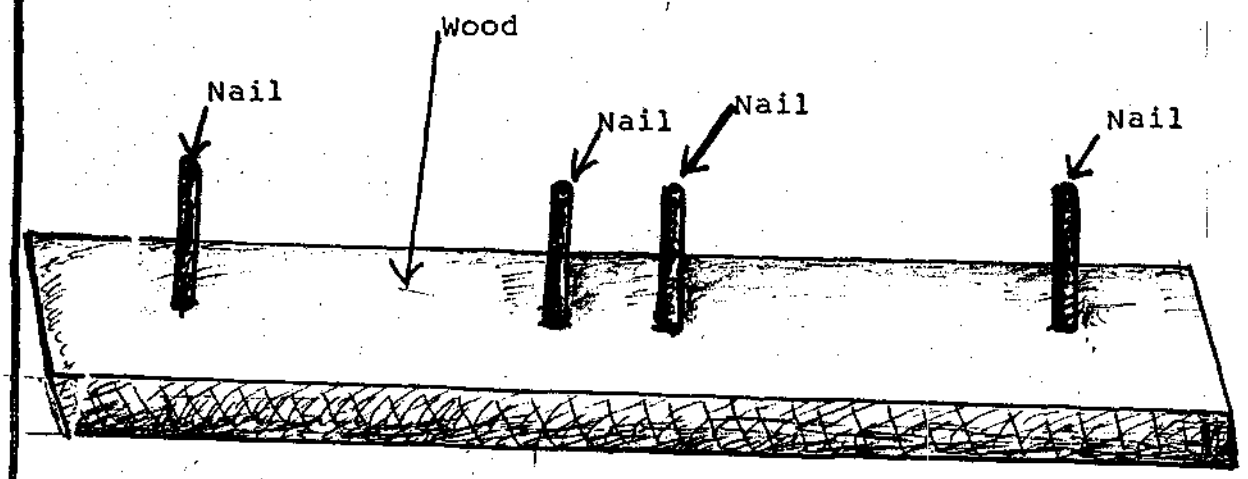
3.2.3. HEDDLE PRODUCTION

The heddles were made from a cotton thread of yarn count $1.95^{s}cc$. The dimensions of the original metal heddle were measured from the base of the metal harness to the centre of the heddle's eye hole, then, to the upper metal rail of the harness. From these calculations, a guiding frame was constructed, employing nails for spacing and for tension reproduction. The heddles were made, one after the other, manually, using the frame for exact measurements (Figure 3). The constructed loom (Plate I).

3.3 BASIC LABORATORY TESTS

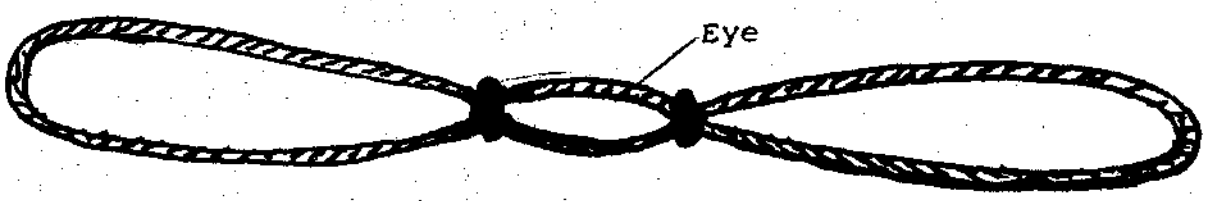
Two sets of laboratory determinations were accomplished for this study. Yarn counts (the measurement of fineness of yarns based on the relationship of length to weight), plus a basic analysis of the weave involved within the Army Corps Belts. They were carried out with the assistance of the Department of Textile Science and Technology, Ahmadu Bello University, Zaria, Nigeria.

(FIGURE 3)



(a) A wooden frame used as a guide for making the heddles.

Four of 5cm nails were driven into the wood at the desired interval on the wood as illustrated in the sketch.



(b) A heddle

THE LOOM



PLATE I

NOTE:

The fabric analysis here does not assume all the details as laid down in fabric and fiber analysis standard manner. It is hoped that such tests could be carried out in due course, when the appreciation of this report might have been realized. It is then that detailed fabric structural analysis might be under taken to provide the necessary information for proper assessment of the product. The tests here could be regarded as only sketches of such details. They are as follows:

3.3.1 TITLE:

Determination of the yarn count of the yarns used in this study.

3.3.1.1 ACRYLIC YARN

(Imitation wool, commonly referred to as baby wool).

AIM:

To determine the yarn count of this acrylic yarn in order to assess its effect on the woven fabrics' pattern; through practical observation and calculations.

INTRODUCTION:

Durability of fabrics depends on a number of factors, including the properties of the fiber. These fiber properties in turn, determine the quality of the yarns which the manufactures do produce.

The woven fabrics are or could be affected by these properties like the strength to withstand tension and the pattern design. It is therefore important that a weaver should be aware of the thickness or finness (yarn count) of yarns that are normally, utilized in theproduction of the woven fabrics.

From tests carried by Textile experts on yarn count, it has been accepted that yarn count can be determined through calculation, using a given unit of that yarn.

MATERIALS:

a - Sensitive balance

b. - A good metric ruler

c. - Calculator (Manual)

PROCEDURE:

1. Four threads, 40cm long, were measured out.
2. They were weighed on the sensitive balance together and the weight was observed and recorded as 0.30gm.
3. The four threads of 40cm, if extended would be, 40 x 4cm or 160cm (i.e. 1.6 metres.

4. 1,000 is accepted as an international number factor in the Militex conversion: (i.e, how many times would 1.6 metres go into this 1,000?

That is, $\frac{1,000}{1.6}$, would be 625.

Weight of material = 0.30 gm as observed on the sensitive balance. The tex would therefore be weight multiply by 625 (i.e. 0.30 x 625 tex. The result would be 187.50 tex. To convert this 6 cotton count, the standard factor is 590.5 (This is also another internationally accepted figure by the textile experts).

Therefore, 590.5 if divided by 187.5 would give 3.15^{s}CC (CC for cotton count). The yarn count for the acrylic yarn used is therefore 3.15^{s}CC.

The yarn (acrylic) contains three plys or atrands spun together. Therefore, in writing the yarn count, it would be 3/3.15.

Following the above given procedure, the yarn count for the rest of the yarns used were worked out, using the folowing data in each case.

3.3.2 RAYON COTTON BLEND

AIM:

To find out the yarn count of the rayon cotton blend in order to compare its effect with the acrylic and other yarns on their pattern design.

INTRODUCTION:

In addition to the fiber properties which the quality of yarn depends upon, various thicknesses in yarn or their finness (yarn count) effect the pattern design in fabric design. The effect can be notised in various appearances or shape in the patterns. In textile design therefore, this effect on the pattern can be compared through observation of the shapes' appearance.

In order to write a report of such performance of yarn in a particular pattern (design) the technical language should be used hence the need to know the yarn count of every yarn being utilized in woven fabrics. This yarn count is usually determined by same calculation of yarn count.

MATERIALS

a - Sensitive balance

b. - Metric ruler

c. - Calculator (Manual)

d. - Writing material - (Paper and pen)

PROCEDURE:

1. Five strands of rayon cotton blend were chosen and measured 40cm long, using the metric ruler.
2. They were weighed on the sensitive balance and the weight recorded was 0.26 gm.

3. If the five strands were to be extended, the length would have been 5 x 40 cm that is, 200cm or 2 metres

4. 1,000 is a number accepted internationally by textile experts as unit of measure in Militex.

5. To find the tex, it is, 1,000 multiplied by 0.26, the result divided by the length of the yarn (strands)

That is, $\frac{1000 \times 0.26}{2}$ = Tex

This would be $\frac{500}{1} \times \frac{0.26}{100}$

or 5 x 26 or 130 tex

The conversion factor for cotton count is 590.5 (another internationally accepted number in textile analysis) To convert to cotton count, the 590.5 would be divided by the tex.

That is, $\frac{590.5}{130}$ = 4.54^{s}CC

There were 2 plys spun together as one strand, therefore the count would be written as 2/4.54

2/4.54.

3.3.1.3 MERCERISED COTTON

(This was the finnest yarn used in this study).

The same procedure was followed and the yarn count was worked out. The data provided below were used to obtained the count.

a. 25 Strands selected.

b. The length of the strands was 40 cm

c. The weight was 15 gm. Using the sensitive balance

CAUTIONS

Great care in any laboratory experiment or observation is one of the fundamental principles to be observed; particularly in handling the equipment and reading of figure. e.t.c-

The use of the sensitive balance requires such great care in order to have accurate and reliable data. Every care was taken to make sure that no foreign body existed on thesensitive balance which would influence the reading. For a reliable data, it was considered that at least three different reading were taken of the material being weighed and the average found.

On the working, the use of physical calculation was compared with the result obtained from the use of scientific calculator - (manual).

CONCLUSION

It is observed that the finner the yarn, the higher the number of its yarn count. Thick spun yarn appeared to have lower number in thier yarn count.

3.3.2 ANALYSIS OF ARMY CORPS BELTS WEAVE

PROCEDURE

Initially, effort was made to identify the drafts of one the Nigerian Army imported corps belts, but the use of hand lens could not solve this problem. The Manual Method of Analysis was adopted, after outting and separating the warp and weft yarns. Five centimetres of the imported belt (produced on motorised looms in United Kingdom) were out and unravelled carefully, both warp and weft; then, the ends and the picks (weft yarns) were carefully separated and counted. The following information was made available:

(a) Warp Yarns

Blue	-	76 x 2 =	152 ends
Red	-	60 x 2 =	120 "
Yellow	-	25 x 1 =	25 "
			297 ends

(b) Weft Yarns

Total picks, 80 per 5 centimetres.

3.3.2.1 CONSTRUCTION OF WEAVE (Density)

Next, the EPC (end per centimetre) and the PPC (picks per cemtimetre) were caculated.

i. The 297 ends were divided by 5cm (297 ÷ 5 = 59.4) approximately 60 ends per centimetre is suggested. 60 EPC (warping).

ii. For the weft; 80 total picks divided by 5cm = 16 picks per centimetre. 16 PPC (Filling).

iii. The construction of the imported Army Corps Belt was therefore, suspected to be 60 EPC/16 PPC.

3.3.2.2 DESIGN OF WEAVE (Weave Pattern)

Close observation, confirmed via Textile Science and Technology Departmental Technician, established the Corps Belts' weaving design as an elongated twill weave, with a step upwards of two, and a step outwards of one.

3.4 WEAVING PRACTICALS

Four factors were to be tested: Loom serviceability, Basic Weaves, Yarn Count Changes and Reproduction of the Nigerian Army Corps Belts. Within these factors, special concentration was applied to colour effects, change in woven design effect through changing lifting of the harnesses (CD or Shed Openings) and the production of Army Corps Belt material.

Samples from the six-harness, personal table loom:

3.4.1 COLOUR EFFECT

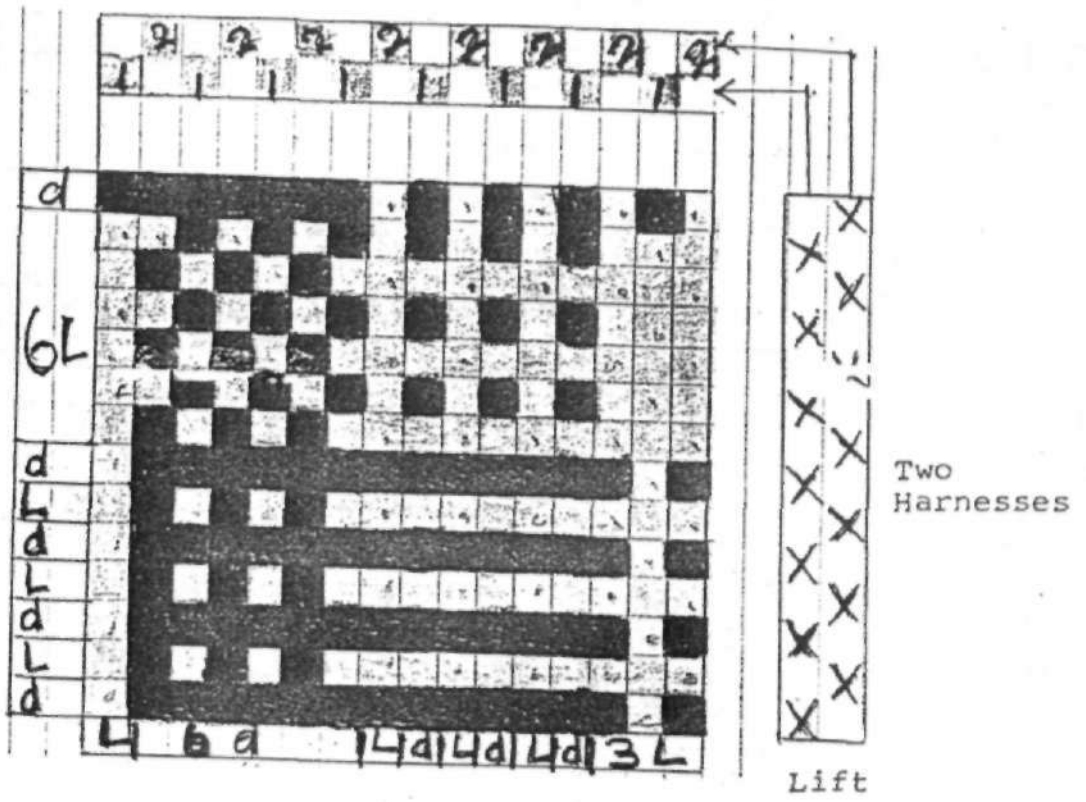
The CE Series: in plain weave 17 projects were undertaken. Drafts in (figure 4 to 4d show some examples and the procedures. The samples were woven on two, three and four harnesses respectively. The line and shape changes are effected purely through changes in the arrangement of light and dark threads in both the warp and the weft. Only arcylic yarns were used; weave pattern (as mentioned above) was plain weave, also known as tabby weave. (PLATE II).

3.4.2 YARN COUNT

The YC Series: Numbers given are in cotton counts (the higher the number, the finer the yarn). Three different thickness of warp yarns and weft yarns were employed; they were also composed of differing fibres, due to availability restrictions in the local markets (Zaria, Samaru and Kaduna Market) during the study.

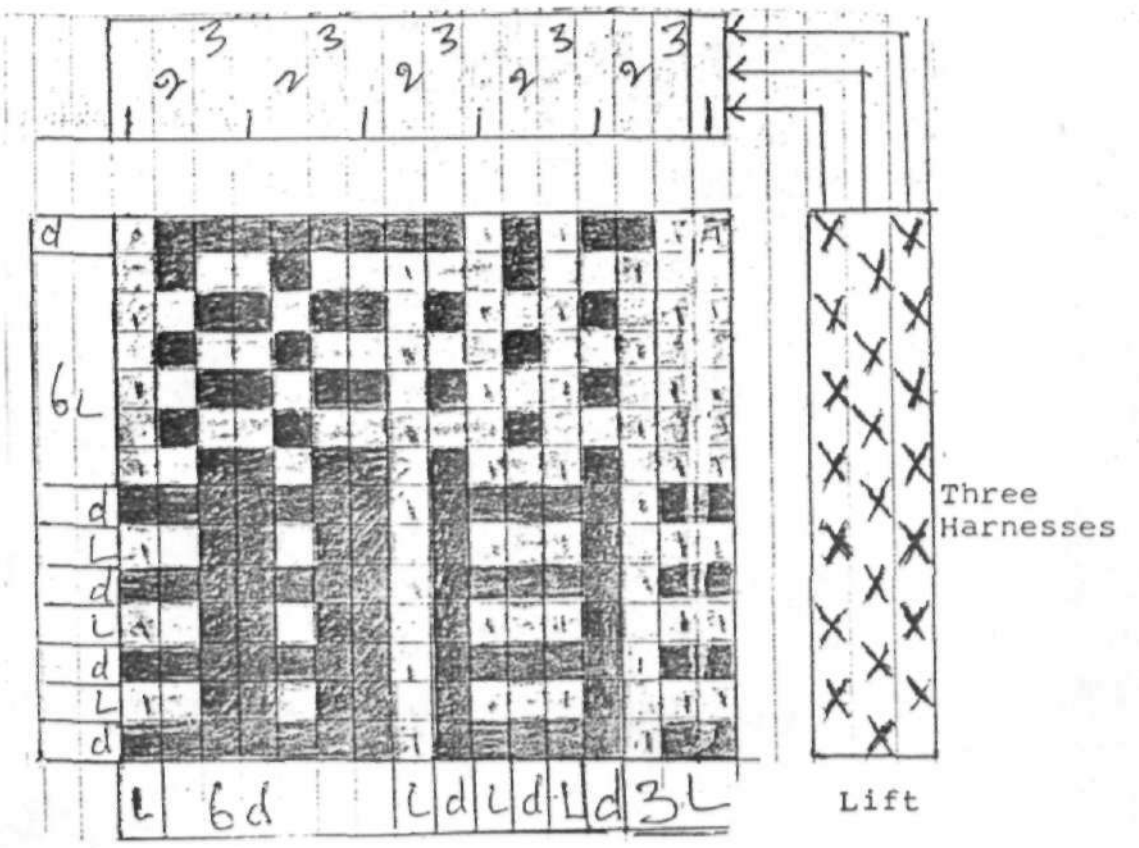
An ever-shot, twill-derivative pattern weave, drafted personally by the researcher was used consistently throughout this YC sampling; therefore, the same DID (threading through the heddles) and

(FIGURE 4a)



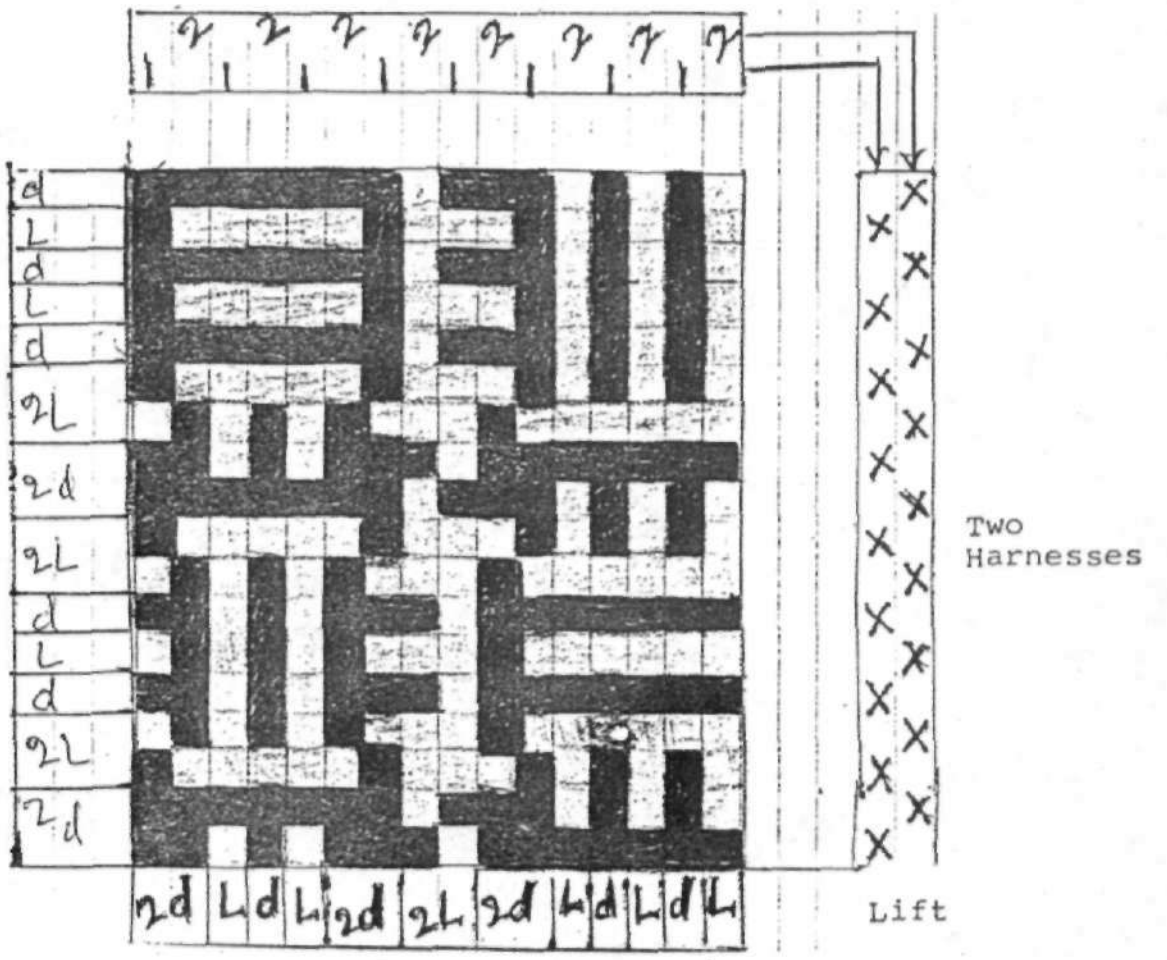
Draft

(FIGURE 4b)

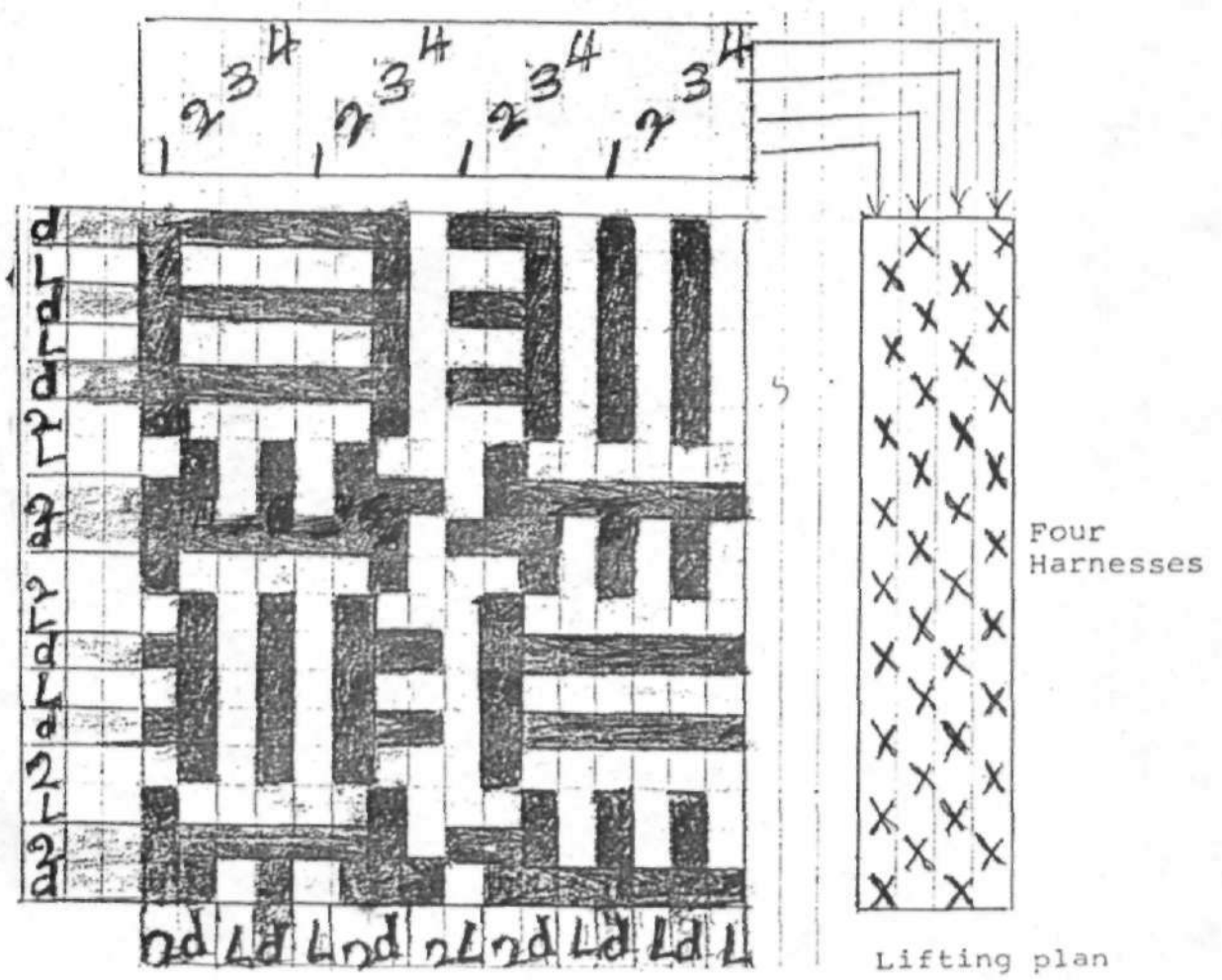


Draft

(FIGURE 4c)



(FIGURE 4d)



the same CD (lifting for shed openings) was used in each sample. Six harnesses were used.

The warp ends were threaded singly through the heddles in each sample of the YC SERIES: a reed with 8 dent/cm was used.

3.4.2.1 YC1/a to d/85/ABU Utilises, for warp, "market yarn" (commonly believed to be cotton blend) of yarn count 4.5400. The warp was threaded through the reed (sleyed) at 8 EPC (ends per centimetre) inthe 8 dents/cm. (20 dents/inch) reed.

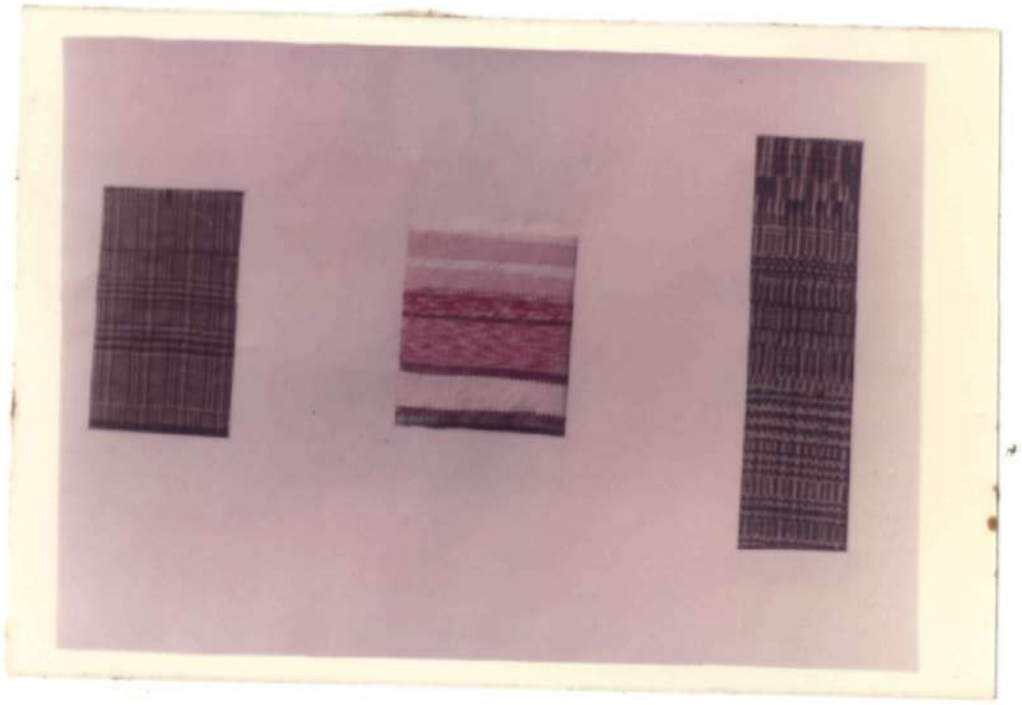
(a) Samples YC1/a - same rayon/cotton blend, 4.54cc, yarn for the weft as for the warp; single per pick.

(b) Sample YC1/b - same weft as warp, but doubled; therefore, 2.27cc for yarn count.

(c) YV1/c - weft is single-strand acrylic, yarn count 3.15cc.

(d) YC1/d - mercerized cotton (thinnest), yarn count 15. (The YC Series show the practical tests of the yarns and the woven fabrics).

COLOUR EFFECT?



Two Harnesses

Four Harnesses



Two Harnesses

PLATE IIA

3.4.2.2 YC2A/a to d/85 ABU Utilises warp of 'baby wool' (acrylic imitation of wool), yarn count 3.15cc, threaded 8 EPC in the 8 dents/cm reed.

(a) YC2/a - weft is same acrylic as the warps; single 3.15cc.

(b) YC2/b - weft is rayon/cotton blend,but doubled; therefore, of yarn count 2.27cc.

(c) YC2/c - weft is rayon/cotton blend, single, yarn count 4.54cc.

(d) YC2/d - weft is mercerised cotton, single; yarn count 15cc.

3.4.2.3 YC2B/a (1 and 2) to d/85 ABU Utilises acrylic warp, yarn count 3.15cc, sleyed 4 EPC in the 8 dents/cm reed.

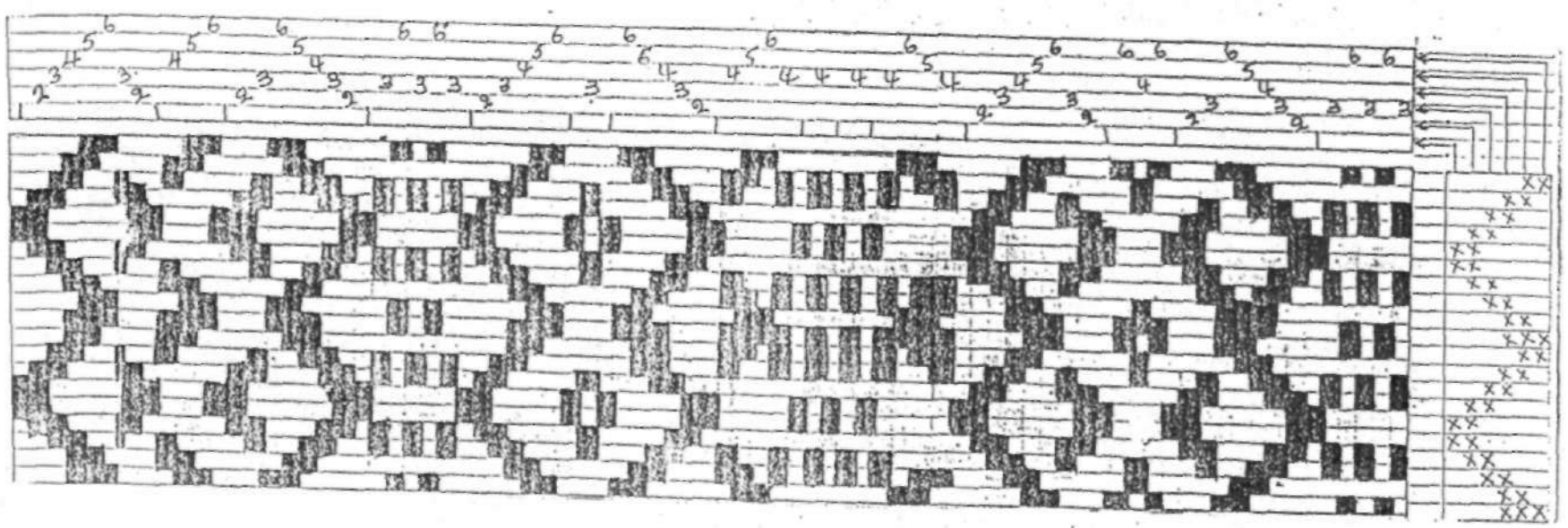
(a) YC2B/a (1 and 2) - weft is, identical to warp; single, acrylic, yarn count 3.15cc.

(b) YC2B/b - weft is rayon/cotton blend, doubled; yarn count 2.27cc.

(c) YC2B/c - weft is rayon blend, single; yarn count 4.54cc.

(d) YC2B/d - weft is cotton mercerised, single, yarn count 15cc. (Figure 5A-B and PLATE III)

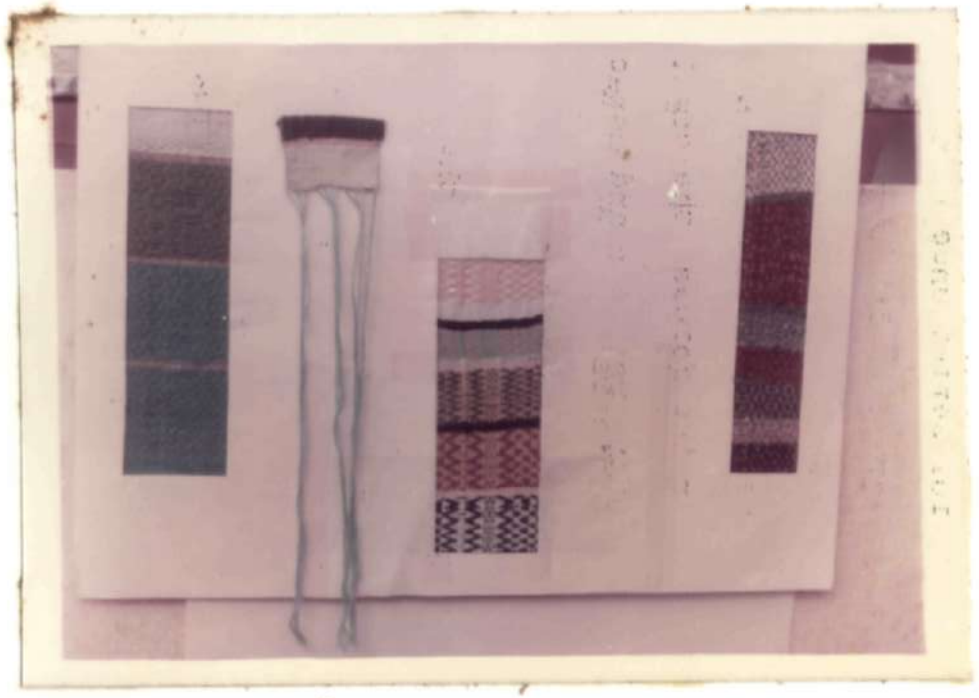
FIGURE 5A



DRAFT

The same draft was used for all the pattern tests in yarn count effect.

YARN COUNT EFFECT



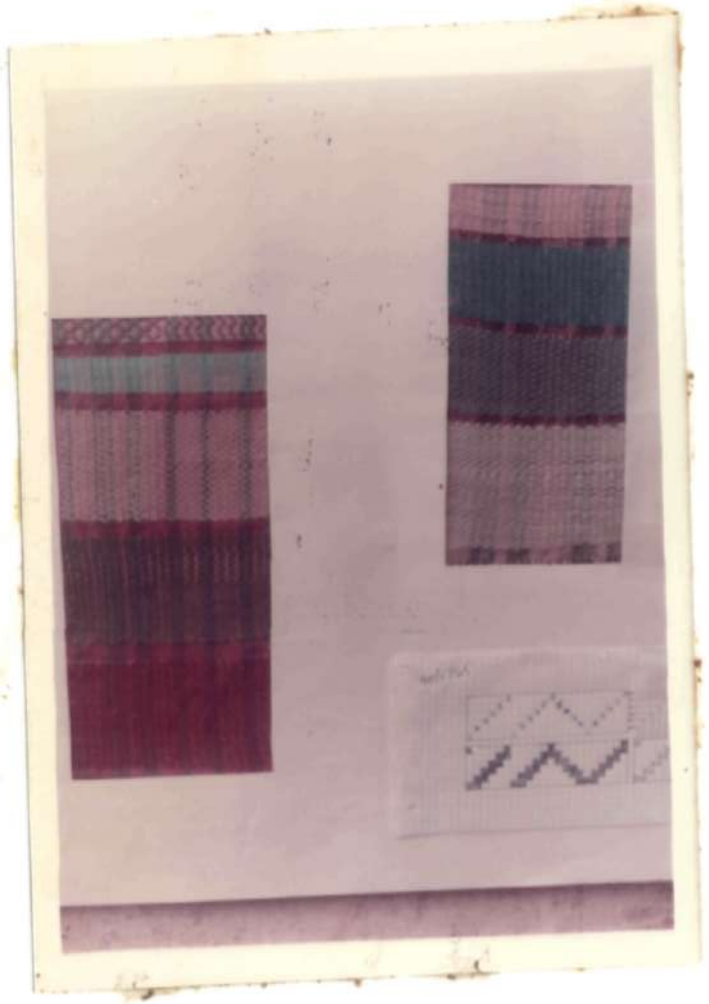
YC2 Warp Rayon - Cotton Blend $4.54^{s}cc$

YC2d Warp Cotton-Mercerized $15^{s}cc$

Warp Acrylic

D Warp Acrylic $3.15^{s}cc$

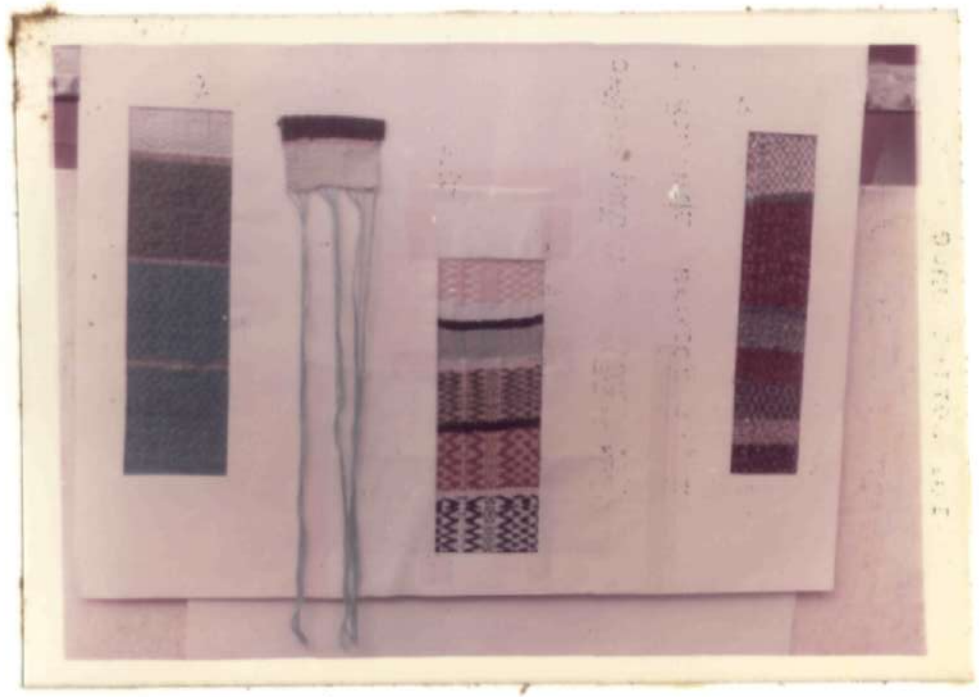
PLATE IIIA



YC4

(PLATE IIIB)

YARN COUNT EFFECT



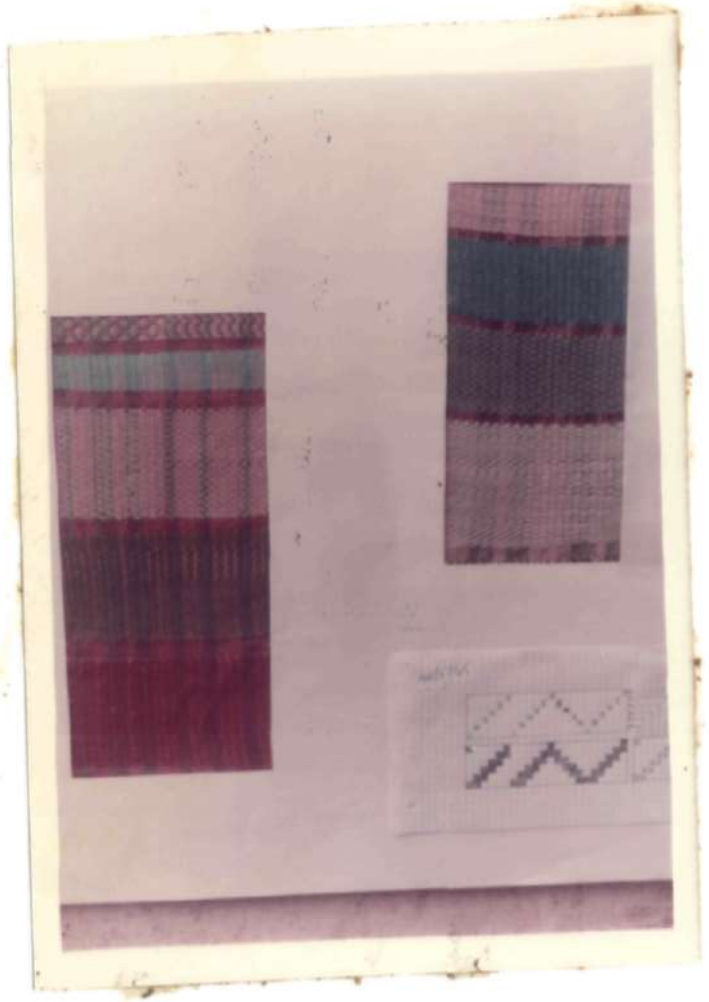
YC2
Warp
Rayon - Cotton Blend
$4.54^{s}cc$

YC2d
Warp
Cotton-Mercerized
$15^{s}cc$

Warp
Acrylic

D
Warp Acrylic
$3.15^{s}cc$

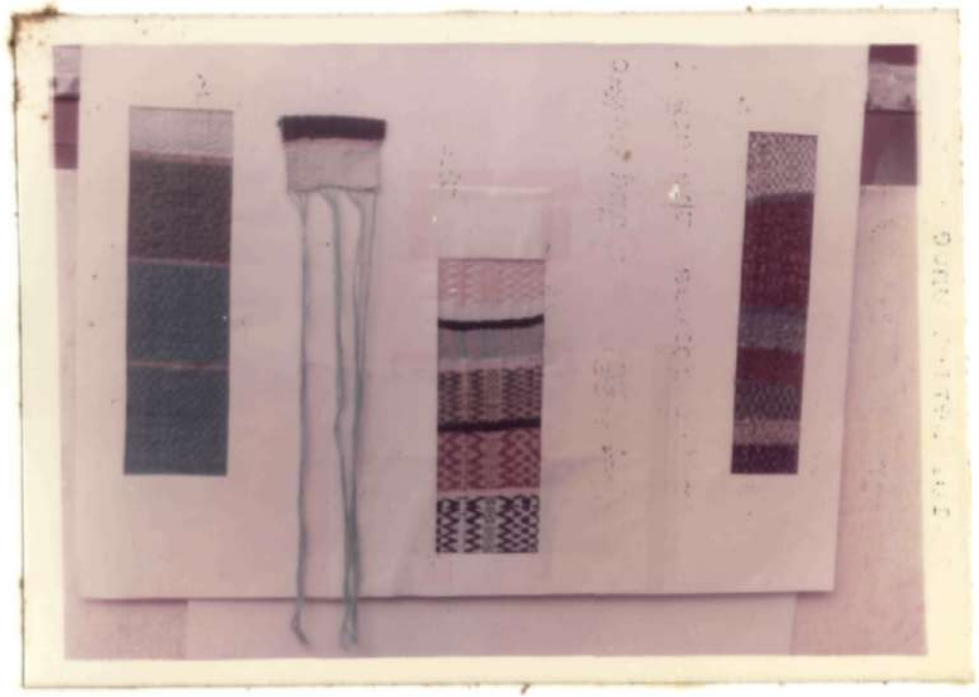
PLATE IIIA



YC4

(PLATE IIIB)

YARN COUNT EFFECT



YC2
Warp
Rayon -
Cotton
Blend

4.54^{s}_{cc}

YC2d
Warp
Cotton-
Mercerized

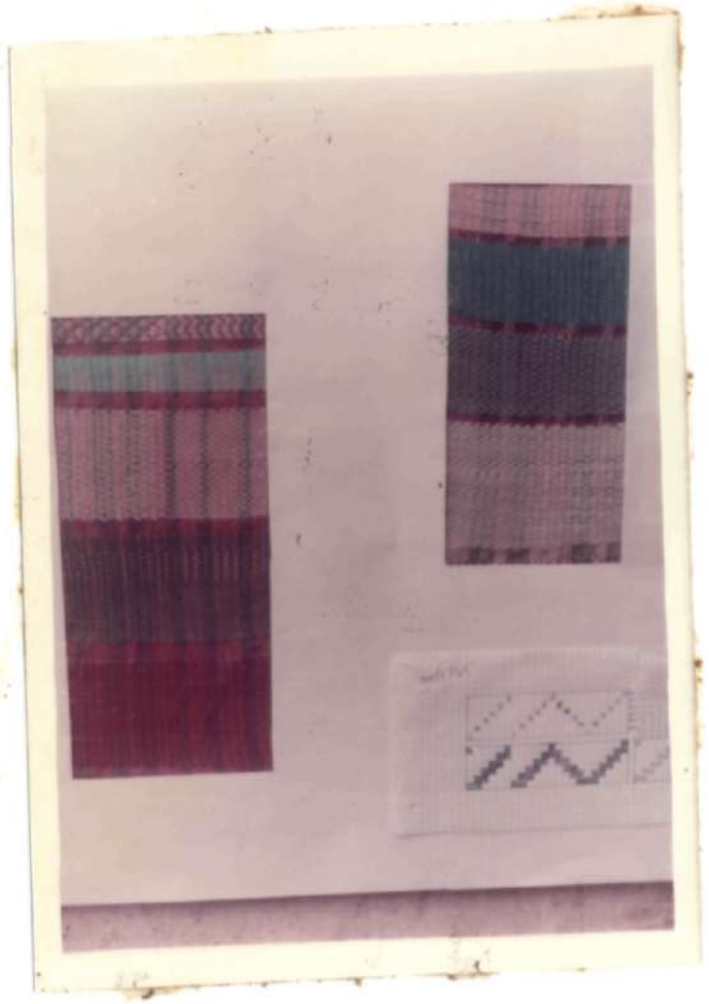
15^{s}_{cc}

Warp
Acrylic

D
Warp Acrylic

3.15^{s}_{cc}

PLATE IIIA



YC4

(PLATE IIIB)

3.4.2.4 YC3/a and b/85 ABU Utilises mercerised cotton as warp, yarn count 15cc, sleyed 8 EPC.

(a) YC3/a - weft is acrylic, single yarn count 3.15cc.

(b) YC3/b - weft is mercerised cotton: double: 7.5cc.

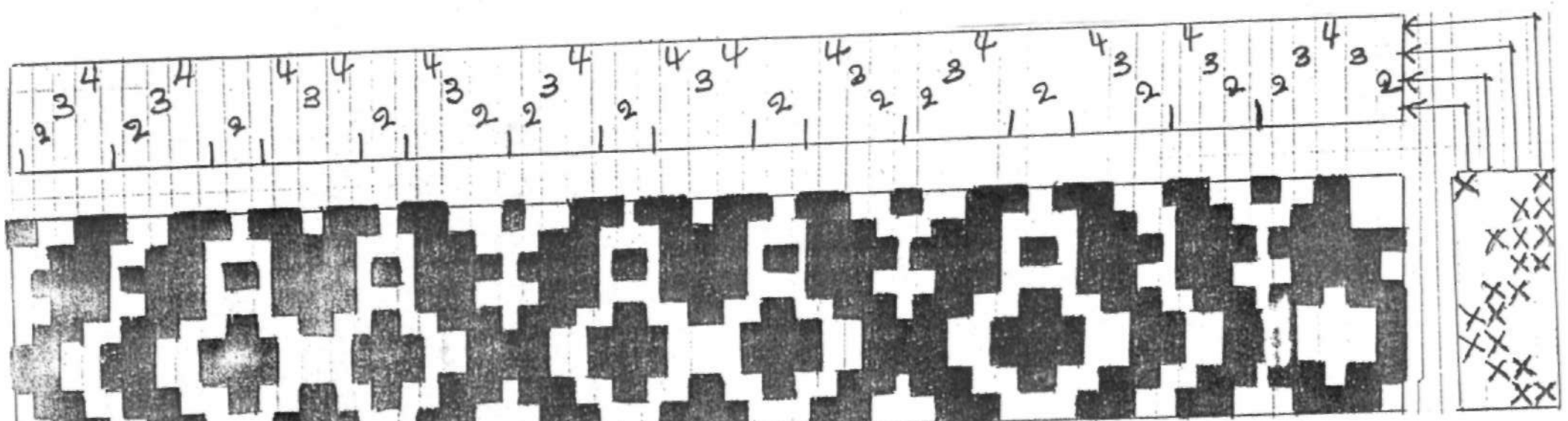
3.4.3 Variety (The VS Series

The same pattern weave as used in the YC SERIES (personal overshot twill-derivative) was developed further to give it more balance; then woven for VS1. VS1/a is woven on six harnesses; VS1/b, on four harnesses. Other weaves in the VS Series were woven while testing shape, via colour, and lifting changes.

3.4.3.1 VS1/a and b/85 ABU - Colour use test: used a warp of rayon/cotton blend, threaded single in the heddles and singly in the 5.6 dents/cm reed.

(a) Six harnesses, colour varieties in weft; tabby, binder different from motif colour; single colour warp.

(b) Four harnesses, related twill; vertical stripes through warp colour changes. (See Draft vsib)

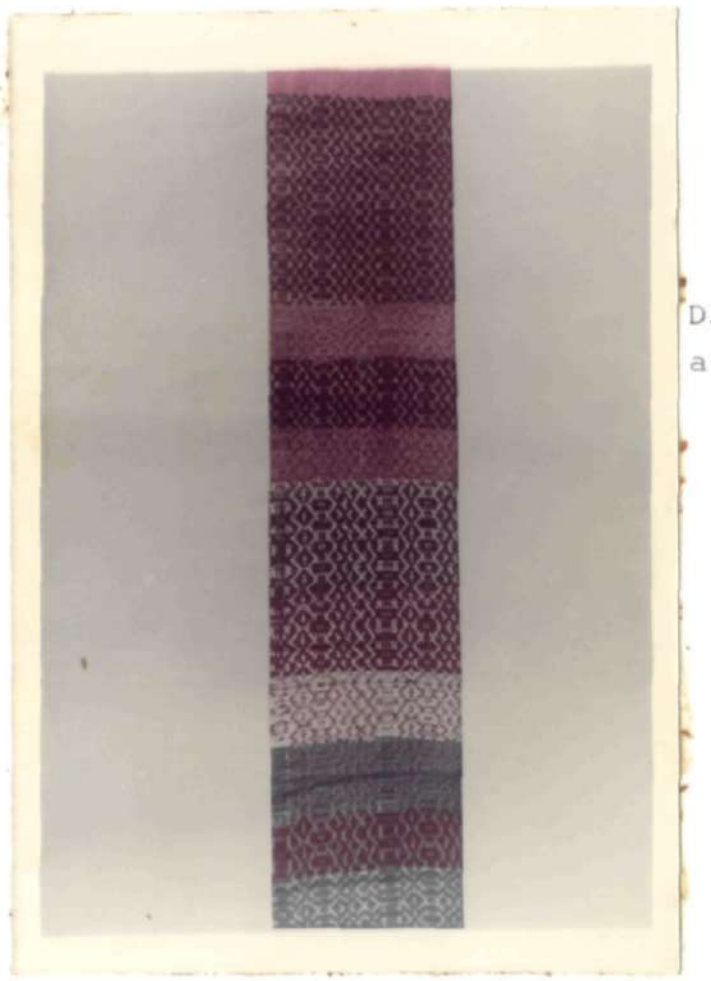


Draft (56 X 9)

Lifting plan

Design used for VS1b study (VS1b of 3.4.3.1)

VARIETY AND SHAPE DESIGNS



Draft and Lifting Plan
as in figure 5A

VS1/A

VARIETY AND SHAPE DESIGNS



VS3/2/ABU85 3.4.3.3

VS1b85 3.4.3.1

VS3/ABU85 3.4.3.2

PLATE IV

3.4.3.2 VS2/85 ABU - Fancy Twill: overshot on four harnesses; red tabby of rayon/cotton blend, single; blue motif of acrylic.

3.4.3.3 VS3/85 ABU - Motif Expansion: via changes in harness lifting. In both warp and weft, acrylic yarns with the cotton count of 3.15cc were used to produce the sample. This is a technique whereby a shape is suggested, and based on the structure of such shape, its harness sequence is also suggested. The term shape design has been adopted. Following the shape, the designer then plots out its CD or lifting plan as provided below: (VS-Variety and Shape is to show that many ways exist to obtain patterns in weaving).

3.4.3.3.1 PROCEDURE

There are six stages in the production of this shape design, broadly classified into two main phases: primary (Stages I to V) and secondary (stage VI).

(a) Primary phase consists of the following Stages:

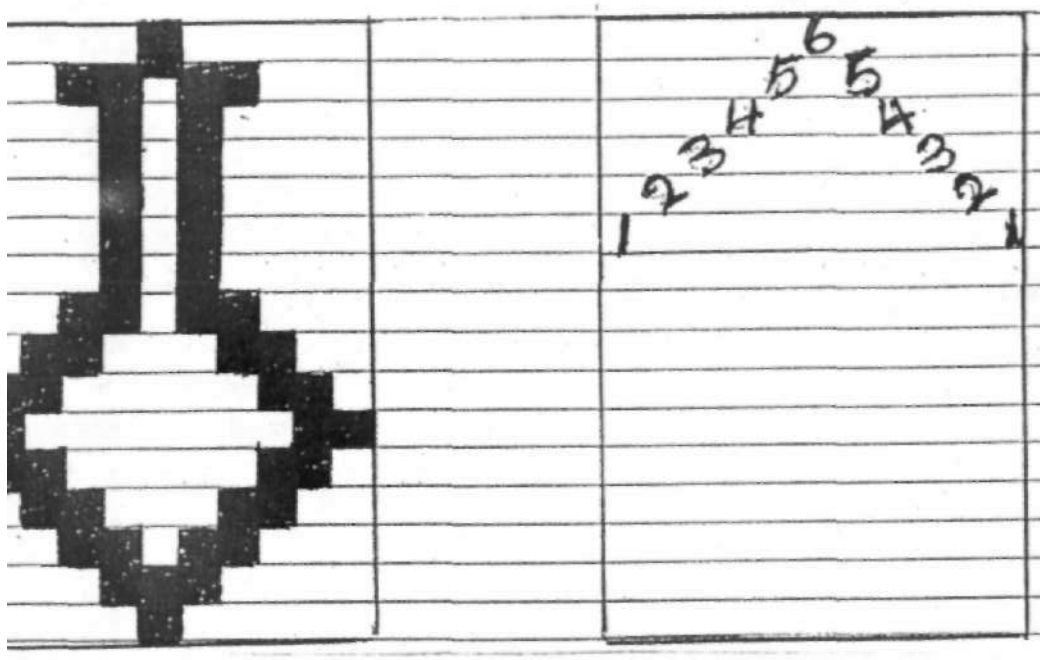
Stage I: The researcher created on graph paper a shape of his choice, (Figure 6)

Stage II: The DID, or threading plan (called a point-twill draft) was suggested, corpidering the appearance of the shape (i.e. how large it is): Figure 7.

Stage III. The shape from stage I was transferred under the DID of stage II. This is demonstrated in Figure 8.

Stage IV: The lifting plan follows the threading and the shape. Filled squares in the design indicate warps lifted over weft; unfilled squares indicate warps under wefts. Filled squares, therefore indicate that the harnesses which control these warp ends must be raised during the picks (weft insertions) for which they are filled. Unfilled squares controlling these warps remain unraised during the picks for which they are unfilled.

(FIGURE 6)



)RM/SHAPE FORMED)

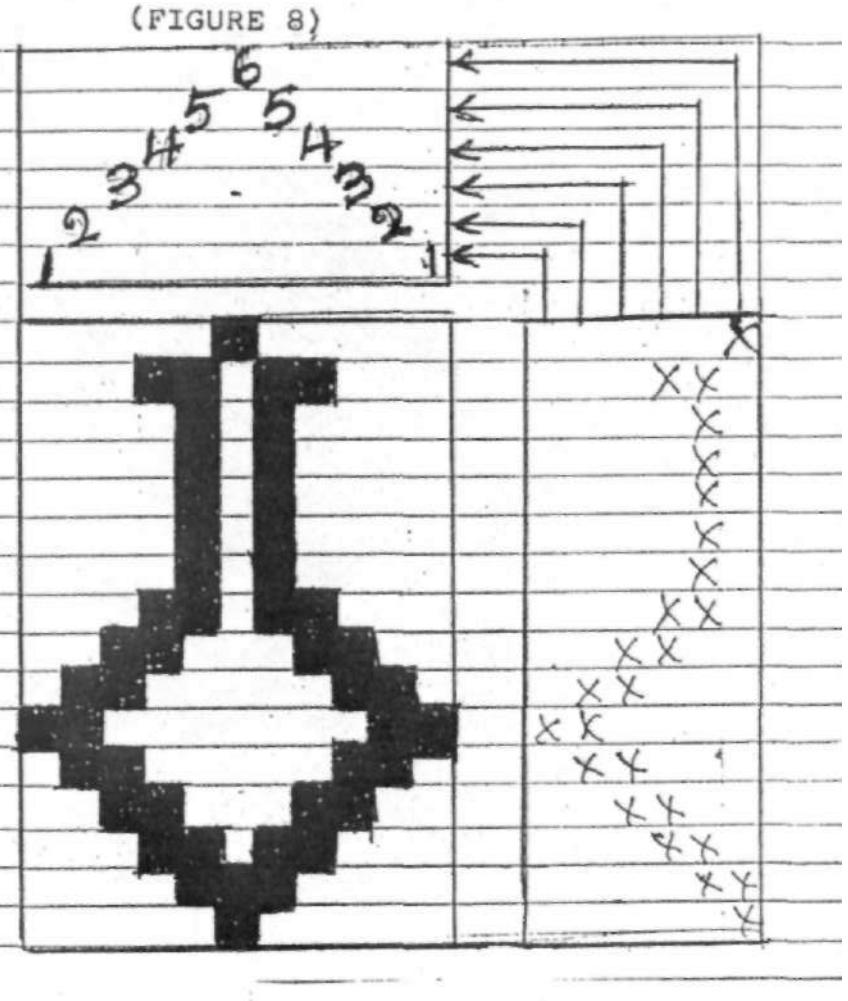
(3.4.3.3.1)

(FIGURE 7)

STAGE TWO

(THREADING SYSTEM)
(SUGGESTED)

(FIGURE 8)



Lift

STAGE THREE

(LIFTING PLAN PLOTTED, FOLLOWING)
(THE SHAPE FORMED.)

Stage V: The design was pictted following the shape correctly as it appears in Figure 8.

The initial lifting plan (Figure 8) from the shape consisted of the following operations:

Picks	Harnesses/Harness Involved
1st Pick	Harness Number 6
2nd Pick	" " 5 and 6
3rd Pick	" " " 4 and 5
4th Pick	" " " 3 and 4
5th Pick	" " 2 and 3
6th Pick	" " 1 and 2
7th Pick	Harnesses Number 2 and 3
8th Pick	" " 3 and 4
9th Pick	" " 4 and 5
10th Pick	" " 5
11th Pick	" " 5
12th Pick	" " 5
13th Pick	" " 5
14th Pick	" " 4 and 5
14th Pick	" " 6

After carrying out these operations (stages I to V), the fabric sample showed that there were many floats of thread/yarns which did not interlace to hold firmly. A weaving designer knows the problems associated with over-floating of yarns in a weave which include easy pulling off. To solve this problem (floats), the researcher therefore decided to control the floats by modification or elimination of some floats in the design. By elimination method, certain additional harnesses, carefully selected, were made to rise along with the previous choices. Through this technique some unnecessary floats were controlled.

Another control method was by tabby technique. Tabby is plain weave and is used with floating patterns to form the over-shot weaving technique. After every floating pattern pick, a plain weave pick is provided in order to bind the fabric together giving a firm structure under the floats. So far, in the above design, six harnesses have been used as dictated by the shape created. A point twill (also called diamond) threading plan was chosen to contain the shape centrally.

This meant, warp ends through harnesses in sequence threading first from 1 - 6 and then reversing from 6 - back to 1 (as already indicated in the design). It was observed that harness number five was raised and continued from 10th pick till the 14th pick.

(b) Secondary Phase

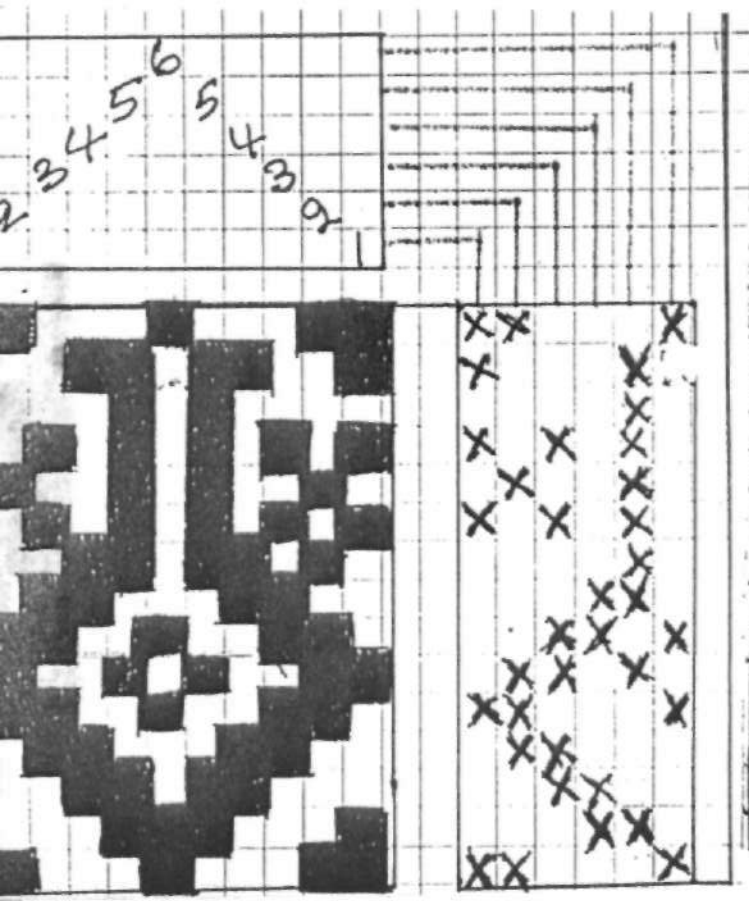
Stage VI: The secondary phase affected the lifting plan (CD). This was where all the necessary harnesses to be raised were planned and indicated so that they were made to rise accordingly. Design in fig shows how the initial floats were controlled or eliminated/reduced. One could choose to employ both techniques, i.e., raising more appropriate harnesses, along with the use of tabby as a backing fabric or backing for more strength.

In the sample shown (Plate III?), first, the initial lifting was used for a small area as shown in the fabric bottom most. Then, followed the elimination technique as shown in the black scrylic yarn; and, finally, the use of tabby technique which produced an appearance on the back side of the fabric whic is reminiscent of the embroidery motifs often used on Hausa caps.

The final lifting stages include the following operations:

Picks	Harnesses Raised
1st 1.	1, 2 and 6
2nd	1, 5 and 6
3rd	4 and 5
4th	3 and 4
5th	2, 3 and 6
6th	1, 2 and 5
7th	2, 3 and 5
8th	3 and 4
9th	4 and 5
10th	1, 3 and 5
11th	2 and 5
12th	1, 5 and 5
13th	5
14th	1, 4 and 5
15th	1, 2 and 6

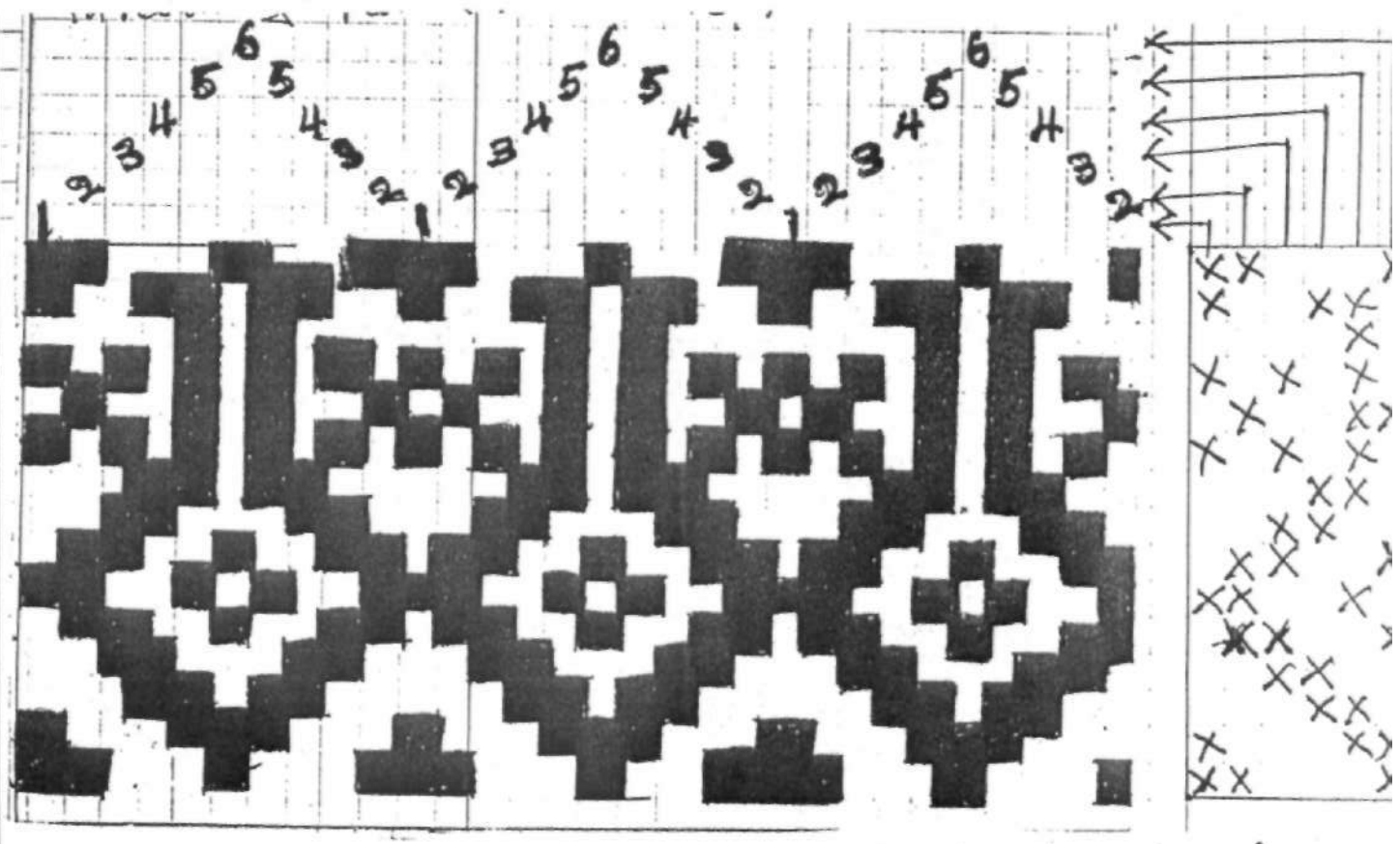
(FIGURE 9)



Floating
Controlled.

Lift

(FIGURE 10)



A Repeat draft

Lifting plan

PLATE IV

VS3/ABU85



VARIETY AND SHAPE DESIGNS

Figures 9 and 10 indicate the repeat draft of this design; while Plate IV shows the woven fabric sample.

3,4.4 PRACTICAL REPRODUCTION OF NIGERIAN ARMY CORPS BELTS

Following the analysis of the original NAOC belt (fig. 11) the researcher carried out a four-samples, pilot study series of the NAOC belt. The following samples were in the pilot study series:

NAOC/1 - utilized a 4.8 dent/cm reed.

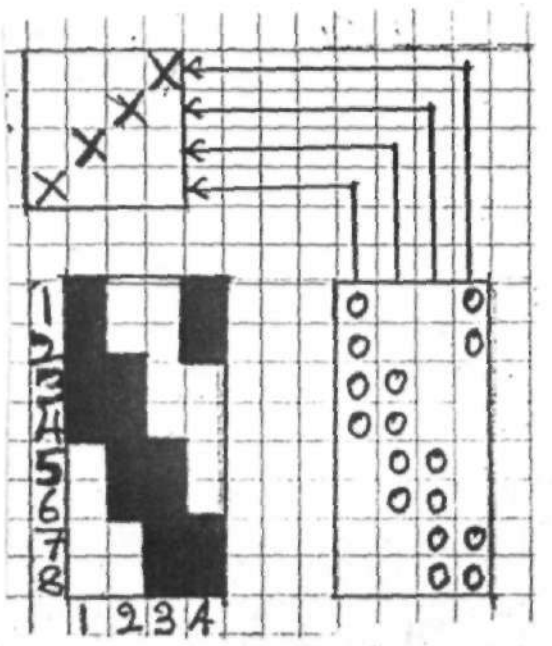
NAOC/2 - utilized a 3.2 dent/cm reed.

NAOC/3 - utilized the 4.8 dent/cm reed.

NAOC/4 - utilized a 5.6 dent/cm reed, (only shown on exhibition)

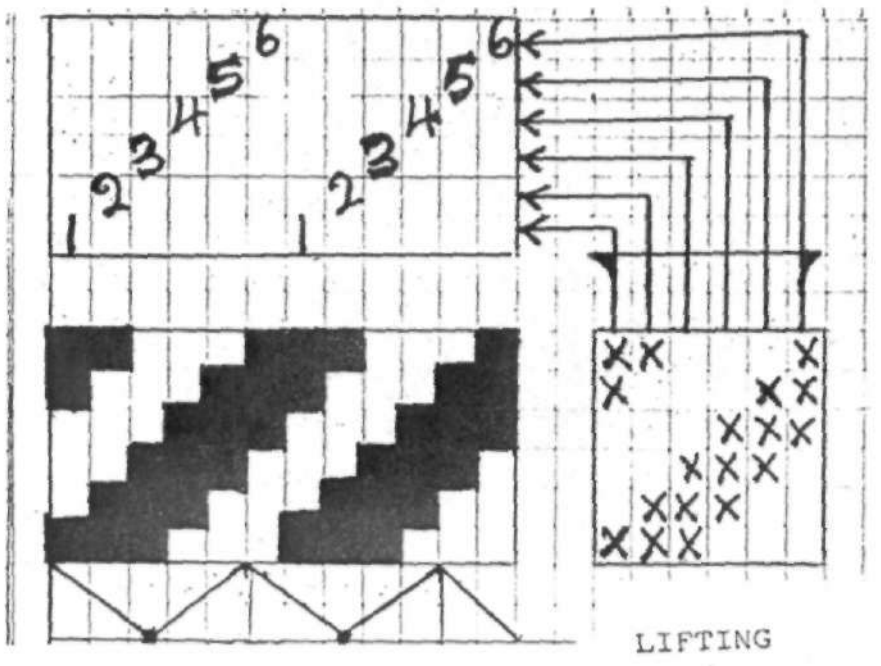
It was the last sample (NAOC/4 with a 5.6 dent/cm reed) which proved the most successful. For each of the four samples in the NAOC Pilot Survey Series, the scrylic yarn of 3.15cc formed the warp. But, it was discovered through the study that if the arp was threaded double through the heddles, its yarn size changed (in terms of thread density) to 1.6cc. This was true in NAOC/2 and NAOC/4. When they were dented 5/dent, it was actually 10 yarns sleyed through each dent, since two yarns were threaded through each heddle.

(FIGURE 11)



(Draft worked out from the Textile Science and Technology Department of Ahmadu Bello University, Zaria dated 27 June, 1985) for the original or the imported NAOC belt.

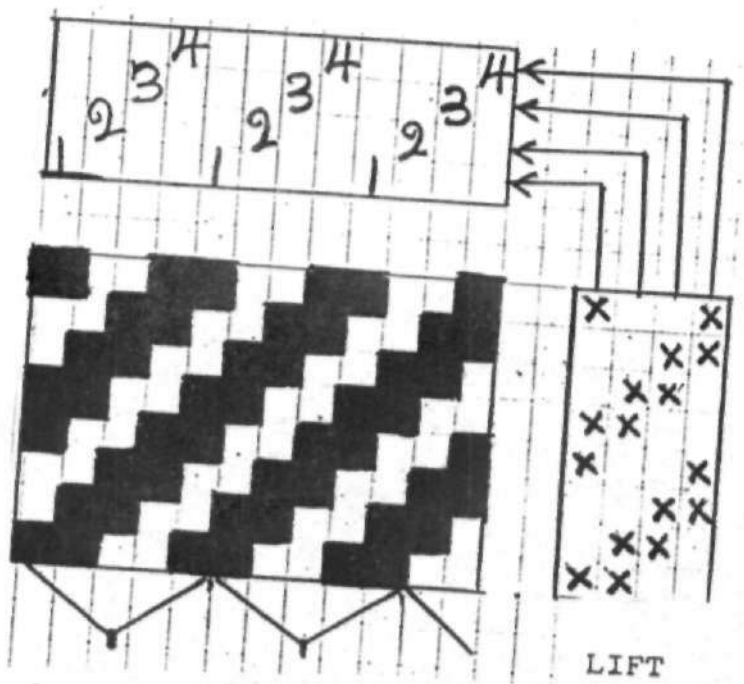
(FIGURE 12)



DRAFT

(The researcher's first Draft).
Six Harnesses were first suggested.

(FIGURE 13)



DRAFT

Weaving Plan the four harnesses used in producing the belts.
The symbol "V" shows that five ends put through a dent in the reed.

Sample study NAOC/4, proving to be the most successful (as mentioned above), was used as a model to carry out the rest of the NA Belt Series. Figure 12 (NAOC 1 - 4).

Five samples (see NAOC/1 - 4 and NAEC/ABU/85) with NA numbers were produced on the researcher's loom using six harnesses. A further trial was given to the use of four harnesses by removing two from the six and this also proved successful. NASIG/ABU/85 - rayon/cotton blend warp. 1 to a heddle, 5/dent or 28 EPC, was the first sample to be produced on the four harnesses. Having seen the ease in the use of the four harnesses, compared to six, the researcher decided to maintain this choice in the production of the subsequent NA Belts. These are shown in the following samples:

(a) NA/ABU - rayon/cotton blend for the yellow, white and red, and acrylic to achieve the dark blue warp: 2/heddle, therefore, 10/dent (if yarns considered single, but actually could be considered as 5/dent of a thicker count); (four harnesses). (See the drafts in Figure 13). (Plates V/a - V/0)

(b) NMS/ABU/85 - identical plan to NAP, with different coloures; (four harnesses).

(c) NAST/ABU/85 - same plan as NAP and NMS, but finished by washing and starching; (four harnesses).

(d) NAB/ABU/85 - same plan, but uses rayon/cotton blend warp only; finished as NAST; (four harnesses).

(e) NAARMD/ABU/85 - same plan as (d).

The researcher has not used the Okene lifting plan for the NA Belts because their lisfting style suggested the usualtraditional method and a varied structure with differences in the fabrics faces. The original, imported belt has the same-face, twill character desired by the researcher dor reasons of quality control.

The reproduction of the NA Belt Series has therefore, utilized both six and four harnesses, using rayon/cotton blend and acrylic yarns for warp, threaded 5/dent (mostly doubled) in the 5.6 dent/cm reed. At the initial stage, number 14 reed (5.6 dents/cm), number 8 (3.2 dents/cm) and number 12 (4.8 dents/cm) were tried, with varied results as found in NAOC/1 - 4.

3.4.4.1 PROCEDURE IN THE PRODUCTION OF THE NA/ABU BELTS

Procedure in the production of the NA/ABU Belts, analysis according to individual samples

NAOC ORIGINAL (Imported Belts)

Type of yarn used was cotton.

EPC - 42.428571 (ends)

PPC - 16

Number to a heddle - not known

Number to a dent - 4 (suspected)

Draft (threading) - Straight Draft.

Lifting - 2/2 twill (suspected)

Yarn count - 3.14^{s}CC.

Type of reed - not known

Harnesses - 4 (suspected).

3.4.4.2 NAOC SERIES

NAOC/1/ABU/85

Type of yarn - rayon/cotton blend.

EPC - 24

PPC -

Number to a heddle - 1

Number to a dent - 5

Threading - Straight Draft.

Lifting - 3/3 twill

Reed 4.8 dent/cm.

3 colours used: blue, yellow and red,

six harnesses used.

3.4.4.3 NAOC/2/ABU/85

Rayon/cotton blend

EPC - 28

PPC - 6

Number to a heddle - 2

Number to a dent - 10

Threading - Straight Draft.

Lifting - 3/3 twill

Reed Number - 8 - 3.2 dent/cm

Colour as before - 3

Six harnesses used.

3.4.4.4 NAOC/3/ABU 85

Rayon/cotton blend

EPC - 28

PPC - 4

Number to a heddle - 2

Number to a dent - 10

Threading - Straight Draft

Lifting - 3/3 twill

Reed No 4.8 dent/cm

3 colours - blue, yellow and red

Six harnesses used.

(Samples NAOC 1 - 4 only available for exhibition, see plates).

NIGERIAN ARMY CORPS BELTS



NAOC ORIGINAL



NAOC/1/ABU85

(PLATE V^A)

NIGERIAN ARMY CORPS BELTS ABU 85 STUDY (NAOC SERIES)



NAOC/2/ABU85



NAOC/3/ABU85

NIGERIAN ARMY CORPS BELTS ABU 85 STUDY (NAOC SERIES)

(PLATE V/O)



NAOC/5/ABU85

3.4.4.5 NAOC/4/ABU/85

Rayon/cotton blend

EPC - 22 ends

PPC - 7

Number to a heddle - 2

Number to a dent - 10

Threading - Straight Draft

Lifting - 3/3 twill

Reed No. - 14 = 5.6 dent/cm

3 colours - blue, yellow and red;

6 Harnesses used.

3.4.4.6 NAEC/ABU/85

Acrylic yarn - $3.14^{S}CC$

EPC - 28

PPC - 5

Number to a heddle - 1 (3 ply)

Number to a dent - 5 (3 ply)

Threading plain - Straight Draft.

Lifting - 3/3 twill

Reed Number - 14 = 5.6 dent/cm

Colours - Navy Blue, Ash Colour

and Green;

Six harnesses used. (see plates accordingly).

NIGERIAN ARMY CORPS BELTS ABU 85 STUDY



NAOC/ABU85



NAEC/ABU85

3.4.4.7 NASIG/1/ABU/85

Rayon/Cotton blend (4.54^{s}CC) for green; acrylic for Navy Blue.

EPC - 24

PPC - 7

Number to a heddle - 1 (2 - plied rayon)

Number to a dent - 5 (3 - plied acrylic)

Threading order - Straight Draft.

Lifting Plan - 2/2 twill

Reed Number - 14

Colour - green, dark green, navy blue (3 colours).

Four harnesses used.

3.4.4.8 NASIG/2/ABU/85

Rayon /cotton blend

EPC - 24

PPC - 6

Number of a heddle - 2 ply

Number to a dent - 10

Threading - Straight Draft

Lifting - 2/2 twill

Reed Number - 14

Colour - blue, green, dirty green

four harnesses used.

NIGERIAN ARMY CORPS BELTS ABU85 STUDY NASIG/ABU85 1 & 2



NASIG/1/ABU85



NASIG/2/ABU85

PLATE V^B

NIGERIAN ARMY CORPS BELTS ABU 85 STUDY NASIG/ABU 85



NASIG/1/ABU 85



NASIG/2/ABU 85

FABRIC 1 & 2

3.4.4.9 NMS/1/ABU/85

Rayon/cotton blend

EPC - 24

PPC - 4

Number to a heddle - 2

Number to a dent - 10

Threading - Straight Draft

Lifting - 2/2 twill

Reed Number - 14

Colours - four: blue, red, yellow and green.

Four Harnesses used.

3.4.4.10 NMS/2/ABU/85

Rayon/cotton blend

EPC - 24

PPC - 6

Number to a heddle - 2

Number to a dent - 10

Threading - Straight Draft

Lifting - 2/2 twill

Reed Number - 14

Colour - (as NMS/1)

After-treatment used.

NIGERIAN ARMY CORPS BELTS ABU85 STUDY NMS/ABU85 1 & 2



NMS/1/ABU85



NMS/2/ABU85

(PLATE V^{C})

NIGERIAN ARMY CORPS BELTS ABU 85 STUDY NMS/ABU 85 - 1 & 2



NMS/1/ABU 85



NMS/2/ABU 85

3.4.4.11 NAST/ABU/85

Rayon/cotton blend $4.54^{s}CC$.

Acrylic - $3.15^{s}CC$.

EPC - 24 for rayon/cotton blend

12 for acrylic.

PPC - 6

Number to a heddle:

2 of the 2 - ply rayon/cotton

1 of the 3 - ply acrylic

Number to a dent:

10 of rayon/cotton (2 ply)

5 of acrylic (3 ply).

Threading - Straight Draft

Lifting - 2/2 twill

Colours - two: yellow and Navy Blue.

Four harnesses used.

3.4.4.12 NAB/ABU/85

Rayon/cotton

EPC - 24

PPC - 6

Number to a heddle - 2

Number to a dent - 10

Threading - Striaght Draft

Lifting 2/2 twill

Colours: blue, yellow and red.

Four harnesses used

Reed Number - 14.

NIGERIAN ARMY CORPS BELTS ABU 85 STUDY



NAST/ABU85



NAB/ABU85

(PLATE V^D)

NIGERIAN ARMY CORPS BELTS ABU 85 STUDY



NAST/ABU 85



NAB/ABU 85

3.4.4.13 NAP/ABU/85

Rayon/cotton blend 1A crylic as weep only

EPC - 24

PPC - 6

Number to a heddle - 2

Number to a dent - 10

Threading - Straight Draft

Lifting - 2/2 twill

Colours - two: Yellow and green

Four harnesses

Reed Number - 14

3.4.4.14 NARM/ABU/85

Rayon/cotton blend

EPC - 24

PPC - 6

Number to a heddle - 2

Number to a dent - 10

Threading - Straight Draft

Lifting - 2/2 twill

Reed Number - 14

Colours - two: Yellow and Red

Four harnesses.

3.4.4.15 Same plan as in the above given (3.4.4.14) (samples have been provided where necessary)

NIGERIAN ARMY CORPS BELTS ABU85 STUDY



NAP/ABU85



NAARMD/ABU85

(PLATE V)

CHAPTER FOUR

FINDINGS AND RESULTS

4.1 PILOT SURVEY

The data collected consisted of observations, opinions from interviews/discussions, and samples. Visits were made in November, 1984 and April/May, 1985 to familiarise the researcher with previous Nigerian experience in Workshops utilizing non-motorised looms. The looms were observed and assessed along with the designs of their constructions. Fabric design techniques and yarns utilized in creating their products all formed parts of the information collected.

Three of the five workshops surveyod were found to have extensive programmes for the contemporary non-motorised looms and their weaving designs.

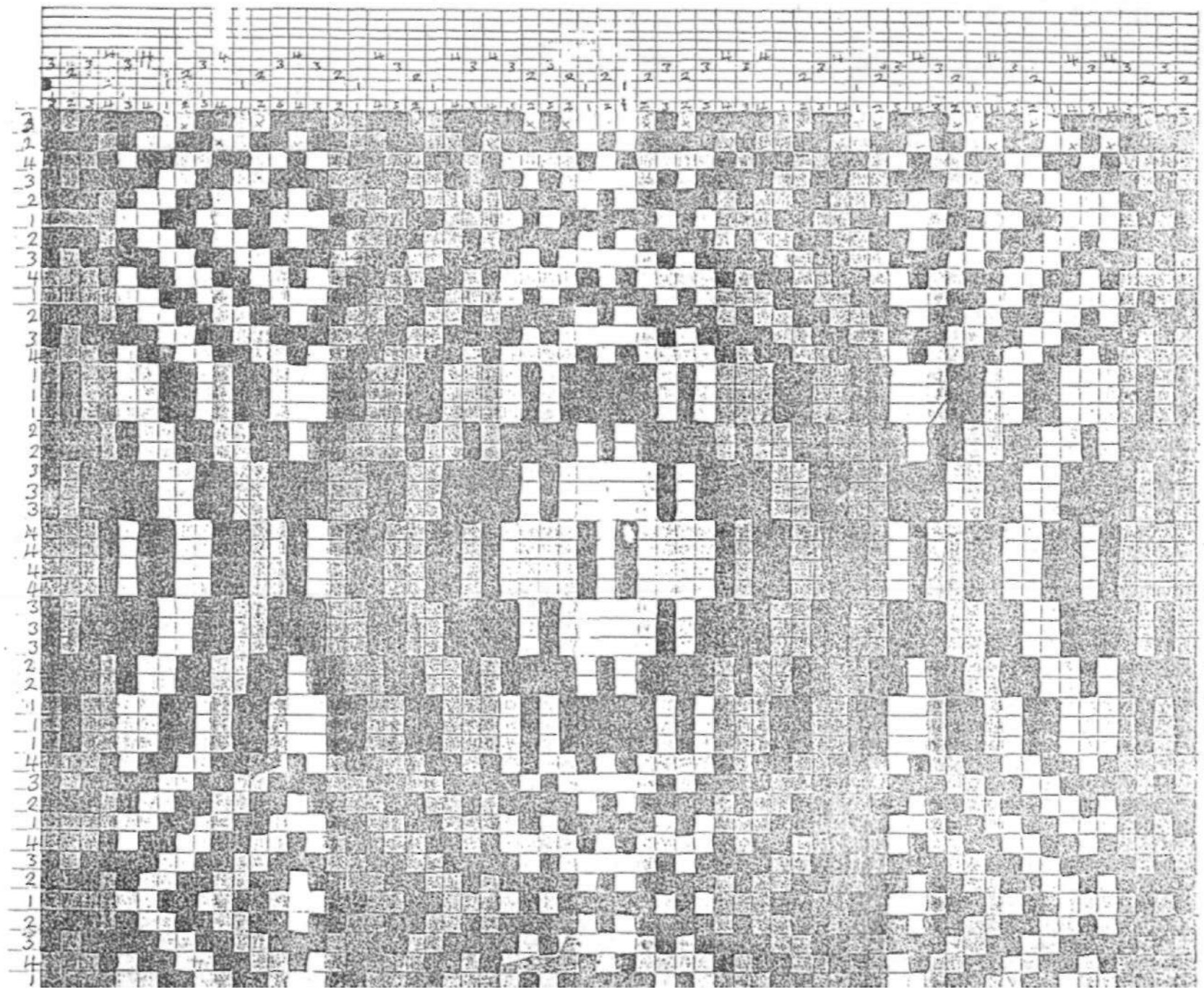
4.1.1 TEXTILE SECTION DEPARTMENT OF INDUSTRIAL DESIGN, AHMADU BELLO UNIVERSITY, ZARIA.

Weaving became a part of the academic course programme of Textile Design Section in 1971 and has, since, developed from that original class. Today, there is a post-graduate degree programme in weaving in this Textile Design Section, along with the undergraduate courses.

There are two major categories of looms in the section: eleven table looms and the six floor looms. All of these looms have been imported from outside the country. In each of the categories of loom, there are variations in terms of sizes and capabilities. One of the major characteristics of the table looms in this section is that they all have four harnesses, while the floor looms have capacities from four to sixteen Harnesses. Two of the floor looms have their heddles in metal; they also are the largest of the looms in the Textile Design Section of the University. There is an intensive weaving programme at the moment in the Textile Section. Every student in the section (irrespective of their individual interest) undertakes weaving like all other courses in Textile Design of the Department of Industrial Design in the University.

Twill weave designs are being utilized extensively, producing interesting woven fabrics which could be used for many purposes. (Figure 14) shows some of these weaving designs. Their products included the following: curtain fabrics, cushion covers, pillow slip, furnishing fabric, knotted rugs, and fabrics that could be used as wrappers and sewn into dresses.

FIGURE 14



(A Weaving Draft taken from the 1984/85 Sectional exams' answer's Drafts in Textile Design Section, A B U, Zaria).

4.1.2 UTOHU YUSUFU WEAVING WORKSHOP

The above named weaving centre was set up after the middle of the 1950s at Okene in Okehi Local Government of Kwara State of Nigeria. The Proprietor, Utohu Yusufu, had had some long-standing experiences in both the traditional and the contemporary weaving, based on the use of non-motorised looms.

He established his own private weaving workshop with six non-motorised looms. He employed the service of Mr. Yakubu Apelende, a local carpenter, who was directed to build the looms for him.

This workshop expanded and offered training services to interested groups and individuals in and around Okene. The looms, then were later increased to fifteen. Yusufu Utohu pointed out that in building the floor-type of the contemporary looms, 10 x 10cm thickness type of the normal wood (plank) should be used. All the materials used for the construction of these looms were obtained locally, except the reed, which he said was an imported item. The height of the floor loom was about 1.9 metres; while the width was 122cm.

Heddles were of cotton twine.

Some of the products of this industry included the following:

Curtains/door blinds,

Bed sheet,

Wrappers,

Pillow slip/cases,

Uniforms for school, colleges and hospitals, floor cover and Army Corps Belts.

The customers according to Yusufu Momoh, the former Manager (1984) included the following:

a. Some units of Nigerian Army, notably; Nigerian Defence Academy, Kaduna, Nigerian Army Depot - Zaria, Nigerian Army School of Education, Ilorin, Others were Pay Corps, Supply and Transport, Signals, Artillery, Armour and Medical.

b. Civilian customers consisted of UAC (United African Company Ltd.), Leventis Stores, Kingsway and Foreign Embassies like the India, American and British. The effort of one Mr. Richard, an

American Peace Corps member who worked around Okene area at that time, was remarkable in advertising these products according to the Manager (1984).

However, at the time of the researcher's visit to the industry, the activities had reduced drastically. All the contemporary non-motorised type of looms were packed and the centre closed. On request, the researcher was taken round the centre where observations and collection of samples of the Army Corps Belts were made.

The following samples were collected during the visit (plate V)

a. - OKNARM/64/84 -

b. - OKNAST/64/84 -

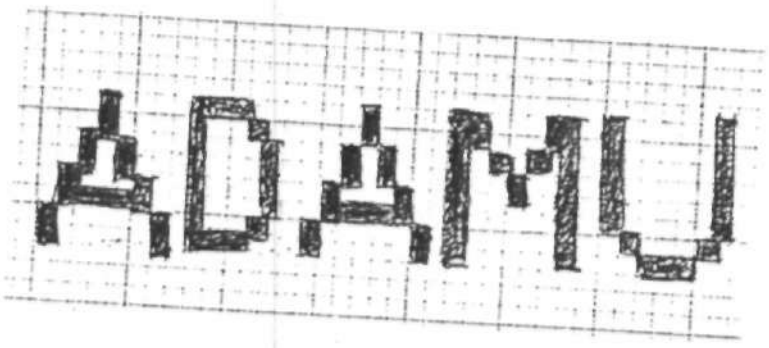
c. - OKNAP/64/84 -

d. - OKNAB/64/84 -

e. - OKNCIV/64/84 -

The only weaving-design element seen was an abandoned drafting note book which showed very little on the contemporary weaving designs. It indicated an attempt to use a name "ADAMU" for weaving motif. (See Figure 15)

(FIGURE 15)



A name design, from Utohu Yusufu's Weaving Industry at Okene.

This sketch was taken from one of the books (exercise note book) kept in the Centre dated 6 November, 1984 by the researcher. A graph exercise note book used for this Weaving design.

NIGERIAN ARMY CORPS BELTS ABU 85 STUDY



OKNAP84 OKNASIG84 OKNAARM84



OKNAST84 OKNAB84

4.1.3 THE NIGERIAN ARMED FORCES REHABILITATION TRAINING CENTRE, OSHODI

The decistion to establish this Rehabilitation Training Centre came in 1969, when the end of the then Nigerian Civil War was anticipated, so as to reduce the large population of the Army that would be on the Federal government's shoulder.

According to Erogbogbo and Gaji (1984) in separate statements, the main and initial purpose of its establishment, was to train all the prospective disabled soldiers from all the branches of the Armed Forces (Army, Navy and Air Force) before leaving for a civil life based on their various capabilities and interest.

The centre has, however, restructured its training programmes as the nature and level of the trainees capabilities changed. The course contents of the centre were later made up of practical Agriculture - Poultry, light or basic Engineering trades, and basic Management courses. This basic Management course is for the commissioned officers. All trainees passing through the centre have to undergo industrial

attachment before graduation. A programme of weaving was set up at the centre but did not live long, and was abolished. A detailed study may be required before any meaningful statement could be made on the factors that were responsible for the elimination of this weaving in the Rehabilitation Training Centre, Oshodi. It was not possible to observe anything about the loom, according to the Assistant Technical Officer (1984), nothing was kept.

4.1.4 THE TEXTILE TRAINING MILLS, AUCHI

This was the former Auchi Co-operative Weaving Society which was formed over twenty years ago. It has now been taken over for effective control and efficiency of its programme by the Bendel State to train students of state origin who would go out to establish on their own in their various areas.

The state government would loan at reasonable low interest to such groups of individuals who joined hands to form a weaving co-operative society in the state after leaving the school. In addition, the government would purchase the products of such cooperatives as an encouragement to the people.

Any data on how many, such cooperatives have been formed has not been made available to this study.

The course contents consisted of the following:

Cotton processes (from the field to the loom)

Basic Textile Mathmatics.

English Language.

Yarn preparation (windings both warp and weft)

Fabric designs (i.e. all element of weaving design).

Dye stuff and Dyeing processes.

The Loom (i.e. from raw material through construction to the mechanism of the non-motorised looms).

Weaving in general.

Fabric weaving.

Finishing processes in fabric making.

Marketing processes of woven fabric.

(The above listed course units were recorded from the School Training File on the 7th November, 1984 with the permission of the Assistant Manager).

There were twelve serviceable floor looms found in the students' studio. They were constructed locally by a local carpenter whose name was given as MOMODU ALASSAN. He was one of the staff that had been transferred from the, then, Auchi Co-operative Weaving Society.

The looms were the giant type like those found at the University of Nigeria, Nsukka and Utohu Yusufu weaving workshop which was out of production. They were about 1.68 metres in height. The horizontal length were about 1.85 metres. The width of these looms was about 1.22 metres (122cm).

The castles on top of the loom with their rockers' arrangement were similar to those of the looms found in the University of Nigeria, Nsukka. Their cords from the opposite rockers in the front were usually tied to the risers, while those from the back of the rockers were tied to the fallers. The terms risers and fallers were given in Mr. C. Ayewa's explanation (1984).

Predominantly, the basic twill weaving techniques were extensively explored. Other elements of weaving design, like colour effect and yarn count, were noticed in the treatment given to their fabrics. Records of designs were maintained, with the samples of such design kept in their cloth album. This cloth album served their customers in the selection of a particular design to be produced on request by the school. Every design was given an identification number, an example was recorded as:

a. "AU/138C"

b. "AU $\frac{8}{2}$ "

This was done to identify one particular design motif from another ; AU$\frac{8}{2}$ was explained as follows:

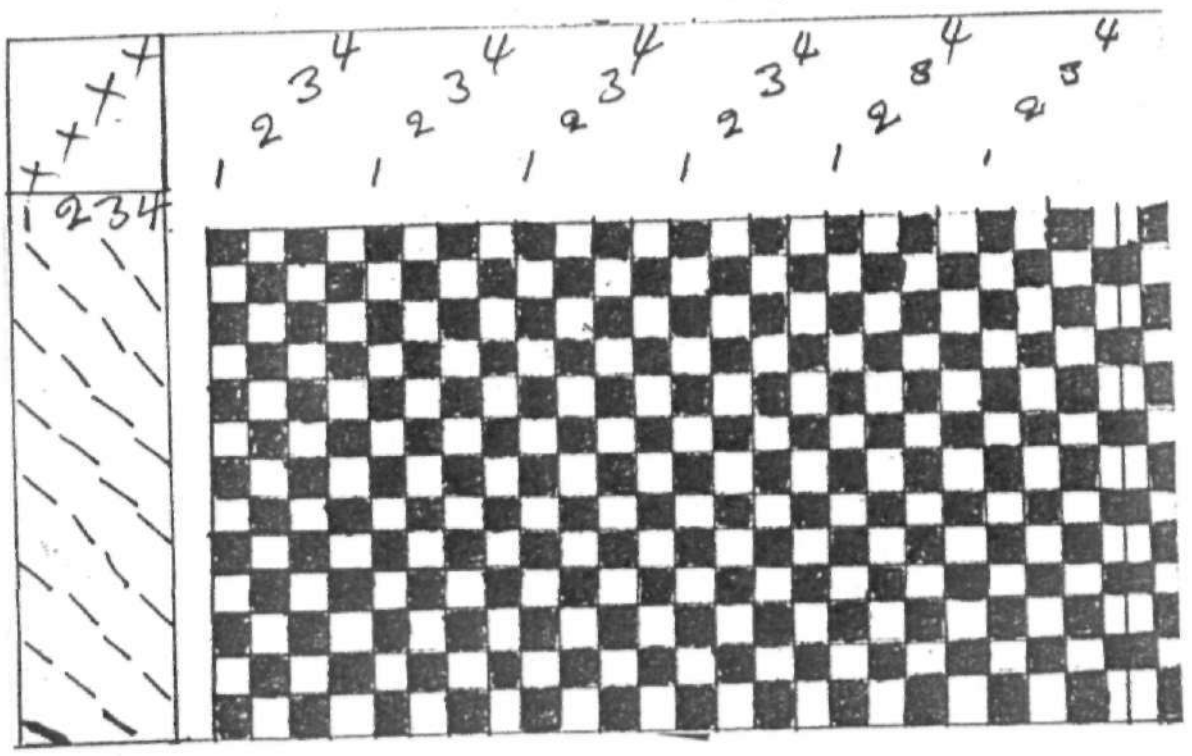
'AU' stood for Auchi town.

'8' stood for the first 8 warp yarns in a particular colour, followed by another colour of 2 ends warp. And that order of warp/weft was effected throughout the length of the fabric, meaning regular sheque as they called it. Threading (draft) was of straight type in the above given example.

Figures 16 and 17 show the draft and the castle respectively.

The products of the school included the following types of woven fabrics: Wrappers, Shoe cover, curtains, table dressing, and belts. Unfortunately, the researcher could not obtain any of the products; as the appropriate authority was not around to grant the permission at the time of visit.

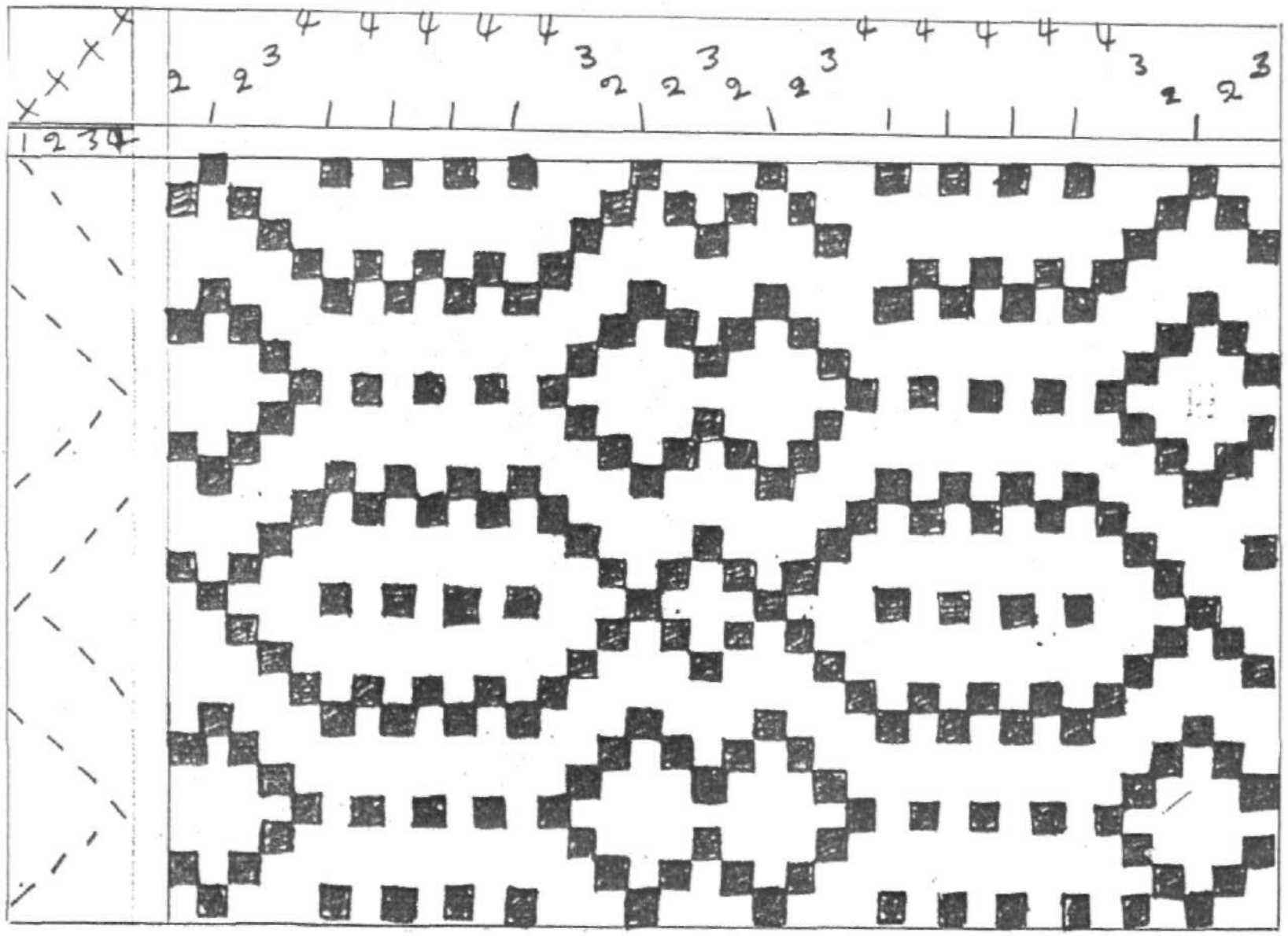
(FIGURE 16A)



LIFT

Draft for the production of the design "AU $^{8}/_{2}$"
From Auchi Textile Training Mills Draft Book,
November 7, 1984 (recorded).

(FIGURE 16B)

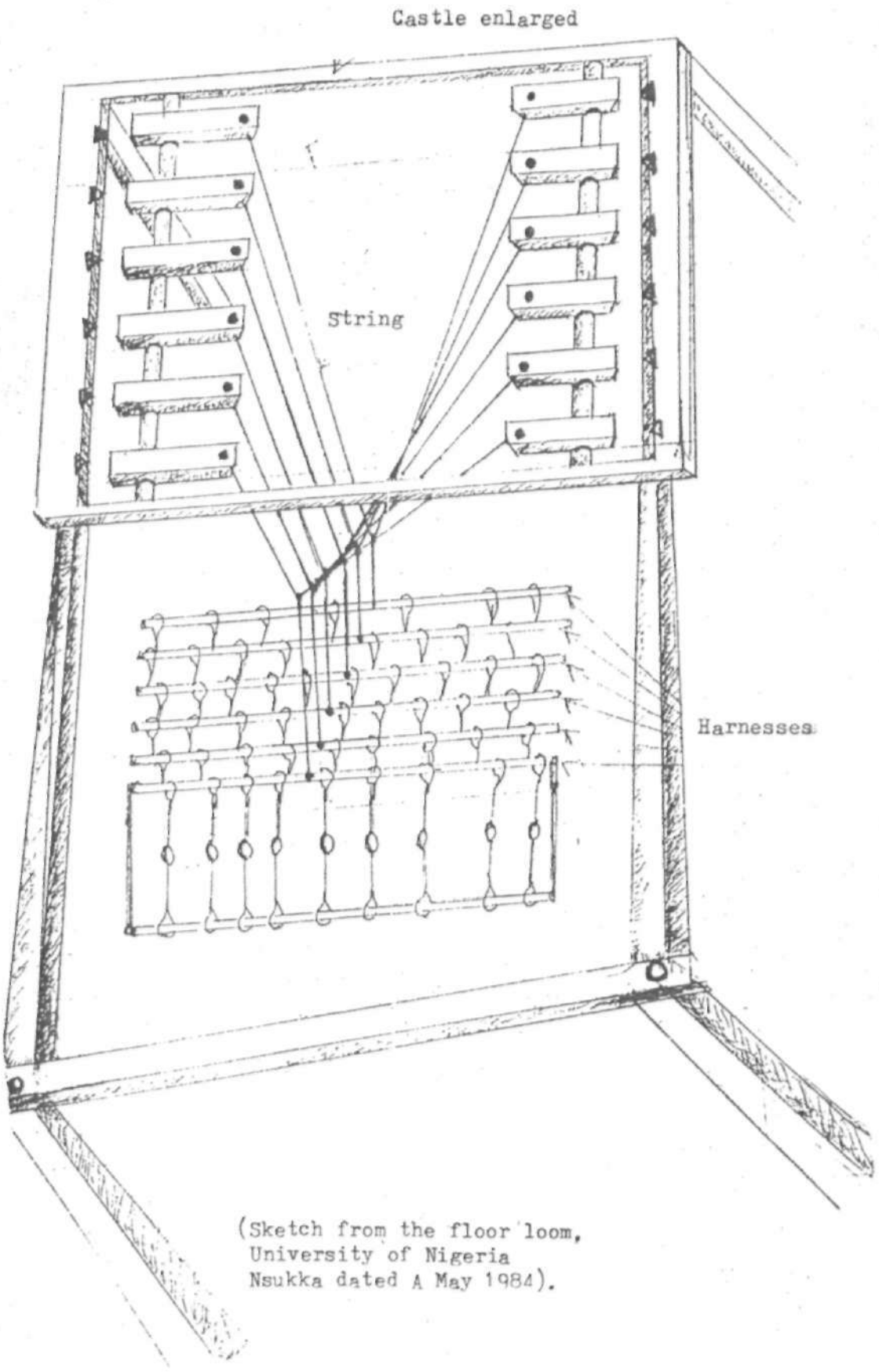


This kind of design is also commonly utilized by both students and staff in Ahmadu Bello University Zaria (Textile Design Section).

LIFT

(DRAFT) A Twill manipulation - Auchi Textile Training Mills
7 November 1984 (recorded).

(FIGURE 17)



(Sketch from the floor loom,
University of Nigeria
Nsukka dated A May 1984).

Some organisations that had enjoyed the products of the institution were:

a. St. Angelas School - Auchi (Uniform)

b. Zuma Memorial, Irrya, (Nurses uniform, Napkins and towels).

c. Nigerian Army - (Belts and Curtain).

There was a new expansion programme in the School. A new block of building had been errected, capable of accommodating fifty, floor looms of the contemporary non-motorised looms. Also, twenty new looms, capable of producing the India madras (woven fabrics) had been imported from India. No photograph of these new looms was possible, or the sketch; as they were still kept in their packages. They were, however, observed to be made out of wood. The looms were also another type of the contemporary non-motorised looms.

4.1.5 NIGERIAN ARMY ORDNANCE CORPS

In the Nigerian Army Organisation of Stores Distributions, stores are distributed from the Central Ordnance Depot through Depots to Ordnance Field parks, etc, before they get to the users (individual officers and men).

There are over four such Depots through which the stores should be distributed. The Base Ordnance Depot, Kaduna is one of such Depots. The sample of the original Ordnance Corps belt was obtained from the Central Ordnance Depot, Yaba, through the Depot in Kaduna. It was this belt that has been analysed for this study. All clothing matters are parts of the responsibilities of the Nigerian Army Ordnance Corps, under the Director of Ordnance Services (DOS), with Headquarters at Surulere - Lagos. The Corps (Ordnance) has its Training School at Ojo along Lagos-Badagry Express Road. This School has some potential for the test in the development of the weaving technology for NA production need. It has a research wing and a carpentry training wing from where various trade, proficiency-grade trainings have been given to selected soldiers. The only other textile programmes in the above mentioned school at the time of the visit are the Tailoring Course and Textile refitting.

4.1.6 UNIVERSITY OF NIGERIA - NSUKKA

Weaving Programme came to be one of the academic courses in the 1970s.

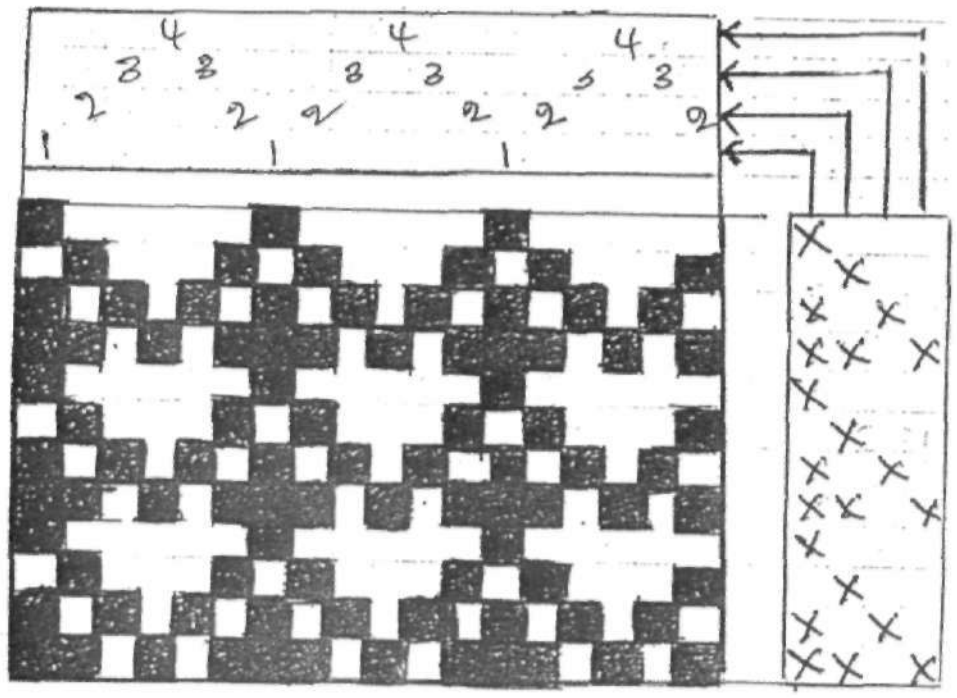
The looms were mostly of the giant floor type already mentioned in this study. They were locally constructed by a local carpenter whose name could not be confirmed before the end of the visit to the institution. However, there is a claim that the present weaving technician, Mr. Ogboso, might have helped in the building the giant floor looms. The general descriptions of these floor looms were similar to those found at Auchi Tectile Training Mills in Bendel State.

Similarly, traditional looms also were found as historical, background information in the development of the contemporary non-motorised looms and their weaving designs. Like in Ahmadu Bello University, Zaria, Textile Design Section, the weaving programmes were of Training purposes. Mass-production for the public is not the aim or objective of the programme.

The products included (like in the areas already discussed): fabrics for wrapper, napkins, towel, bed sheet, pillow slip; other wall-hanging woven fabrics and rug.

An example of a design given to the researcher

(FIGURE 18)



(A Draft used for a towel weave according to Mr. Ogboso).

LIFTING PLAN

This Weaving design was obtained from the Department of Fine and Applied Arts, University of Nigeria, Nsukka, dated 4 May, 1984. (Four Harnesses were used).

at the time of visit is here found in (Figure 18) Since the arrival of Dr Okeke in the latter part of the 1970s, Weaving Programme has improved greatly. Twill weaves were also extensively utilized, like in most Nigerian institutions where the contemporary non-motorised looms are being used for training.

4.2 LOOM CONSTRUCTION

The loom commissioned by the researcher and used for this study was (as mentioned before) a copy of the Dryad Company looms presently in use at Ahmadu Bello University, Zaria and University of Nigeria, Nsukka. Briefly, it varies from the original, imported table loom by having six harnesses rather than four. It is approximately 34cm wider, and less efficient in craftsmanship, strength and operation. Nevertheless, this was an improvement made on an earlier attempt (1980) by the researcher when an Army Carpenter from the Depot Nigerian Army, Zaria, was directed to assemble a four harness table loom, using his hand tools and skills,

4.2.1 COST OF MATERIALS

There were no actual charges asked for labour in the construction of this loom; most of the

services were voluntary. However, the amounts spent for its creation were as follows: The planks, bought at two different times were forty and thirty-five naira (i.e. ₦40.00 and ₦35.00) = ₦75.00) including cost of precessing. The cost of metal parts at various times was sixty Naira (₦60.00). Six hanks of cotton thread for the heddles were purchased from Kaduna Central Market at six naira per hank, giving a total of thirty-six naira (36.00). The making of heddles was charged at five kobo per heddle for one thousand, five hundred (i.e. $\frac{₦1,500 \times 5}{100}$ = ₦15 x 5 = ₦75.00 cost of making the heddles. Subsequent cost of tools for corrections in the loom was twenty-two Naira (₦22.00).

The rough breakdown of the cost could be seen as follows:

Planks	-	₦75.00
Metal Parts	-	60.00
Cost of Twine (6 Hanks)	-	36.00
Making the Heddles	-	75.00
Cost of Corrections	-	22.00
Estimated Total	-	₦268.00

(Two hundred and sixty-eight Naira Only).

4.2.2 HARNESSES/HEDDLES : PROBLEMS

The first heddles were not equally built; there were differences in the level of the heddles eyes. To solve this problem of inequality in the heddles eyes, the researcher made guidging frame. Followings the samples' specification, and utilizing the guide and the servise of an experience weaving technician, one thousand five hundred twine Heddles were adequatly produced for the loom. There were also a problem from the initial selection of twine for the heddles. Nylon, being slippery, required additional knots or a beat-sealing treatment in order to be effective for making heddles.

Initial grooves for harness travel were not out evenly or correctly. The researcher had to rectify this problem by an iron-fileing technique, to provide free movement of the harnesses. The harness travel supports did not remain attached to the loom frame and were therefore, unstable. This problem was finally rectified through proper screws. A problem of inbalanced lifting of the harnesses brought about inadequate shed openings, tension problem along with alow working. However, this problem was later controlled by lengtening some parts of harnesses that were found shorter than the

required length by welding technique at the Mechanical Engineering Department of Ahmadu Bello University, Zaria.

4.3 BASIC LABORATORY TESTS

The following were the findings for the two sets of laboratory determinations accomplished in this study:

4.3.1 YARN COUNT MEASUREMENTS

4.3.1.1 Acrylic Yarn, the yarn count was found to be $3.15^{s}CC$. (Cotton count). (3.3.1.1 referred).

4.3.1.2 Rayon/Cotton blend was found to be $4.54^{s}CC$ (3.3.1.2 referred).

4.3.1.3 Mercerized cotton (the thinnest yarn used in this study was found to be $15^{s}CC$. (3.3.1.3 refered).

4.3.1.4 The heddle yarn or twine was found to have $1.192^{s}CC$.

4.3.2 ANALYSIS OF ARMY CORPS BELTS WEAVE

The Nigerian Army Ordnance Corps (NAOC) Belt (i.e. the imported type) was found to have 60 ends per centimetre (60 PP C). It has 16 picks (weft) per centimetre (16 PP C). Five ends per dent, straight draft and twill lifting were suspected.

It was woven out of cotton yarn. It's yarn count was $\underline{3.14^{s}CC.}$ Type of reed and exact number of harnesses were not known or stated.

4.4 WEAVING PRACTICALS

The weaves in this study generally belong to either the stripe pattern, plain or check, twill weaves. Two major groupings have been used for the purpose of this analysis. The groupings are: the direct military fabrics (these were the Nigerian Army Corps Belts) and general fabrics; these were those shown from colour effect study, yarn count and shape designs. The direct military fabrics were all of stripe pattern/twill weaves; while the other group could either be identified as plain, weft-faced weaves, check, or overshot designs.

From the analysis carried out throughout the production processes and the weaving of the samples in this study, the following finings have been made available:

4.4.1 COLOUR EFFECT

In the CE Series, both the alternate lifting and two colour alternation are playing the parts in the design effect.

The use of two harnesses and two colours only is shown in the drafts. It was only the manipulation of one colour against the other that produced the effects. (plate IIA) use of two harnesses colour effect. Two colours of yarns were selected, Yellow and Dark Green. The warping order was as follows:

Warping Orders:

1 Dark Green
1 Yellow } 3 times.
2 Dark Green
2 Yellow } 2 times.

Weft Order:

Was as Warped.

One observation made about the colour effect was that, if the number of harnesses are even, the patterns would not be altered by increasing (i.e., from two to four or eight). The patterns or effects achieved in two harnesses are the same as in four harnesses in such order. This exploration was limited to only plain weave, since it is based on alternating two elements only.

4.4.2 YARN COUNT VARIATIONS

The YC Series; six harnesses used.

To determine the effect of differing yarn counts on a weave, three projects were selected, having the same threading plans and lifting orders; also the number of harnesses and reed size were the same. From the production of the above mentioned samples, it has been observed that the acrylic yarn which was the thickest yarn used in the weaves produced bigger shapes or made the motifs more prominent than the other two. Rayon/ cotton blend follows, used as a single in the weft or pick. On the other hand, the mercerized cotton yarn, the thinnest of them all, reduced the size of the motif or pattern.

Another effect of the thinnest yarn was that it was weak when used as warp; it requires, also, a higher number of dents/centimetre in the reed in order to produce fine fabrics.

The acrylic and rayon/cotton blend tended to produce heavier or thicker fabrics. Plates and figures provide both the photograph and drafts of the weaves.

4.4.3 VARIETY SERIES

One of the observations in the use of colour in this study was the element of colour contrast and harmony. For instance, in sample YC2A and YC2B/D, the colour yarns selected were so close in tone that the contrast was almost lost. From this study, it was further realised that availability of colour yarns in locality placed restriction on the weaver. Examples were the brilliant blue substituted for nevy blue in the NAOC belts and that of the Signal belts.

In the fancy twill, it was observed that higher number of harnesses would be ideal for intricate designs. However, such designs require experience in the manipulation of both the harnesses and lifting plans. Also, various elements of weaving design could be required to complete such a design. For example, the use of tabby might be necessary to bring out the motif clearly as in the case of VS1/a and VS3/85 - motif expansion. In addition, motif expansion as demonstrated in the VS3/ABU/85 involved many lifting operations. Strict patience was then required to execute the plan.

4.4.4 REPRODUCTION OF ARMY CORP BELTS

Generally, in the reproduction of the Nigerian Army Corps Belts through the use of the contemporary non-motorised looms, four harness looms have proved to be convenient; though six and above could still produce the same design. It has been observed through this study that the threading plans for the Army Belts like the NAOC Belt, NAEC and others were in straight drafts while their lifting plans were in twill weaves. If eight harnesses were used, it could be 4/4 twill (lift plan). If six harnesses, 3/3 twill is appropriate and if on four harnesses like in the samples produced in this study, 2/2 twill would be ideal.

It has also been found from the study that acrylic yarns are not the ideal stuff for the corps belts, due to their elasticity behaviour or contraction. Rayon/cotton blend of high quality could be one of the ideal yarns. One other observation that was made on the rayon/cotton blend (4.54^{s}cc) revealed that some dyes used on them were not colour fast to washing. This was confirmed from the brilliant blue when the researcher attempted to apply cassava starch on one of the hanks. The solution was deeply stained.

4.4.4.1 PRODUCTION COST OF THE ABU/85 NIGERIAN ARMY CORPS BELTS

The following are the estimated costs of production of the research belts:

The Corps Belt for the Nigerian Army signals has three colours. It means, three colour yarns had to be bought. The cost of one hank of rayon/cotton blend at Zaria market at the time of this study was two Naira (₦2.00). For the three colours, three hanks were bought, making a total of six Naira (₦6.00).

In the same manner, the colour yarns for other corps belt were purchased. None of the Nigerian Army Corps Belts woven in this experiment has over four colours, and so, one could estimate the raw material cost of the belt as follows:

(a) For four colours, rayon/cotton blend, at two Naira a hank, about eight Naira would be spent (₦8.00).

(b) For a belt with acrylic yarn type, at one Naira thirty kobo, would be five Naira twenty kobo (₦5.20). (It should be noted that acrylic type of yarn is not ideal for the belts).

Nigerian Military School, (NMS) Zaria has a belt with four colours blue, yellow, red and green. Four hanks of the above named colours, one each was bought at two Naira a hank which gave a total of eight Naira (₦8.00).

The Nigerian Army pay corps belt has four colours as well, white, yellow, red and navy blue. Unfortunately, there was no navy blue colour type in the rayon/cotton blend, therefore acrylic navy blue type was substituted for it costing one Naira thirty kobo per ball. The other three colours were four in rayon/cotton. That is, six Naira for the three rayon/cotton blend for yellow, red and white, plus one Naira thirty kobo for the acylic yarn (i.e. ₦7.30).

The Nigerian Army Education Corps Belts has three colours. The yarns were all acrylic types at one Naira thirty kobo a roll at Zaria market. Total cost was three Niara ninety-nine kobo (i.e. ₦3.99).

Armourd Corps belt has two colours and so, two hanks of rayon cotton blend were bought making four Naira.

Structure of the NAOC belt according to the Analysis: (based only on EPC and PPC identification).

Warp yarns

Blue had 76 x 2 - 152 (blue ends)

Red had 60 x 2 - 120 (red ends)

Yellow had 25x 1 - 25 (Yellow ends)

Total warps - 297

For the Waft:

All in one colour (black)

Total picks (weft), 80 per 5 centimetre.

To find EPC and PPC respectively, the 297 ends and the 80 picks will be divided by 7cm and 5cm picks respectively. (The width of the belt is 7cm, therefore to get the EPC, the 297 should be divided by 7cm).

(i) EPC: 297 - 7 - 42.428571

Approximately 42.4 EPC

(ii) PPC: The 80 picks per 5cm should be divided by 5 (i.e. PPC) i.e. 80 - 5 - 16 PPC.

YARN/THREAD PER PICK OR WEFT/FILLER IN THE STUDY

According to the structural observations in the three type of belts in this study, each pick, weft/filler, contained the number of yarn/thread as indicated below:

(i)	(ii)	(iii)
NAOC original the imported belt. 2 thread (6 ply in a single thread) in one pick. (see 84C (i) Samples. Type of yarn: COTTON.	CKNASIG 84 In a single pick, there were about 32 threads (see 84C ( ) samples Yarn count 15scc Type of yarn: Cotton Mercerized.	NA/ABU85 Study in Count 4.54sCC 4 threads in one pick (2 ply in thread) See 84C (iii) Sample Type of ya Rayon Cotton blend.

Method used in this study was Manual/Physical Separation of fabric structure and observation. This method is one of the accepted fabric structural examination/identification. The method has been used by Department of Tectile Science and Technology of Ahmadu Bello University, Zaria in 1984/85 Academic Session. Badu (1985).

From the information given in this Chart, the Total threads/yarn per centimetre have been worked out as shown below:-

S/NO.	CORPS	EPC (End Per Centimetre)	TPP (Thread Per Pick)	PPC (Pick Per Centimetre)	TT In PPC Total Threads in Picks per Centimetre)
1.	NARM/ABU/85P	28	4 (2 ply)	6 ----	48
2.	NASIG/ABU/85P	24	" "	7 ----	56
3.	NASIG/ABU/85P	24	" "	6 ----	48
4.	NAST/ABU/85P	24	" "	6 ----	48
5.	NAP/ABU/85P	28	"" "	6 ----	48
6.	NAB/ABU/85P	24	" "	5 ----	40
7.	NAEC/ABU/85P	12	" "	5 ----	40
8.	NMS/1/ABU/85P	24	" "	4 ----	32
9.	NMS/2/ABU/85P	24	" "	6 ----	48
10.	NAOC/1/ABU/85P	24	" "	6 ----	48
11.	NAOC/2/ABU/85P	24	" "	4 ----	32
12.	NAOC/3/ABU/85P	28	" "	4 ----	32
13.	NAOC/4/ABU/85P	28	" "	5 ----	40
14.	NAOC/5/ABU/85P	22	" "	5 ----	40
15.	NAOC/ORIGINAL/85P	24	2 (6 ply)	16 ----	192

	EPC (End Per Centimetre)	TPP (Thread per pick)	PPC (Pick Per Centimetre)		TT in PPC (Total Threads in Picks Per Centimetre)
OKNAARMD84C	80	9	5	---	45
OKNASIG84C	80	32	12	---	384
OKNAST84C	80	9	12	---	108
OKNABC	80	32	12	---	384
OKNABC	80	9	5	---	45

KEYS

EPC - End Per Centimetre.

EPC - Pick Per Centimetre.

TPP - Threads per Pick.

TT in PPC - Total Threads in Per Picks Per Centimetre.

(For detail about TPP in this study, See page 84B).

CHAPTER FIVE

SUMMARY/CONCLUSION

The following is the summary of findings in this research.

5.1 LOOM CONSTRUCTION

Making/Constructing a non-motorised loom of the contemporary type, requires great care and precision for an efficient functioning of such a loom. A high degree of skill, a knowledge of the movement and function of every component, and the selection of correct materials for the construction of each part are crucial to its success. It is possible to build some of those looms locally if all the points raised could be observed strictly.

Evidences exist in this country where similar acquired skills through training in weaving have been used to provide the looms. Examples were: between 1974 and 1975, when Uchukwuanugo S. Okeke used his skills as a teacher in weaving and directed the construction of the contemporary non-motorised looms at the Alvan Ikoku College of Education in Owerri, in Imo State of Nigeria. The University of Nigeria, Nsukka, has contemporary non-motorised looms, mostly floor looms all

locally constructed under the direction of a trained weaver, who used the local carpenters. The Auchi Textile Training Mills in Bendel State of Nigeria also has the similar looms. Other areas as reported by Adetoro, (1984) included Akure and Ilesha, in Ondo State and by Sandstrom (1985) as Uyo Weaving Cooperative in Cross River State functioning in 1974 with locally made broad looms (floor looms) under the state government (South Eastern at that time).

Similar effort is at an advanced stage to provide the looms for the Textile Section in the Department of Industrial Design, Ahmade Bello University, Zaria from the metriscope Nigeria Limited, Zaria under the direction of a weaving expert, from the University, Sandstrom (1985).

Apart from the limitations of a loom, other factors that place constraints on the weavers/ Designers, could be the yarn count, availability of coloured yarns and their sources of supply. The substitution of acrylic navy blue for the needed rayon cotton blend in some of the woven pieces shown in this study is an evidence of the scarcity effect of materials on a weaver. The

function of a fabric would determine the type of yarn the weaver should look for.

Despite the disadvantage of slow production speed of the hand loom, it is still holding some significant positions in many countries, both economically, and educationally. India and China are outstanding examples. Ancilliary equipment forming a mini-factory as a back up for a fly-shuttle hand loom greatly increases the efficiency, through control of consistent yarn tension and through speed.

Opportunity is still opened to the non-motorised fabrics production techniques, since a great variety of products can be produced through this technology. In Nigeria, the previous relationship which existed between some units of the Nigerian Army and the Utohu Yusufu Weaving Centre in the 1970s, served as an example.

Another important point to note in assessing the cost of this loom is that, this was not based on the actual bargain, particularly in the services. Secondly, the type of wood used here cannot be accepted as ideal or model of materials.

Also is the point of materials, cost in the market that seem not to be stable. This means that any prediction today may not be appropriate for the future. The choice of these cheap materials for this study was based on the researcher's desire to use the cheapest material possible in the location of the study as an experiment

An example was an incident in the purchase of the heddle twines. The first time at Kaduna central market, a hank was sold to the researcher at five Naira fifty kobo when only two hanks of the cotton thread were found with the trader. A further demand for more hanks was made which was to be collected on the following day. But on the collection day, the owner refused to sell at the previous price and increased it to six Naira. The same thing could happen to the cost of planks. The price of planks in Zaria may not be the same in Kaduna, Kano, Makurdi or Lagos etc. Distance from the source of supply cannot be over looked as a factor which affects the prices, including the behaviour of individual seller which could matter in the prices.

The Nigerian Army Ordnance Training School has a training programms in carpentry/joinery up to the level of the Nigerian trade test proficiency of the highest grade in that profession: a research wings as well exists in that school, (NAOTS). The school could experiment with technolo gy.

There is lack of awareness of the potential role of weaving in the Nigerian Military Programmes. This might have been the reason for its removal from the Training Programme at the Nigerian Armed Forces Rehabilitation Training Centre, Oshodi. However, evidence exists of the utilization of fabrics produced through the use of non-motorised looms, in the Nigerian Military enviroment. The curtains in the Officers' Mess, Nigerian Army Depot, Zaria, and the various Corps belts sometimes produced at Okene are two examples of such fabrics.

It was observed that all of the non-motorised looms in the various institutions/workshops visited in this study are capable of producing the fabrics listed for the Military environment in Nigeria: the Corps Belts, Curtains and Pillow Slip. Examples have been shown through this study

in the samples woven as the Army Belts and other fabrics.

5.2 OBSERVATIONS/CONCLUSIONS

This study does not claim absolute coverage/ knowledge of all the existence of the non-motorised looms in Nigeria; neither has it claim on all the problems facing the needs of the Nigerian Army clothing matters. The study has only attempted or assumed representational approach on an exploratory basis, but could be tested.

Nevertheless, from the study conducted so far, it was noticed in the stations visited and from the discussions, that a shortage of the contemporary non-motorised loom remained one of the major problems facing the proper development of the contemporary weaving designs/technology in Nigeria. It was observed also that inadequate propagation of the weaving programme, coupled with inadequate training/facilities and contemporary equipment had led to the suspension of weaving in the Nigerian Armed Forces Rehabilitation Training Centres in the 1970s. Inadequate information about the contemporary weaving craft is still being observed in the

Nigerian Military development programme.

The researcher observed too, that it would be difficult at this stage to provide enough data for predictions on the job opportunity for the Military personnel leaving the service through Rehabilitation Training Centre. This would require further research specifically on this weaving technology and its income-producing capabilities in Nigeria today. It is therefore, concluded that there is still need for proper information about this intermediate weaving technology as it could benefit both the Nigerian Military and her public.

This study also supports the view that apart from actions carried out by the weaver between the threading system and lifting orders, the background training of the weaver in understanding of the clour effects and yarn count have important parts to play in the final product of a woven fabric. Along with the above given findings must go on understanding of the consumer and his needs.

Another concluding thought in this study is that even though effort is needed to explain the significance of the contemporary weaving in the Nigerian Military environment before anything

could be done, the Nigerian Military could join the public by patronizing the hand-crafted weaving industry in Nigeria. This would not only serve as an encouragement for the development of weaving industry in Nigeria but, also, as the Military participation in the consumption of Made-in-Nigeria Textile Goods.

Finally, it has been observed that all the non-motorised looms in the institutions of higher learnings visited in this study could produce fabrics that the Nigerian Military might need. It is, however, important to stress that for faster production and more complicated designs, the floor looms/fly shuttle looms would be of greater advantage in the non-motorised loom profession.

5.3 RECOMMENDATIONS

The following points are the recommendation from this study.

The non-motorised weaving should be considered in the present Nigerian Military, utilizing the looms for training and production development programmes. Further research should be conducted to determine the significance of hand-woven fabric

techniques to both the Nigeran Military and the public, in terms of job opportunity and self-reliance.

A study could also be undertaken to determine the extent to which this contemporary weaving can be utilized in the Nigerian Army. Such study should also look into the type of weaving scheme which could be drawn up for the Nigerian Army Development programme and Training.

Should there be need for the reintroduction of the contemporary weaving in any of the Nigerian Training Institution, the Military should encourage such individuals or groups who would set up their own weaving industries by patronizing such industries through the purchase of the products in the future. A similar encouragement was given to the Aba Textile Centre in 1959 by the government under Late Dr Michael Okpara when he was the premier of the then Eastern Region of Nigeria.

The Nigerian Army Ordnance Corps could be granted the authority to experiment with the manufacture of some basic textile needs of the

Army. This step could work towards setting up a Military Textile Industry in Line with Defence Industry Corporation, as soon as the needs are clearly understood for the country's self-reliance in this direction. The Nigerian Textile Designers should extend their research work to the country's Military environments in order to improve the quality of the clothing items.

Effort should be made to conduct a thorough study to assess the serviceability of the locally produced Nigerian Army Corps Belts, for their acceptance into the Nigerian Army clothing items. This, if done and approved by the Army, would provide its legality in the Nigerian Army, Clothing items. It is then, that the quality control of the locally produced belts would be checked as against the Okene and other types being attempted locally.

REFERENCE

Adetoro S.A. (1984) "Introduction to Woven fabric in Nigeria", (literary work supporting Nigerian exhibition on weaving) Focus on Africa, organised by the Commonwealth Institute - London for the exhibition, 1st August to 30th September, 1984.

Agarwal J.C. and Sureh Mehta (1984) "Restructuring India's Textile Industry" pages 20 - 21 October/ November 1984 issue in African Textiles, Satellite Communication Ltd., Lagos Nigeria.

Albers Anni (1974) On Weaving, Studio Visita Pub London.

Ayewa J. (1984) (Informant) interview with the Assistant Manager, Auchi Textile Training Mills, dated 7th November, 1984, Auchi, Nigeria.

Buhari Mohammed (1984) Former Head of State of Nigeria, a "call" - New Nigerian Newspaper Ltd, issue number 5,779 page 1 of October 17, 1984, Kaduna, Nigeria.

Eicher J.B. (1976) Nigerian Hand-crafted Textiles, University Press, Ile-Ife, Nigeria.

Emeka Omeruah, (1984) Speech Address, on the Convocation Ceremony for Kaduna Polytechnic 1983/84 graduates - Guardian Newspaper Ltd, of 18th October, 1984, Page 8, Kaduna Nigeria.

Erogbogbo E. (1984) "A Brief History of the Nigerian Armed Forces Rehabilitation Centre", - SOJA Magazine, page 6, August issue by Nigerian Army Public Relation Unit, Lagos, Nigeria.

Gerard, K. Boon, (1981) Technology Transfer in Fibres, Textiles and Aparel, Sijthoft and Noordhoff, U.S.A.

Hall A.J. (1980) Standard Handbook of Textile 8th Ed. Butter worths London Boston Sydney - Wellington - Durban Toronto 1975 - 1980

Standard Hand book of Textile 8th Ed New York John Whisely and Sons 1975.

Hameed Gaji, (1984) Interview with the Assistant Technical Officer, Nigerian Armed Forces Rehabilitation Training Centre, Oshodi on the History/Programme of Weaving in the Centre (NAFRC) dated 8th November, 1984, Oshodi, Nigeria.

Hillary Chetwynd (1969), Simple Weaving, Watson Gustill Co., Ltd., New York.

Laya Brostaff (1978), Professional Hand-Weaving on Fly Shuttle Loom. Van Nostranuf, Reinhold Company Ltd., New York.

Lesilie J. Clarke (1974) Craftsman in Society, G. Bell and Sons Ltd., London.

Newman Thelma (1984) Contemporary African Arts and Crafts. George Allen and Unwin Ltd., London.

Okeke, U.S. (1984) Interview with the Head of Department, Fine and Applied Arts, University of Nigeria, Nsukka dated 4th May, 1984 - Nsukka, Nigeria.

Robinson A.T.C. and Marks (1973) Woven Cloth Construction. The Textile Institute, Manchester.

Sandstrom A. (1985) Class discussion Post-graduate period June (1985), Ahmadu Bello University, Zaria.

Uche Okeke, (1977) "Progress of the Arts in NigeriA". A Review of the 2nd World Black and African Festival of Arts and Culture, p.47.

Venice Lamb and Judy Holmes (1980) Nigerian Weaving - a Progress International Publication in Nigeria. National Petroleum Pub. Co., Ltd., Lagos, Nigeria.

RESTRICTED

Headquarters
Nigerian Army
Ministry of Defence
Independence Building
Lagos

NA/230/105/2/EDN

See Distribution

12 Mar 84

LOCAL COURSE
STUDENT ADMISSION 1983/84 SESSION
AHMADU BELLO UNIVERSITY, ZARIA
COURSE: MA INDUSTRIAL DESIGN STUDIES
ASSY: OCT 83 - JUN 85
LT OP ADA (N/6887)

1. This is to inform you that the above named military personnel admitted in the above named institution is sponsored by the Nigerian Army.

2. You are therefore requested to forward all bills including tuition, accommodation, feeding and other expenses to Headquarters Nigerian Army, Directorate of Training and Operations, Ministry of Defence, Lagos for settlement with the attached proforma.

3. All subsequent debit notes should be accompanied by end of session examination result of the student. Failure to comply with this may cause delay in settlement of bills.

4. Acknowledge receipt.

EI OBEYA
Lt Col
for Chief of Army Staff

Distribution:

External:
Action:

The Accountant
Ahmadu Bello University
ZARIA

Internal:
Action:

HQ NAOC - Release above named officer to attend the course.

AHQ 'A'
AHQ MS 'A'

Information:
COAS
1 Base Ord Depot

RESTRICTED

DEPARTMENT OF INDUSTRIAL DESIGN
Ahmadu Bello University, Zaria

F. ID/83/84 April 15, 1984

TO WHOM IT MAY CONCERN:

This is to introduce Patrick Oneh ADA (LT.), who is a Post-Graduate student in the Textile Section of the Dept. of Industrial Design, Ahmadu Bello University, Zaria. He is carrying out a study of the "Non-motorized Loom and its Weaving Designs in Nigerian Market".

Lt. Ada will be travelling during our Easter Break (20th April to 7th May, 1984) to various Nigerian workshops to acquaint himself with existing looms and equipment in these weaving areas/institutions. This visit will be in the nature of familiarisation, to prepare for a later, more thorough collection of data.

We would be most grateful if you could be of assistance to this conscientious student.

Thank you.

A. J. Sandstrom

Ms. A. J. Sandstrom (Supervisor)
Senior Lecturer
Textile Section
INDUSTRIAL DESIGN DEPT.

DEPARTMENT OF INDUSTRIAL DESIGN
15 APR 1984
A. B. U. ZARIA

cc: A. J. Sandstrom
Dept. of Ind. Design
Head of Section.

DEPARTMENT OF INDUSTRIAL DESIGN
AHMADU BELLO UNIVERSITY
ZARIA.

Ref:- F. ID/83/83 15 July, 1984.

TO WHOM IT MAY CONCERN.

ADA Oneh Patrick (LT) is a Postgraduate student in the Textile section of the Department of Industrial Design Ahmadu Bello University, Zaria, and will undertake study tour of the following places between September and October 1984 for final thorough Data collection for his Research.

The places are:

1. Okene Weaving Centre (Kwara State).
2. Uyo Co,operative Weaving Centre (Cross River State).
3. Iseyin and Ilorin Traditional Weaving Centres.
4. Ibadan Polytechnics Textile Workshop - Ibadan.
5. Nigerian Army Rehabilitation Training Centres, Oshodi - Lagos and Kachia respectively.
6. Nigerian Army Ordnance Training School Ojo - Lagos.
7. University of Nigeria Nsukka Textile Workshop.
8. Defence Industrial Cooperation of Nigeria - Kaduna.
9. Calico Weaving Industry - Kaduna.
10. Kaduna Polytechnic - Textile Workshop.
11. Universal Textiles - Kano.
12. Nigerian National Museum Kaduna.
13. Nigerian Army Museum (NMS) Zaria.
14. Benue State Polytechnics Ugbokolo - Benue State.

His field of is "STUDY OF THE CONTEMPORARY NON-MOTORISED LOOMS AND THEIR WEAVING DESIGNS IN NIGERIA"

We would be most grateful if you could be of assistance to this concientious student.

Thank you.

Augusta J. Sandstrom

Ms. A. Sandstrom (Supervisor)
Senior Lecturer
Textile Section
INDUSTRIAL DESIGN DEPARTMENT
AHMADU BELLO UNIVERSITY
ZARIA.

cc: Head of Section.

" Head of Department.

DEPARTMENT OF INDUSTRIAL DESIG.
HEAD OF DEPARTMENT: Y. D .HASSAN
Teloph: 32581/3 Direct: 33231 Telegs: Unibello Zaria

Your Ref:

Our Ref: F.ID.28/84

24th August, 1984.

TO WHOM IT MAY CONCERN

DATA COLLECTION TOUR ADA ONEN PATRICK (LT)

The above-named is a Registered Post-graduate student in this Department. His Research project requires some extensive study tour to the following selected places in Nigeria to obtain valid data to back up his study.

The places are:-

1. Okene Weaving Centre - Okene
2. Uyo - Co-operative Weaving Centre → Anubi Textile Mill
3. Ilorin and Iseyin Traditional Weaving Centres - Ilorin
4. Ibadan Polytechnic Textile Workshop - Ibadan
5. Nigerian Army Rehabilitation Training Centre - Oshodi and Kachia respectively.
6. Nigerian Army Ordnance Training School Ojo.
7. Museum for Nigerian Arts Cultural Studies, A. B. U., Zaria.
8. Nigerian Army Museum Military School - Zaria.
9. Universal Textile Ltd, Kano.
10. Calico Weaving Industry, Kaduna.
11. YABA COLLEGE OF TECHNOLOGY - LAGOS

I shall appreciate any assistance that you could render to him whenever he comes to your location.

Thanks.

Y. D. Hassan,
Head of Department.

Post-graduate Section
Dept. of Industrial Design
Ahmadu Bello University
Zaria.

8 February 85

The Commandant
Depot Nigerian Army
Zaria.

Through Mrs SANDSTROM/JACKSON
Senior Lecturer
Dept. of Industrial Design
Ahmadu Bello University
Zaria.

Approved & forwarded by
A.J. Sandstrom
(Mrs. B. Jackson)
11 FEB 1985
DEPT. OF INDUSTRIAL DESIGN
A.B.U. ZARIA

Dear Sir,

APPLICATION FOR DATA COLLECTION INTERVIEW
LT ADA O P N/6887 (NAOC)

1. I humbly ask, if the Commandant could grant me his audience for a brief interview, in connection with my research programme at the Ahmadu Bello University, Zaria.

2. I am LT ADA O P of the Nigerian Army Ordnance Corps, one of the Military Personnel in this Institution.

a. My field of study is in Textile Design, for a Master's degree programme.

b. The topic of my Research is, STUDIES ON THE CONTEMPORARY NON-MOTORISED LOOMS AND THEIR WEAVING DESIGNS IN NIGERIA.

c. The study, briefly here is aimed at finding out areas of benefits of this intermediate Technology, both to the military and the civil lives of this country, utilizing the country's resources (skills and materials etc) in the field of Textiles.

3. Therefore, I would be very grateful if the commandant could help me with certain facts about the two areas mentioned below, when granted the permission to do so.

a. The impression and advice on some locally produced NA corps belts and other items (a sample has been attached here which was collected from my field trips).

b. The collapse of weaving as a course in the Nigerian Armed Forces Rehabilitation Centre - Oshodi, Lagos.

c. Other advice/information will be of great help in this study.

4. May I be correct to believe that the commandant had once commanded the centre (NAFRC - Oshodi) hence the greater basis for my request Sir.

5. I have the honour to be Sir.

Your obedient servant

ADA O P
LT
Student officer.

Textile Section
Industrial Design Dept.
Ahmadu Bello University

10 September, 1984

Lt. Patrick Ada
Post Graduate Area
Textile Section
Dept. of Industrial Design
Ahmadu Bello University
Zaria

Dear Lt. Ada,

ACCEPTANCE OF RESEARCH PROPOSAL

Your Research Proposal titled The Contemporary Non-Motorised Looms and their Weaving Designs in Nigeria (Toward Intermediate Technology and Equipment) has been read, corrected where need-be, discussed with you and finally approved.

You are now advised to proceed with the further stages of your programme toward your Masters' Degree studies.

Signed:
Augusta J. Sandstrom
Mrs. A.J. Sandstrom
Supervisor



cc: File, Dept. Industrial Design

Post-graduate Group,
Textile Section,
Department of Industrial Design
Ahmadu Bello University,
Zaria.

18th Jan[illegible], 1985

The Head of Department,
Dept. of Industrial Design,
Ahmadu Bello University,
Zaria.

Dear Sir,

APPLICATION FOR RESEARCH INFORMATION

May I be allowed to collect the following information under your control, for the purpose of my Research in this Department.

a. The year "Textile Design" started as one of the academic course units in this university.

b. Name/Names of its first lecturer/lecturers.

c. Number of the first group of students that were enrolled for the course.

Also, I shall be grateful, if given the same opportunity to complete the information as contained in the attached sheet of paper, for the same purpose.

Grateful if this request could be met as soon as it is possible.

Thanks.

Yours Obediently,

ADA OP
MA (Industrial Design) II
1984/85 session.

Dept of Industrial Design
Post-graduate Section
A B U
Zaria.
8 May 85

The Commanding Officer,
1 Base Ordnance Depot
Nigerian Army
Kaduna



Dear Sir,

APPLICATION FOR INFORMATION (Research Data)

1. I humbly ask for the commanding officer's permission to use any of the clothing distribution figures to this Depot from the Central Ordnance Depot Lagos as part of my Research Data (information)
2. This could be any of the years distribution already made to this Depot, whether already received or yet to be received.
3. My field of Research is in the area of "Textile intermediate Technology in the Service of the Nigerian Armed Forces using the less Sophisticated Skills and Techniques/Materials.
4. I shall be very grateful if this request could be granted.

Thanks.

Yours Obedient Servant
ADA O.P (N1/6887)
LT